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Impact of textile raw material access on CAFTA-DR members' apparel exports to the United States: a quantitative evaluation

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ABSTRACT

This study quantitatively evaluated the impact of textile raw material access on Dominican Republic-Central America Free Trade Agreement (CAFTA-DR) members' apparel exports to the United States. Results from the computable general equilibrium (CGE) model show that improving CAFTA-DR garment producers' textile raw material access would significantly enhance the price competitiveness of their apparel exports to the United States and increase the export volume. However, improving CAFTA-DR garment producers' textile raw material access would primarily benefit Asian textile suppliers but result in CAFTA-DR members' reduced dependence on the U.S. textile raw material supply. The study's findings provided new insights into the textile and apparel trade patterns in the Western Hemisphere and offered valuable inputs contributing to the public policy debate on expanding U.S. apparel sourcing from CAFTA-DR members from a unique supply chain perspective.

Introduction

Over the past decade, U.S. fashion brands and retailers have seen Central America as a critical emerging apparel-sourcing base[1] (Frederick & Gereffi, 2011; Lu, 2022). Especially since implementing the Dominican-Republic Central America Free Trade Agreement (CAFTA-DR) in 2006, a trade deal among the United States, El Salvador, Guatemala, Honduras, Nicaragua, the Dominican Republic (joined in 2007), and Costa Rica (joined in 2009), apparel sourcing from the region gained consistent interest among U.S. companies (CRS, 2022; Lu, 2022). For example, trade statistics show that U.S. apparel imports from CAFTA-DR members[2] totalled $8.6 billion in 2019 and nearly stayed at the same level in 2021 despite market turbulence such as the pandemic (UNComtrade, 2022).

U.S. apparel sourcing from CAFTA-DR members also directly supports Central America's economic growth and job creation (Lopez-Acevedo & Robertson, 2012). Between 2015 and 2021, apparel products stably accounted for nearly one-fourth of CAFTA-DR members' merchandise exports, and more than 86% of these apparel exports went to the United States alone (UNComtrade, 2022). As estimated, a billion dollars of apparel exports to the U.S. could support about 75,000–84,000 sewing jobs in CAFTA-DR countries (Bair & Gereffi, 2014; OTEXA, 2022a; ILO, 2022). Thus, not surprisingly, policymakers have attempted to leverage expanded U.S. apparel sourcing from CAFTA-DR to address social and economic issues in Central America, such as migration to the United States (NSC, 2021).

Nevertheless, U.S. apparel sourcing from CAFTA-DR members is NOT without significant challenges. As Table 1 shows, CAFTA-DR countries' market shares in the U.S. apparel import market fell from 11.8% in 2005 before the trade agreement entered into force to only 10.6% in 2021, measured by value (UNComtrade, 2022). Particularly, CAFTA-DR garment exporters had to face intensified competition in the U.S. market when most Asian suppliers were no longer subject to the quantitative restriction as the Agreement of Textiles and Clothing (ATC) terminated in 2005 (Datta & Kouliavtsev, 2020). In other words, CAFTA-DR failed to boost U.S. apparel sourcing from Central America as hoped. Trade data also indicated that U.S. apparel sourcing from CAFTA-DR members concentrated on simple and low-value items, such as T-shirts, and lacked product diversification with no improvement over the years (USITC, 2022). As a result, despite the interest in expanding 'near-sourcing,' U.S. fashion companies often could not move apparel-sourcing orders from Asia to CAFTA-DR members (Lu, 2022).

Numerous studies have evaluated CAFTA-DR members' competitiveness in making and exporting finished garments, especially as opposed to suppliers in Asia (Lopez-Acevedo & Robertson, 2012; Frederick et al., 2015; Platzer, 2017). However, as a critical research gap, few studies have fully addressed how backward linkage, i.e. textile raw material access affects CAFTA-DR members' apparel export performance. Notably, textile raw materials typically account for over 60% of a garment's production costs, meaning textile raw material access theoretically could directly affect a

Table 1. Sources of U.S. apparel imports (by value).

Sources/year	2005	2010	2015	2018	2019	2020	2021
CAFTA-DR	11.8%	8.9%	9.0%	10.1%	10.3%	9.6%	10.6%
Asia	63.6%	76.6%	76.6%	75.2%	74.3%	76.9%	76.5%
China	26.4%	40.9%	35.9%	33.0%	29.7%	23.7%	24.0%
Vietnam	3.6%	7.6%	11.4%	13.5%	16.2%	19.6%	17.6%
Bangladesh	3.2%	5.1%	6.3%	6.5%	7.1%	8.2%	8.8%
Rest of the World	24.6%	14.5%	14.5%	14.7%	15.4%	13.5%	12.9%

Data source: UNComtrade (2022).

country's apparel export competitiveness, from the price to the variety of product offers (ITC, 2022; Lu, 2022).

Given the high stakes of improving the status quo, this study aims to quantitatively evaluate the impact of textile raw material access on CAFTA-DR's apparel exports to the United States. This study's findings will fill a critical research gap and significantly enhance our understanding of the vital bottleneck that prevents more U.S. apparel sourcing from the CAFTA-DR region from a supply chain perspective. The study's findings will also provide valuable input, helping policymakers understand the economic impacts of CAFTA-DR on related textile and apparel production and regional trade patterns (USTR, 2022).

Literature review

Textile production vs. apparel production

While textile and apparel are often treated as a single industry, these two are vastly different sectors. In general, textile manufacturing, which includes spinning yarns, weaving or knitting fabrics, and dyeing, is a highly capital and technology-intensive process mainly done by machines in the twenty-first century (Lu, 2015). In comparison, apparel manufacturing, which includes cutting and sewing fabrics or knitting, remains highly labor-intensive today (Lopez-Acevedo & Robertson, 2016).

The heterogeneous nature resulted in different textile and apparel production and trade patterns consistent with classic trade and economic development theories. For example, the factor proportion theory argues that a country would enjoy a comparative advantage in making and exporting the products intensively using the production factor (e.g. labor or capital) it is affluent with (Krugman, 1981). Thus, developing countries with relatively abundant cheap labor, such as Bangladesh and Vietnam, took the lead in labor-intensive apparel production and exports (WTO, 2022a). In contrast, developed economies like the United States and many Western European countries enjoyed a comparative advantage in making and exporting capital and technology-intensive textile products (Platzer, 2017; Keough & Lu, 2021).

The stage of development theory proposed by Toyne et al. (1984) also argues that a country's textile and apparel industry would go through six development stages parallel with its national economic advancement level (i.e. the embryonic stage, early export of apparel, more advanced apparel production and export, golden age, full maturity, and post-maturity stage). In particular, a developing country, which lacks capital, technology, and supporting industries, cannot be self-sufficient for capital-intensive textile

production until its national economy becomes advanced enough. Such a pattern explains why most garment producers in developing countries rely heavily on imported textile raw materials like yarns and fabrics (WTO, 2022b).

CAFTA-DR and the Western Hemisphere textile and apparel supply chain

Apparel exports from CAFTA-DR members, such as those labeled 'Made in El Salvador' or 'Made in Guatemala,' were typically made through a regional production and trade network known as the Western Hemisphere textile and apparel supply chain (Platzer, 2017). Figure 1 illustrates that the United States was the primary textile supplier within this regional supply chain. Then, CAFTA-DR garment producers cut and sew imported yarns and fabrics into finished apparel, which were mainly exported back to the United States for consumption (Lu, 2015). Because of this regional trade and production network, over half of CAFTA-DR members' textile imports, such as yarns, consistently came from the United States. Likewise, the United States stably accounted for nearly 90% of CAFTA-DR members' apparel exports over the past decade (UNComtrade, 2022).

Three factors shaped the CAFTA-DR region's unique Western Hemisphere textile and apparel supply chain. One was geographic proximity, which allowed products traded between CAFTA-DR members and the United States to enjoy a shorter lead time than those sourced from outside the region (Frederick & Gereffi, 2011; Datta, 2021). For example, industry sources indicate that shipping cargo from CAFTA-DR members to the United States typically took less than a week, about half the time (i.e. around 20 d) when U.S. companies imported from Asia (GlobalData, 2023). Yeh and Lee (2014) also argued that faster speed to market would financially benefit fashion companies by lowing inventory levels and reducing operational costs. Further, empirical studies using the gravity model showed that a shorter distance would statistically expand the textile and apparel trade flows in the Western Hemisphere (Chi & Kilduff, 2010).

The second factor was the economic advancement level. Notably, as developing countries, CAFTA-DR members have not yet reached the development stage that enables them to be self-sufficient in capital-intensive textile manufacturing (Toyne et al., 1984; World Bank, 2022). In comparison, as a high-wage developed economy, the United States enjoys a comparative advantage in making capital-intensive textiles. However, its labor-intensive apparel production capacity has shrunk over the past decades (Keough & Lu, 2021). In other words, the regional supply chain results from a labor division between CAFTA-DR members and the United States based on their respective economic development levels and comparative advantages (Platzer, 2017; Werner International, 2022).

The third factor was trade policy. On the one hand, like other U.S. free trade agreements, CAFTA-DR allows the textile and apparel trade between its members to enjoy zero import tariffs as long as the product meets the rules of
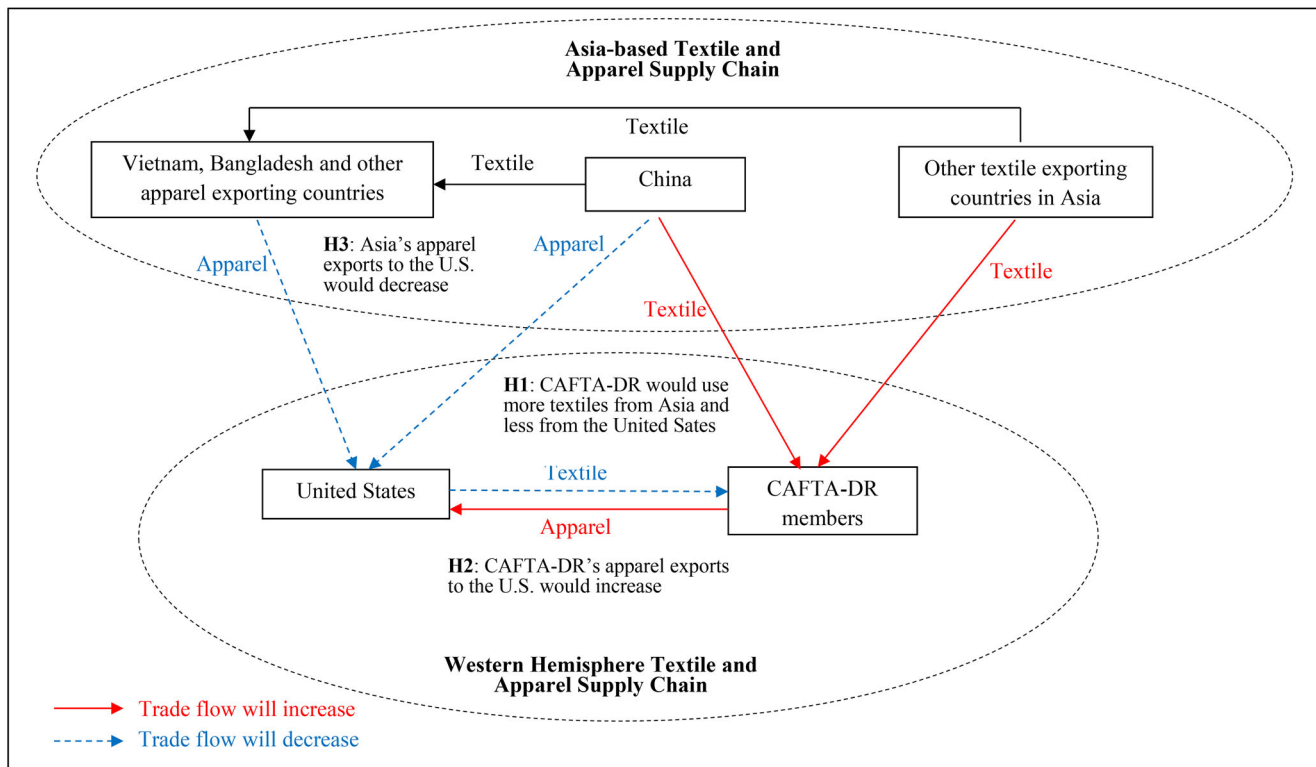
Figure 1. Impact of improved textile raw material access on CAFTA-DR's apparel exports to the United States and related trade flows: A theoretical framework.
Source: created by the author

origin requirements (USTR, 2022). Specifically, CAFTA-DR requires that clothing qualified for the preferential duty benefits generally needs to use yarns and fabrics made by its members and be cut and sewn within CAFTA-DR, known as the 'yarn-forward' rules of origin (Elliott, 2016; USTR, 2022). Notably, as the United States is the sole leading textile producer within the entire CAFTA-DR region, the 'yarn-forward' rules of origin created a *de facto*-captured export market for U.S. textiles (Elliott, 2016). Understandably, out of its financial interests, U.S. textile producers have strongly supported keeping the restrictive 'yarn-forward' rules of origin in CAFTA-DR and rejected any attempts that may 'weaken' the rules (Werner International, 2022; NCTO, 2022).

On the other hand, as Table 2 shows, most CAFTA-DR members set a relatively high tariff rate for textile imports from non-members of the trade agreement (WTO, 2022a). This means that using textiles from outside the region would make CAFTA-DR's garment exports to the United States be taxed 'twice' at the border – one for the raw material and the other for the finished garments (i.e. not compliant with the 'yarn-forward' rules). As a result, the

'double tariff' burden significantly reduced the financial incentives for CAFTA-DR garment producers to use textile raw materials beyond the U.S. supply (Platzer, 2017).

CAFTA-DR's competitiveness as an apparel sourcing base for the United States

While the U.S. apparel import market was highly competitive, as Table 1 shows, U.S. fashion companies primarily sourced apparel from two regions. One was Asia, led by China, Vietnam, and Bangladesh. The other was countries nearby, primarily CAFTA-DR members (UNComtrade, 2022). CAFTA-DR members' competitiveness as an apparel sourcing base for the United States was closely associated with the Western Hemisphere textile and apparel supply chain. On the one hand, studies indicated that CAFTA-DR garment producers enjoyed a competitive edge in speed to market, thanks to their geographic location and the integrated regional supply chain. For example, in a survey of 34 leading U.S.-based fashion companies, Lu (2022) found that CAFTA-DR members outperformed Asian suppliers regarding lead time (i.e. the time between an order is placed and received), a critical apparel sourcing criterion. Meanwhile, nearly 80% of surveyed companies claimed CAFTA-DR's duty-free benefits when importing apparel from the region, suggesting the trade agreement's preferential market access provided a significant incentive to facilitating U.S. apparel sourcing from CAFTA-DR members (Lu, 2022). Gereffi and Bair (2010), Lopez-Acevedo and Robertson (2012), and Paganini and Steenbergen (2021) drew similar conclusions.

Table 2. CAFTA-DR Members' Average Applied Tariff Rates for Textiles in 2019.

Countries	Tariff rates (%)
El Salvador	8.2
Guatemala	8.2
Honduras	8.2
Nicaragua	8.2
Dominican Republic	4.1
Costa Rica	7.6

Data source: WTO (2022b); In the table, 'Textiles' refer to Standard International Trade Classification (SITC) code 65.

Table 3. Herfindahl–Hirschman index (HHI) of U.S. apparel imports (by value).

Exporters	2010	2015	2019	2021	2022*	Product diversification
China	3.2	2.7	2.4	2.4	2.2	Highly diverse
Vietnam	4.9	3.4	3.5	3.6	3.2	Diverse
Bangladesh	10.7	10.7	10.7	8.3	8.5	Concentrated
CAFTA-DR	9.7	8.8	10.6	12.7	13.3	Increasingly highly concentrated

Data source: USITC (2022); 'Apparel' covers HS Chapters 61 and 62 at the 6-digit level.
*January–June.

On the other hand, it was of concern that relying on the Western Hemisphere supply chain made CAFTA-DR garment producers struggle to access sufficient textile raw materials, which weakened their apparel export competitiveness in the U.S. market. Notably, as complying with the restrictive 'arn-forward' rules of origin was required to enjoy the preferential duty benefits, it often left CAFTA-DR garment producers with no choice but to use U.S.-made textiles, which were costly and with limited options (Frederick et al., 2015; Paganini & Steenbergen, 2021). As a result, Lu (2022) found that U.S. fashion companies consistently rated CAFTA-DR garment producers as uncompetitive in sourcing costs and production flexibility, mainly because the types of locally available yarns and fabrics were insufficient and the price too high. Also caused by a shortage of textile raw materials within CAFTA-DR, the Herfindahl–Hirschman index (HHI) in Table 3 shows that U.S. apparel imports from CAFTA-DR significantly lacked product diversification, and the problem has worsened over the past decade (Matsumoto et al., 2012; USITC, 2022). In comparison, by leveraging its more capable local textile production capacity, Asian countries' apparel exports to the United States, such as those from China and Vietnam, covered far more diverse product categories (Shen & Mikschovsky, 2019).

Additionally, studies such as Freund et al. (2018) and Minchin (2012) found that the U.S. textile industry gradually switched to making more technical textiles and less apparel-related fabrics. The macro trade statistics indicated the same trend. For example, As Table 4 shows, from 2015 to 2019, the value of broadwoven fabric (NAICS code 31321) and knit fabric manufacturing (NAICS code 31324) both dropped in the United States and accounted for a declining share of the textile industry's total output (US Census Bureau, 2022). Thus, some worry that the U.S. textile industry's structural change could further deteriorate the CAFTA-DR region's textile raw material shortage problem (Lu, 2022).

Textile raw material access and CAFTA-DR's apparel exports to the United States

In summary, based on a review of existing studies and economic theories, this study proposes three hypotheses regarding textile raw material access and CAFTA-DR's apparel exports to the United States, as Figure 1 illustrates:

> H1: Improving CAFTA-DR members' textile raw material access would increase their textile imports from Asia but reduce their dependence on U.S. textile supplies.

Under the Western Hemisphere textile and apparel supply chain, particularly the restrictive 'yarn-forward' rules of origin, CAFTA-DR garment producers used the United States as their primary source of textile raw materials (Platzer, 2017). However, due to the U.S. textile industry's structural change, U.S.-made yarns and fabrics were costly and becoming increasingly limited in supply (Saki et al., 2019; US Census Bureau, 2022; WTO, 2022a). Instead, Asia currently serves as the world's largest textile production base, accounting for about 65% of the total textile exports in 2021 (WTO, 2022a). Textile yarns and fabrics made in Asian countries were also rated as more price competitive and in a greater variety than their U.S. counterparts (Baiardi & Bianchi, 2019; Lu, 2022). Thus, if CAFTA-DR members could more easily access and source textile raw materials beyond the U.S. supply, theoretically, it would benefit Asia textile exporters, such as China, given their competitiveness on a level playing field. Nevertheless, CAFTA-DR members' increased use of Asian yarns and fabrics may reduce their demand for the U.S. supply, resulting in a decline in CAFTA-DR's textile imports from the United States.

> H2: Improving CAFTA-DR members' textile raw material access would increase their apparel exports to the United States.

> H3: Improving CAFTA-DR members' textile raw material access would reduce U.S. apparel imports from Asia.

Notably, as developing countries, CAFTA-DR members cannot be self-sufficient in capital-intensive textile production and must rely on imported textiles (Lopez-Acevedo & Robertson, 2012). In addition, textile raw materials accounted for the lion's share of a garment's production costs and directly affected the price competitiveness, product availability, and assortment of CAFTA-DR's apparel exports (ITC, 2022; Lu, 2022). Thus, theoretically, improving CAFTA-DR members' textile raw material access, such as reducing the import costs and increasing the supply variety, would enhance the competitiveness of CAFTA-DR

Table 4. Structure of U.S. textile mills output (by value).

NAICS	Product description	Growth of output 2015–2019	Share in textile output in 2015	Share in textile output in 2019
31311	Fiber, yarn, and thread	−16.8%	21.4%	17.9%
31321	Broadwoven fabric	−2.0%	13.4%	13.2%
31322	Narrow fabric	−0.8%	4.9%	4.9%
31323	Nonwoven fabric	11.0%	28.6%	32.0%
31324	Knit fabric	−2.7%	5.4%	5.3%
31331	Textile and fabric finishing	−2.5%	18.6%	18.3%
31332	Fabric coating	9.2%	7.6%	8.4%

Data source: US Census Bureau (2022). Note: 'Broadwoven fabrics' refer to woven fabrics more than 12 inches (30.48 centimeters) in width. Such fabrics are typically used to make woven apparel products or home furnishings. 'Narrow fabrics' are typically used for decorative purposes (e.g. tapes, braids, and webbings). 'Knit fabrics' are typically used to make knit apparel items.

members' apparel exports to the United States and expand the trade volume. Further, expanding U.S. apparel sourcing from CAFTA-DR members would reduce the U.S. import demand for like products made in Asia, given the competing relationship between the two (Datta, 2021; Khan, 2022).

Method and data

Research method

To test the hypotheses, this study assumed that CAFTA-DR members cut their textile import tariff rates to improve garment producers' textile raw material access (i.e. to reduce the cost of sourcing textiles from anywhere in the world and beyond the U.S. supply). Although liberalizing CAFTA-DR's 'yarn-forward' rules of origin may also improve its member countries' textile raw material access, the strong objection from the politically-influential U.S. textile industry makes it an unrealistic option (NCTO, 2022). Specifically, this study evaluated the following two scenarios:

Scenario 1: Assumed CAFTA-DR members cut their import tariff rates for textiles by half from the base level in 2019 (as shown in Table 2). All other tariff rates remained unchanged.
Scenario 2: Assumed CAFTA-DR members 100% cut their import tariff rates for textiles from the base level shown in 2019 (as shown in Table 2). All other tariff rates remained unchanged.

Comparing the results in the two scenarios would better illustrate the quantitative impact of textile raw material access on CAFTA-DR members' apparel exports to the United States and the value of related textile and apparel trade flows.

The computable general equilibrium (CGE) model developed by the Global Trade Analysis Project (GTAP) was adopted in the study to evaluate the two scenarios empirically and test the hypotheses. Studies investigating the economic impact of trade policies often used the CGE model as it captures the input–output relationship between industry sectors in an open global economy, generating more robust results than a single-equation economic model (Walmsley et al., 2014; Hertel, 1997, pp74–80).

This study adopted the GTAP CGE model's assumption that textile and apparel production and trade happen in a perfectly competitive market, which follows the principle of constant returns of scale (Van der Mensbrugghe, 2018). In the CGE model, the following behavioral equations were used to describe a country's decision in production and trade in a multi-country and multi-sector open economy:

First, Equation (1) describes the supply of a product for the domestic and international market, i.e. the value of the industrial output of product i in country $r[qo(i, r)]$:

$$qo(i,r) = SHRDM(i,r) \times qds(i,r) + \sum_{k \in r} SHRXMD(i,k,s)$$
$$\times qxs(i,k,s) \quad (1)$$

where $SHRDM(i, r)$ denotes the share of domestic sales of product i in country r; $qds(i, r)$ denotes the value of domestic sale of product i produced in country r; $SHRXMD(i, k, s)$ denotes the share of export sale of product i supplied by country k to region s and there are r number of regions in total; $qxs(i, k, s)$ denotes the value of export sale of product i supplied by country k to region s; r refers to the set of regions.

Second, Equation (2) describes the demand for imports, i.e. the value of imports for product i supplied by country r to region s :

$$qxs(i,r,s) = qim(i,s) - \sigma_M(i)$$
$$\times \left[pms(i,r,s) - ams(i,r,s) - pim(i,s) \right] \quad (2)$$

where $qxs(i, r, s)$ denotes the import value of product i supplied by country r to region s; $qim(i, s)$ denotes the value of aggregate import demand for product i in region s; $ams(i, r, s)$ denotes the external price reduction factor for product i supplied by country r to region s; $pim(i, s)$ denotes the composite price of imports for product i in region s. $\sigma_M(i)$ denotes the elasticity of substitution between imports and domestically-made commodity for product i in region s. The value of $\sigma_M(i)$ is usually positive, suggesting a competing relationship between imports and the domestically-made product in an importing country (Dixon & Jorgenson, 2012).

Further, the variable $pim(i, s)$ in Equation (2) mathematically equals the weighted average price of imports from all import sources for product i, i.e.:

$$pim(i,s) = \sum_{k \in r} MSHRS(i,k,s) \times pms(i,k,s) \quad (3)$$

where $MSHRS(i, k, s)$ denotes the share of product i supplied by country k to region s and $pms(i, k, s)$ denotes the import price of product i supplied by country k to region s. r refers to the set of regions.

Additionally, the variable $pms(i, r, s)$ in Equation (3) is affected by the tariff rate applied to product i supplied by country r to region $s[tms(i, r, s)]$ and the cost, insurance, and freight (CIF) price of product i supplied by country r in region $s[pcif(i, r, s)]$, i.e.:

$$pms(i,r,s) = tms(i,r,s) + pcif(i,r,s) \quad (4)$$

When using the CGE model to quantify the effect of improved textile raw material access on CAFTA-DR members' apparel exports to the United States, we assigned the exogenous variable $tms(i, r, s)$ new values as the policy shock (Dixon & Jorgenson, 2012). Specifically, in scenario 1, the value of $tms(i, r, s)$ equaled half of CAFTA-DR members' average applied tariff rates for textile imports in 2019, as described in Table 2. In scenario 2, the value of $tms(i, r, s)$ was reduced to zero. The CGE model then calculated the new equilibrium status for the product and factor markets by solving behavioral Equations (1)–(4) simultaneously (Burfisher, 2021). Finally, the economic impact of the policy shock (i.e. the effect of CAFTA-DR members' tariff cut on textiles to improve garment producers' textile raw material

access) was reflected by the value change of the endogenous variables $pms(i,r,s)$, $qxs(i,r,s)$, $qo(i,r)$, $qds(i,r)$ and $pim(i,s)$ at their initial and the new equilibrium status (Dixon & Jorgenson, 2012).

Data source

This study adopted the latest GTAP10 database to run the CGE model (Aguiar et al., 2019). The 65 sectors in the database were categorized into textile (defined as International Standard Industrial Classification, ISIC, code 17 and code 243), Apparel (defined as ISIC code 18), and Others (i.e. all other sectors). The 141 countries the dataset covers were categorized into CAFTA-DR, USA, China, Vietnam, Bangladesh, the Rest of Asia, and ROW (i.e. the rest of the world). Such categorization allowed us to illustrate the effect of CAFTA-DR members' textile raw material access on related trade flows and compare the potential winners and losers of the policy change.

Results and discussions

First, the CGE model estimation results supported *H1* that improving CAFTA-DR members' textile raw material access would increase their textile imports from non-U.S. sources. Specifically, as Table 5 shows, when other factors remain constant, cutting CAFTA-DR members' import tariff for textiles would result in a notable expansion of their textile imports from Asia suppliers. For example, compared with the base year level in 2019, CAFTA-DR members' annual

textile imports from China (i.e. variable $qxs(i_{Textile}, r_{China}, s_{CAFTA-DR})$) and the Rest of Asia (i.e. variable $qxs(i_{Textile}, r_{RestofAsia}, s_{CAFTA-DR})$) would increase by \$219.9 million and \$85.9 million in scenario 1, respectively. Likewise, with a deeper tariff cut in scenario 2, CAFTA-DR members would import even more textiles from China (up \$485.5 million) and the Rest of Asia (up \$183.8 million) compared with the base year level in 2019. In comparison, CAFTA-DR members' textile imports from regions other than Asia would only increase marginally in both scenarios.

Meanwhile, consistent with theoretical prediction, CAFTA-DR members' textile import tariff cut would reduce their dependence on the U.S. supply. Specifically, compared with the base year level in 2019, CAFTA-DR members' annual textile imports from the United States (i.e. variable $qxs(i_{Textile}, r_{USA}, s_{CAFTA-DR})$) would reduce by \$181.9 million in scenario 1 and suffer a more profound drop of \$384.7 million in scenario 2. Related, with a decline in its exports to CAFTA-DR members, textile production in the United States (i.e. variable $qo(i_{Textile}, r_{USA})$) would decrease by \$250.5 million in scenario 1 and \$511.9 million in scenario 2 compared with the base year level in 2019 when holding other factors constant. Overall, the results echoed previous studies' findings and suggested that textiles 'Made in the USA' may not necessarily be competitive in free-market competition (Elliott, 2016). Instead, to a great extent, CAFTA-DR members' current dependence on U.S. textiles resulted from trade policies like the restrictive 'yarn-forward' rules of origin (Keough & Lu, 2021; Werner International, 2022).

Further, the results showed that with increased textile imports from Asia, CAFTA-DR members' average price of textile imports (i.e. variable $pim(i_{Textile}, s_{CAFTA-DR})$) would reduce by 1.39% in scenario 1 and 2.98% in scenario 2 from the base year level in 2019 when holding other factors constant. In other words, using more price-competitive textile inputs imported from Asia to replace more expensive U.S. supplies would help CAFTA-DR garment producers cut production costs.

Second, the CGE model estimation results supported *H2* that improving CAFTA-DR members' textile raw material access would significantly increase their apparel exports to the United States. Specifically, Table 5 shows that when other factors remain constant, cutting CAFTA-DR members' import tariffs for textiles would result in a notable expansion of their apparel exports to the United States. Compared with the base year level in 2019, CAFTA-DR members' annual apparel exports to the United States (i.e. $qxs(i_{Apparel}, r_{CAFTA-DR}, s_{USA})$) could increase by \$198.2 million in scenario 1 and by as much as \$432.2 million in scenario 2 when holding other factors constant.

The CGE model estimation also indicated that improving CAFTA-DR members' access to textile inputs beyond the U.S. supply would further enhance the price competitiveness of their apparel exports to the United States. For example, compared with the base year level in 2019, the average price of CAFTA-DR members' apparel exports to the United States (i.e. variable $pms(i_{apparel}, k_{CAFTA-DR}, s_{USA})$) would

Table 5. Impact of improving CAFTA-DR members' textile raw material access unit: \$million.

Volume change of CAFTA-DR members' textile imports (base year = 2019)		
Sources	Scenario 1	Scenario 2
World	\$92.0	\$211.5
USA	−\$181.1	−\$384.7
CAFTA-DR	−\$37.8	−\$78.9
China	\$219.9	\$485.5
Rest of Asia	\$85.9	\$183.8
ROW	\$5.1	\$5.8
Volume Change of U.S. Apparel Imports (Base year =2019)		
Sources	Scenario 1	Scenario 2
World	\$71.2	\$155.9
CAFTA-DR	\$198.2	\$432.2
China	−\$55.6	−\$120.9
Vietnam	−\$14.4	−\$31.3
Bangladesh	−\$9.1	−\$19.7
Rest of Asia	−\$27.4	−\$59.6
Rest of the world	−\$20.6	−\$44.9
Volume Change of Textile Production (Base year = 2019)		
Producers	Scenario 1	Scenario 2
USA	−\$240.5	−\$511.9
China	\$288.0	\$638.2
Rest of Asia	\$82.3	\$175.9
Volume Change of Apparel Production (Base year = 2019)		
Producers	Scenario 1	Scenario 2
CAFTA-DR	\$256.6	\$558.9
China	−\$77.6	−\$168.9
Vietnam	−\$15.7	−\$34.0
Bangladesh	−\$10.4	−\$22.7
Rest of Asia	−\$31.0	−\$67.3

decrease by 0.35% in scenario 1 and by 0.59% in scenario 2 when holding other factors constant.

Third, the CGE model estimation showed that as CAFTA-DR members benefit from improved textile raw material access and expand their apparel exports to the United States, U.S. apparel imports from Asia would decrease (i.e. *H3* is supported). Table 5 indicates that among Asian suppliers, China would suffer the most significant decline in its apparel exports to the United States (i.e. down $77.6 million in scenario 1 and down $168.9 million in scenario 2 compared with the base year level in 2019). Notably, as U.S. fashion companies source almost all kinds of apparel products from China, the market competition between garments 'Made in China' and those sourced from CAFTA-DR members is somehow unavoidable (OTEXA, 2022a; Lu, 2022). In comparison, U.S. apparel imports from other Asia suppliers, such as Vietnam and Bangladesh, focused on narrower categories of products (see Table 3). Thus, the results showed that U.S. apparel imports from these Asian suppliers would decline modestly in scenarios 1 and 2, reflecting their more limited competition with apparel from CAFTA-DR members.

Conclusions and Future research agenda

This study quantitatively evaluated the impact of textile raw material access on CAFTA-DR members' apparel exports to the United States. By adopting the GTAP CGE model based on the latest GTAP10 database, the study found that:

First, cutting CAFTA-DR members' textile import tariffs to improve their garment producers' textile raw material access would significantly expand their textile imports from non-U.S. sources, primarily from Asia. Meanwhile, CAFTA-DR members' dependence on the U.S. textile raw material supply would decline. Second, with improved textile raw material access, CAFTA-DR members would enhance the price competitiveness of their apparel exports to the United States and increase the export volume. Third, as CAFTA-DR members benefit from improved textile raw material access and boost their apparel exports to the United States, U.S. apparel imports from competing Asian suppliers would decrease.

The study's findings provided new insights into the intricate and interconnected textile and apparel trade patterns in the Western Hemisphere. The results also offered valuable inputs contributing to the public policy debate on expanding U.S. apparel sourcing from CAFTA-DR members from a unique supply chain perspective. Besides, the results have two other important business and policy implications:

First, the current debate on expanding U.S. apparel sourcing from CAFTA-DR members mainly focuses on improving CAFTA-DR members' garment production capacity or more strictly enforcing the 'yarn-forward' rules of origin (Werner International, 2022; NCTO, 2022). However, this study's findings call for more efforts to enhance CAFTA-DR garment producers' textile raw material access. On the one hand, the results indicated that U.S. apparel imports from CAFTA-DR members and those sourced from Asia could be largely substitutable. Thus, there is great potential to leverage expanded U.S. apparel sourcing from CAFTA-DR members to help U.S. fashion companies diversify their sourcing base and mitigate the growing sourcing risks associated with Asian suppliers (Khan, 2022; Lu, 2022). On the other hand, the study's results confirmed that enhancing CAFTA-DR members' textile raw material access would be critical to meet these countries' apparel production needs, given the nascent local textile manufacturing capability (Paganini & Steenbergen, 2021). In addition, as a notable benefit of accessing textile inputs from more diversified sources at a lower cost, CAFTA-DR garment producers would improve the price competitiveness of their exports to the U.S. and potentially offer a greater variety of products.

Second, the findings suggested that improving CAFTA-DR members' textile raw material access would result in winners and losers, creating new dilemmas for policymakers. For example, allowing CAFTA-DR members to access textile raw materials beyond the U.S. supply and at a lower cost would benefit Asian textile suppliers and boost CAFTA-DR garment producers' exports to the United States. Likewise, U.S. fashion companies could diversify their sourcing base and reduce sourcing costs by taking advantage of CAFTA-DR members' improved export capacity and price competitiveness. However, as CAFTA-DR garment producers use more Asian textiles and reduce their dependence on the U.S. textile supply, the U.S. textile industry would lose a critical export market and suffer significant financial losses. In history, due to vested interests, the U.S. textile industry has strongly opposed any policy changes that may hurt its exports to the Western Hemisphere market, including CAFTA-DR members (Platzer, 2017; NCTO, 2022). Thus, policymakers could find it economically and politically challenging to balance various stakeholders' competing interests when implementing new policies to improve CAFTA-DR members' textile raw material access.

Despite the interesting findings, future studies could be conducted further in several aspects. First, with data availability, future studies can continue to evaluate the relationship between textile raw material supply and CAFTA-DR's apparel exports at a more disaggregated product level. It remains unknown what specific textile raw materials were most seriously in shortage or would significantly impact the region's garment exports to the United States. Second, it would be meaningful to survey U.S. fashion companies and CAFTA-DR garment producers to understand their perspectives on the effect of textile raw material access on U.S. apparel sourcing from CAFTA-DR members. The role of value-added services, such as textile design and apparel product development, in facilitating the regional supply chain integration and U.S. apparel sourcing from CAFTA-DR members can also be examined. Additionally, several leading CAFTA-DR apparel exporting countries, including Honduras and Nicaragua, were negotiating free trade agreements with China, Taiwan, and other Asian economies (Yang & Araya, 2022). Future studies could estimate the potential effect of these new trade agreements on CAFTA-DR garment producers' access to Asian textiles and the survival of the Western Hemisphere textile and apparel supply chain in the long run.

Notes

1. Unless otherwise specified, in this study, 'apparel industry' refers to Standard International Trade Classification (SITC) code 84 and 'textile industry' refers to SITC code 65 (UNComtrade, 2022).
2. This study investigates U.S. apparel sourcing from other CAFTA-DR members. To avoid confusion, unless otherwise specified, in this study, 'CAFTA-DR members' and 'CAFTA-DR countries' refer to El Salvador, Guatemala, Honduras, Nicaragua, the Dominican Republic, and Costa Rica and do not include the United States.

Disclosure statement

No potential conflict of interest was reported by the author.

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