

Research on the Impact of Trade Frictions on the Export of Chinese Steel Products

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Abstract: The steel industry stands as a crucial and cardinal pillar within China's economic edifice, serving as a potent safeguard that has propelled China to the forefront as a powerhouse in infrastructure and manufacturing. Chinese steel has emerged as one of the quintessential hallmarks of the economic "external loop", endowing global economic progression with China's puissance. Concurrently, the exportation of steel products has evolved into a significant conduit for the Chinese steel sector to assimilate surplus production capacity. In tandem with the expeditious augmentation of China's steel production capacity and the incessant enlargement of export trade dimensions, numerous countries have instigated trade remedy investigations directed at China's steel export trade, thereby precipitating a crescendo in international trade frictions. Through an in-depth dissection of the supply-demand panorama, import-export circumstances of Chinese steel, as well as the nascent trends in international trade frictions, this treatise probes into the ramifications of trade frictions upon the export competitiveness, scale, and structure of Chinese steel products, with the aspiration of proffering references for the sustainable evolution of China's steel industry. Moreover, pertinent recommendations regarding how the Chinese steel industry ought to forestall and counteract trade frictions in the times to come are proffered from the tripartite strata of the government, industry associations, and enterprises respectively.

Keywords: Steel supply-demand, trade frictions, steel import-export, coping stratagems.

1. Introduction

In the milieu of global economic integration, the trade liaisons among nations have become progressively more intertwined and complex. Import and export trade has not only impelled a more refined and specialized international division of labor but has also augmented the operational efficacy of the global economic apparatus. Steel, being a fundamental and quintessential building and industrial raw material, commands a prominent and pivotal position within the realm of international trade. The reform and opening-up initiative have expedited China's economic progression onto a rapid growth trajectory and concomitantly galvanized the exuberant expansion of the Chinese steel industry. In 1996, China's crude steel output transcended 100 million tons for the first time, thereby ascending to the apex of global rankings. Over the ensuing 28-year span, China has tenaciously retained its preeminent position. From 2020 to 2023, China's crude steel output has steadfastly remained above 1 billion tons for four consecutive years [1], constituting 53%~56% of the global aggregate crude steel output. China's annual steel product exports have persistently hovered between 60 million and

100 million tons. China has long been established as the world's foremost steel producer and exporter and an indispensable and linchpin component within the global supply chain matrix. Simultaneously, the export of steel products has emerged as a significant conduit for China to assimilate domestic surplus production capacity.

In the wake of the intensifying competition within the international market, the proclivity towards international trade protectionism has manifested a conspicuous and pronounced augmentation in recent years. To shield the interests of their domestic enterprises, numerous countries have resorted to a diverse array of measures and stratagems to attenuate the impact of international trade upon their domestic economic landscapes, giving rise to an increasingly arduous and severe panorama of trade frictions. The export of Chinese steel products is confronted with a burgeoning multitude of challenges. For instance, in the current year, major exporting countries such as Vietnam, Turkey, and Malaysia have embarked on imposing tariffs or initiating anti-dumping investigations against steel products originating from China. In the face of the deteriorating external environment, the question of how the Chinese steel industry ought to respond becomes of paramount significance. Particularly in the context of a more acutely prominent disparity between supply and demand consequent to the contraction of domestic demand, it is of cardinal importance to dissect and scrutinize the impact of trade frictions on steel product exports and formulate efficacious countermeasures. This article undertakes an in-depth exploration of the practical ramifications of trade frictions on the export of Chinese steel products. By meticulously analyzing the supply and demand circumstances of Chinese steel, the import and export scenarios of Chinese steel, the principal modalities and extant status of trade frictions, it endeavors to fathom the influence of trade frictions on the export competitiveness, scale, and structure of Chinese steel products and concludes that the impact of trade frictions on the export of Chinese steel products chiefly encompasses the attenuation of export competitiveness, the elevation of export thresholds, the augmentation of export impediments, the diminution of export scale, and the concurrent exacerbation of the contradiction between supply and demand within the domestic steel market in China.

2. Analysis of the Supply, Demand, Import and Export Circumstances of Chinese Steel

2.1. Analysis of the Supply and Demand Circumstances of Chinese Steel

2.1.1. The Supply Circumstances of Chinese Steel

The data publicized by the National Bureau of Statistics indicates that during the year 2023, the cumulative production of crude steel in China amounted to 101,908 million tons, remaining at a level comparable to that of the previous year. In the year 2023, the cumulative production of steel products throughout the year reached 136,268 million tons, demonstrating a year-on-year growth rate of 5.2%. In 2023, the capacity utilization ratio of China's ferrous metal smelting and rolling processing industry was 78.2%, exhibiting an increment of 1.9% in comparison with the corresponding figure of the previous year.

Table 1: The circumstances of China's crude steel production in recent years

Year	Crude Steel Production (million tons)	Year-on-Year Change	Share of Global Production
2013	77902	8.7%	48.5%
2014	82553	6.0%	49.4%
2015	80367	-2.6%	49.5%

Table 1: (continued).

2016	80442	0.1%	49.6%
2017	83135	3.3%	49.2%
2018	92808	11.6%	51.3%
2019	99588	7.3%	53.3%
2020	105680	6.1%	56.5%
2021	103279	-2.3%	52.9%
2022	101300	-1.9%	54.2%
2023	101908	0.6%	53.9%

Data Sources: Mysteel and China Iron and Steel Industry Association

As is discernible from Table 1, the production of crude steel in China had manifested a continuous upward trajectory before 2020 and attained its zenith in 2020. Subsequently, the production has witnessed a certain degree of retrogression. Following the data furnished by the National Bureau of Statistics, the cumulative production from January to September amounted to 768.48 million tons, registering a year-on-year diminution of 3.6%. Moreover, in September 2024, the crude steel production in China stood at 77.07 million tons, exhibiting a year-on-year decline of 6.1%. During the 15th Five-Year Plan period, it is anticipated that the production of crude steel in China will experience a gradual descent concomitant with the waning of domestic demand and the incessant intensification of international trade frictions, albeit the overall quantum of crude steel will still linger at a relatively elevated level.

2.1.2. The Demand Scenario of Chinese Steel

In recent epochs, in the wake of the persistent enfeeblement of the real estate sector and the mounting encumbrance of local debts, the overarching demand for steel products in China has been typified by perpetual attrition and constriction. The epicenter of demand has progressively transmuted from the construction industry to the manufacturing industry. The manufacturing industry has incrementally emerged as the preponderant force in China's steel demand. Notably, the expeditious expansion of equipment manufacturing industries reliant on steel, such as new energy, construction machinery, automobiles, household appliances, and shipbuilding, has efficaciously galvanized the demand for corresponding steel products [1]. The tableau of China's domestic apparent steel consumption in recent years is presented in Table 2.

Table 2: The situation of China's apparent steel consumption in recent years (Unit: 10,000 tons)

Year	Apparent Consumption (Production-Net Export)	Year-on-Year Change	Share of Steel Used in Manufacturing	Share of Steel Used in Construction
2013	74145	12.32%	45.2%	54.8%
2014	71077	-4.14%	43.6%	56.4%
2015	67234	-5.41%	45.3%	54.7%
2016	68102	1.29%	44.9%	55.1%

Table 2: (continued).

2017	77384	13.63%	45.0%	55.0%
2018	83605	8.04%	45.0%	55.0%
2019	91190	9.07%	42.0%	58.0%
2020	100870	10.62%	44.0%	56.0%
2021	95440	-5.38%	46.0%	54.0%
2022	92670	-2.9%	47.0%	53.0%
2023	89570	-3.35%	48.0%	52.0%

Data Sources: Mysteel and China Iron and Steel Industry Association

It can be deduced from the data presented in Table 2 that the domestic steel consumption within China has been progressively diminishing after attaining its apex in 2020 over the past decade. By 2023, the apparent consumption had cumulatively receded by 11.2% from its zenith in 2020. The consumption structure is also in a state of flux. Under the sway of the downward spiral of the real estate industry, the consumption of construction steel has initiated a contraction. In the first three quarters of 2024, the construction area of real estate undertakings declined by 25% year-on-year in comparison with its acme in 2021, and the newly initiated area in the first three quarters of 2024 manifested a prodigious year-on-year slump of 67% vis-à-vis its peak in 2020. It can be prognosticated that the steel demand will linger in a downward declivity of reduction in the ensuing years, whilst the proportion of steel deployed in the manufacturing industry will exhibit an ascending propensity year by year. Concurrently, China's competitively priced and high-quality steel will constitute a robust substratum for buttressing the global outreach of China's manufacturing industry.

Considering the comprehensive scrutiny of the supply and demand circumstances within China's steel industry, it is observable that with the enervation of domestic steel demand in China, whilst the supply remains at a relatively elevated echelon, the disparity between supply and demand will persist over the long haul. As is evinced by the historical data, when China's economic growth is languid and the domestic steel demand is lackluster, steel exports will metamorphose into a cardinal conduit for equilibrating the incongruity between supply and demand of steel in China.

2.2. Analysis of China's Steel Import and Export

2.2.1. Import and Export Scenarios of China's Steel and Steel Billets in Recent Years

It can be discerned from Table 3 that in 2023, the exports of Chinese steel products and steel billets scaled a new zenith within the past seven years, whilst the import volume of steel products dipped beneath 10 million tons. Under the customs statistical data, during the period from January to September 2024, China's cumulative exports of steel products amounted to 80.71 million tons, registering an increment of 14.106 million tons year-on-year, accompanied by a growth rate of 21.2%. The cumulative exports of steel billets reached 3.41 million tons, exhibiting a year-on-year growth rate of 37.5%. It is anticipated that the annual exports of Chinese steel products in 2024 will once more surmount 100 million tons, reverting to the level of the incipient stage of the supply-side reform in 2016.

Table 3: Statistical table of import and export scenarios of china's steel and steel billets in recent years (Unit: 10,000 tons)

Year	Steel Export Volume	Steel Import Volume	Steel Net Export Volume	Billet Export Volume	Billet Import Volume	Billet Net Export Volume
2023	9026	765	8261	328	327	1
2022	6671	1056	5615	103	638	-535
2021	6686	1427	5259	0	1255	-1255
2020	5367	2023	3344	2	1800	-1798
2019	6429	1230	5199	4	210	-206
2018	6933	1317	5616	0	105	-105
2017	7541	1330	6211	0	49	-49
2016	10853	1322	9531	0	25	-25
2015	11240	1278	9962	0	26	-26
2014	9378	1443	7935	0	29	-29
2013	6234	1408	4826	0	55	-55

Data Sources: General Administration of Customs, Global Trade Tracking System (GTT)

2.2.2. Analysis of the Destination of Chinese Steel Exports

From the vantage point of the regions of direct exporting countries, the annual exports of Chinese steel products preponderantly stream towards Asia (61.39 million tons, constituting 69%), Latin America (11.45 million tons, accounting for 11.7%), and Africa (9.93 million tons, making up 11%), where the infrastructure and manufacturing industries are comparatively underdeveloped. The proportions in Europe, North America, and Oceania are merely 5.6%, 1.6%, and 1% respectively. In terms of individual countries, Chinese steel products are principally exported to Vietnam, South Korea, Thailand, and the Philippines. In 2023, the aggregate exports to these four countries tallied 26.71 million tons, accounting for 29.6% of the total export volume. The specific circumstances of steel product exports by country are presented in Tables 4 and 5 as follows:

Table 4: Statistical table of the situation of main exporting countries of chinese steel products in recent years (Unit: 10,000 tons)

Sequence Number	Country	2022	2023	Increase/Decrease	2024 Jan.-Sep.	Same Period Last Year	Increase/Decrease
1	Vietnam	536	925	389	948	647	301
2	Korea	633	840	207	626	641	-15
3	Philippines	391	432	41	386	336	50
4	Thailand	380	474	94	386	357	29
5	UAE	200	378	178	385	262	123
6	Indonesia	284	366	82	344	267	77
7	Saudi Arabia	225	337	112	327	238	89

Table 4: (continued).

8	Turkey	238	401	163	312	322	-10
9	Other Regions	3741	4873	1132	4374	3683	691
Total		6628	9026	2398	8088	6753	1335

Data Sources: General Administration of Customs, Steel Home Data Center

Table 5: Statistical table of the top 10 countries for chinese steel product exports from 2020 to 2023

Ranking	Country				Export Volume Share %			
	2020	2021	2022	2023	2020	2021	2022	2023
1	Korea	Korea	Korea	Vietnam	9.3	9.6	8.5	8.9
2	Vietnam	Vietnam	Vietnam	Korea	7	7.1	7.2	8.4
3	Thailand	Thailand	Philippines	Philippines	5.7	4.9	5	4.7
4	Philippines	Philippines	Thailand	Indonesia	4.8	4.6	4.9	4.4
5	Indonesia	Indonesia	Indonesia	Thailand	4	4.1	4.5	4.3
6	Japan	Saudi Arabia	Saudi Arabia	Russia	3.7	3.7	3.9	3.6
7	USA	Turkey	Russia	UAE	3.7	3.3	2.9	3.6
8	Myanmar	Japan	Japan	Malaysia	2.5	2.7	2.8	2.9
9	Saudi Arabia	UAE	UAE	Turkey	2.4	2.2	2.8	2.9
10	UAE	Russia	India	India	2.4	2.2	2.5	2.9

Data Sources: General Administration of Customs

It can be seen from Table 5 that from January to September this year, the growth rate of steel exports from China to Vietnam is the highest, reaching 46.5%. It is estimated that the volume of steel exports from China to Vietnam will exceed 12 million tons this year. Southeast Asian countries are currently in a period of rapid economic development. The construction of infrastructure and the vigorous development of the manufacturing industry have driven a rapid increase in the steel demand. At the same time, Southeast Asian countries are geographically close to China, and the transportation cost is relatively low. Therefore, for a long time to come, the Southeast Asian region will be the main export destination of Chinese steel.

2.2.3. The Situation of China's Steel Exports by Variety

The production capacity of domestic plate materials has witnessed a rapid expansion over the past two years, with the most prominent increment in exports. As per Table 6, during the period from January to September 2024, China's exports of diverse plate materials amounted to 55.028 million tons, with a year-on-year augmentation of 11.575 million tons, representing a growth rate of 26.6%. The increase in plate material exports constituted 82.1% of the growth in steel exports. Among the principal varieties of steel exports, the hot-rolled coil registered the largest export increment. From January to September, the cumulative export volume reached 20.557 million tons, with a year-on-year addition of 5.963 million tons, accounting for 42.3% of the increase in steel exports. Subsequently, coated plates, cold-rolled coils, and medium and thick plates followed, with their export increments accounting for 16.7%, 7.3%, and 6.9% of the increase in steel exports respectively.

Against the backdrop of the decline in domestic demand, the substantial augmentation in steel exports, particularly of plate materials, serves as a crucial factor in equilibrating domestic resource supply.

Table 6: Export situation of each variety from 2022 to 2024 (Unit: 10,000 tons)

Export Volume	2023	2022	Change (%)	2024 Jan.-Sep.	Same Period Last Year	Change (%)
Long Products	1532	1103	38.9	1328	1167	13.8
Flat Products	5963	4298	38.7	5503	4345	26.6
Steel Pipes	1007	868	16	782	760	3
Other Steel	524	463	13.3	458	388	18.1
Total Steel	9026	6732	34.1	8071	6660	21.2

Data Sources: Steel Home Data Center

2.3. The Impact of China-US Trade Frictions on Steel Exports

China-US trade frictions have emerged as one of the central foci of global trade frictions in recent times. In the domain of steel, the United States has instituted a series of trade-restrictive measures against Chinese steel products, encompassing the elevation of tariffs, the initiation of anti-dumping and countervailing investigations, and so forth. These measures have exerted a colossal impact on the export of Chinese steel products to the US market. Concurrently, China-US trade frictions have also instigated alterations in the global trade configuration. Other countries have emulated the United States and implemented trade-restrictive measures against Chinese steel products, thereby further aggravating the export predicament of Chinese steel products.

From 2015 to 2024, within nearly a decade, there were 163 trade lawsuits filed by the United States against Chinese export products, among which 14 pertained to the steel industry, and there were 74 cases affecting the indirect exports of steel in sectors such as automobiles and metal products [2]. During the trade war, steel products and various products fabricated from steel have also become the epicenters of friction. Since March 2018, the United States has levied a 25% tariff and an additional 10% import tariff on Chinese steel products.

Over the past decade, the US steel import volume has fluctuated between 20 and 40 million tons. Europe, Canada, and Mexico are the foremost steel-importing nations for the United States, and the proportion of imports from China is relatively meager. In 2023, China's steel exports to the United States dwindled to 845,100 tons, accounting for less than 1% of China's total steel exports. China-US trade frictions have a circumscribed direct influence on China's steel exports yet have a relatively substantial impact on the indirect exports of steel, especially the exports of downstream manufacturing products. The mimetic effect engendered thereby has expedited the ascendancy of international trade protectionism.

3. Causes, Principal Instruments, Current State and Characteristics of Steel Export Trade Frictions

3.1. Causes of Steel Export Trade Frictions

The trade frictions that China has encountered can be ascribed to political and economic factors. From a political perspective, the expeditious expansion of China's steel export trade has imposed substantial stress on the steel industries of numerous nations, thereby precipitating a sharp escalation in trade barriers. To bolster the growth of their domestic steel sectors, the governments of importing countries

will inevitably institute a plethora of policy measures to circumscribe the impact of Chinese steel products.

Economically, China's steel exports are voluminous, and the market is overly concentrated, which exerts a momentous impact on the steel industries of importing countries. The precipitate increase in China's steel export volume renders it arduous for the domestic markets of importing countries to endure. China's steel exports predominantly consist of low-cost products. Owing to China's steel overcapacity, the domestic steel price has long been beneath the international market level, giving rise to chaotic competition in the export market and furnishing an ostensible pretext for other countries to recurrently initiate trade barriers against the Chinese steel industry [3]. The export structure of Chinese steel products is defective, preponderantly comprising low value-added varieties with relatively inferior product grades, rendering it more susceptible to trade frictions [4].

3.2. Principal Instruments of Steel Export Trade Frictions

In the context of steel export trade frictions, the principal means encompass tariffs, anti-dumping and countervailing. Augmenting the import tariff of steel products is one of the commonly deployed stratagems in trade frictions. Importing countries augment the import cost by elevating tariffs to restrain the ingress of foreign steel products and safeguard their domestic steel industries. For instance, certain countries levy exorbitant anti-dumping and countervailing duties on Chinese steel products, culminating in a significant diminution in the market share of Chinese steel products in these countries [5].

Anti-dumping is currently the preponderant form of trade friction that China confronts [6]. Anti-dumping pertains to the imposition of anti-dumping duties on steel products vented in the importing country at a price lower than the normal value. Some countries initiate anti-dumping investigations on the pretext that Chinese steel products are being dumped and ultimately levy hefty anti-dumping duties, which gravely impinges on the export of Chinese steel products.

Countervailing implies the imposition of countervailing duties on steel products that receive government subsidies. Some countries aver that Chinese steel enterprises have availed themselves of unreasonable government subsidies and initiated countervailing investigations on Chinese steel products, further exacerbating the tribulations of Chinese steel product exports.

3.3. Current Situation and Characteristics of Steel Export Trade Frictions

In 2024, China's steel exports experienced a substantial augmentation, with the incremental export orders predominantly originating from countries within Southeast Asia and the Middle East. Among the 20 countries or regions that receive the largest volume of China's steel exports, 10 are situated in Southeast Asia and the Middle East. During the period from January to September 2024, the exports to Vietnam amounted to 9.48 million tons, exhibiting a year-on-year growth rate of 46.5%, rendering Vietnam the foremost destination for China's steel exports. Subsequently, South Korea, the Philippines, Thailand, and the United Arab Emirates follow, with export volumes of 6.26 million tons, 3.86 million tons, 3.86 million tons, and 3.85 million tons respectively. The incessant increment in the volume of China's steel exports across the global market has attracted the attention and solicitude of certain countries. Some countries allege that Chinese steel products are being vented at diminished prices in the international market, constituting dumping behavior, and have thereby initiated anti-dumping investigation procedures. Presently, anti-dumping and countervailing have emerged as prominent predicaments confronting Chinese export enterprises, resulting in a conspicuous escalation in the number of original trade remedy investigations on Chinese steel products. According to incomplete statistics, from January to October 2024, the cumulative tally has reached 27 cases, with an augmentation of over 50% in comparison to the equivalent period in 2023. From January to

September 2024, the quantity of Chinese export-involved products dispatched to the complainant countries/regions reached 31.8186 million tons, accounting for 39.3% of China's total steel exports during the concurrent period this year. Among the trade remedy cases initiated this year, the one that exerts the most profound impact on export volume is the anti-dumping case instigated by Vietnam against Chinese hot-rolled coils, involving 83.2% of the steel products that China exports to Vietnam. Consequently, once the anti-dumping investigation in Vietnam is consummated, it is anticipated to have the most significant repercussions on China's steel exports. The panorama of trade frictions between China and major export countries since this year:

Table 7: Partial Anti-dumping Investigation Scenario of China's Steel Industry from January to October 2024

Sequence Number	Country	Product Type	Category
1	Australia	Welded Pipe	Anti-dumping
2	Korea	Galvanized Sheet, Medium Plate	Anti-dumping
3	Vietnam	Hot-dipped Galvanized Sheet	Anti-dumping
4	Vietnam	Hot-rolled Coil	Anti-dumping
5	Malaysia	Tin-coated Sheet	Anti-dumping
6	Malaysia	Prestressed Concrete Steel Strand	Anti-dumping
7	Thailand	Alloy Hot-rolled Coil	Anti-dumping
8	India	Non-oriented Electrical Steel	Anti-dumping
9	Brazil	Tin-coated and Chromium-coated Sheet Coil	Anti-dumping
10	Brazil	Color Coated Sheet	Anti-dumping
11	Brazil	11 Types of Steel Products	Import Quota
12	Brazil	Steel Cord	Anti-dumping
13	Brazil	Cold-rolled Coil	Anti-dumping
14	Saudi Arabia	Stainless Steel Round Pipe	Anti-dumping
15	Ukraine	Galvanized Sheet	Anti-dumping
16	Chile	Steel Bar	Anti-dumping
17	Colombia	Galvanized and Aluminum-zinc Coated Sheets	Anti-dumping
18	Canada	Wire Rod	Anti-dumping
19	Canada	Steel Products	25% Tariff
20	United States	Steel and Aluminum	Section 301
21	Mexico	Steel Screws	Anti-dumping
22	South Africa	Flat Rolled Products, Section Steel	Anti-dumping
23	United Kingdom	Tin-coated Sheet	Anti-dumping
24	Guatemala	Galvanized Sheet, Medium Plate	Anti-dumping
25	Turkey	Tin-coated Sheet	Anti-dumping
26	Turkey	Non-alloy Wire Rod	Safeguard Measures
27	Turkey	Hot-rolled Coil	Anti-dumping

Data Sources: Steel Home Data Center, China Trade Remedy Information Network

The steel export trade frictions in the recent two years predominantly exhibit the following characteristics: Anti-dumping predominates, accompanied by the coexistence of multiple protective measures. Steel trade frictions are initially manifested in the domain of anti-dumping. In the wake of the divergence in the economic recovery trajectories of diverse countries, steel overcapacity, and feeble demand have instigated the resurgence of trade protectionism. The scope of the entities involved in frictions has been progressively expanding. Historically, the principal counterparts of China's steel trade frictions were developed nations such as the United States, the European Union, and Canada. In recent times, nevertheless, the primary instigators of trade frictions have been ASEAN and South American countries, which have recurrently launched anti-dumping and countervailing litigations against China to circumscribe the importation of Chinese steel. The assortment of products under scrutiny has become more variegated. In recent years, the gamut of products under investigation within China's steel industry has encompassed multiple classifications and models, including long products, flat products, and steel pipes, with hot-rolled coils and cold-rolled and coated products preponderating.

4. Impact of Trade Frictions on the Export of Chinese Steel Products

4.1. Impact on Export Scale

Trade frictions will precipitate a diminution in the export volume of Chinese steel products. Owing to trade-restrictive stratagems such as the augmentation of tariffs and the inauguration of anti-dumping and countervailing investigations by sundry countries, the competitiveness of Chinese steel products in the international marketplace has been attenuated, engendering a curtailment in export orders and a consequent decline in export volume. The intensification of trade frictions has culminated in the contraction of export market shares. Trade frictions have occasioned the gradual supplanting of the market shares of Chinese steel products in certain traditional export markets by those of steel products from other countries. For instance, in the US market, the market share of Chinese steel products has experienced a substantial decline, while the market shares of steel products from other countries like India and South Korea have registered an increment. The escalation of trade frictions has bequeathed greater sales duress upon export enterprises. The abatement in export volume and the constriction of market conduits and shares have compelled Chinese steel export enterprises to redirect a greater proportion of their products to the more competitive domestic market. Some enterprises have been coerced into reducing production, suspending operations, or even succumbing to bankruptcy, thereby exerting an adverse influence on the stable progression of China's steel industry.

4.2. Changes in Export Structure

Trade frictions will have an imprint on the export structure of Chinese steel products. Foremost is the realignment of product structure. Trade frictions impel Chinese steel enterprises to expedite the recalibration of product structure and enhance the added value of products [7]. To countervail trade-restrictive measures, enterprises have amplified their endeavors in the research and development and fabrication of high-end steel products, diminished the exportation of low-value-added products, and ameliorated the quality and competitiveness of exported wares. Secondly is the modification of the market structure. Under the aegis of trade frictions, the market structure of Chinese steel products exports have also been transmuted. Enterprises have commenced to assiduously explore nascent markets and attenuate their reliance on traditional markets. For example, they have augmented their export initiatives to countries along the "Belt and Road" and extended their outreach into additional markets in Africa and South America.

4.3. Product Competitiveness

Trade frictions will undermine the competitiveness of Chinese steel products. Primarily, trade frictions give rise to an elevation in the export cost of Chinese steel products. On the one hand, the augmentation of tariffs augments the export cost of enterprises; on the other hand, anti-dumping and countervailing investigations also compel enterprises to shoulder substantial legal fees and response costs. The competitiveness of Chinese steel products in the international market principally derives from low-cost labor and resources, which confers a comparative edge upon Chinese steel products [8]. The ascension in cost will enfeeble this comparative advantage and attenuate the price competitiveness of Chinese steel products in the international market. Secondly, the impetus for technological innovation becomes more strenuous. To fortify product competitiveness, Chinese steel enterprises must redouble their efforts in technological innovation, fabricate more environmentally friendly and low-carbon steel products, and enhance product quality and performance. Trade frictions impel enterprises to place greater emphasis on technological innovation and hasten the tempo of transformation and upgrading. Thirdly, the salience of brand building becomes conspicuous. In the milieu of trade frictions, brand building assumes particular importance for Chinese steel enterprises. By forging brands with international clout, augmenting the added value and market acceptance of products, and reinforcing the competitiveness of enterprises.

5. Conclusion

The direct repercussion of trade frictions is to curtail the export scale of Chinese steel products. Additionally, trade frictions also heighten the export threshold, debilitate the competitiveness of Chinese steel products, and concomitantly precipitate alterations in the export structure of Chinese steel products. The international trade environment confronted by the Chinese steel industry is growing increasingly austere. It is incumbent upon steel industry participants and the government to formulate anticipatory response strategies.

In response to the quandaries of modifications in export structure and diminution in competitiveness engendered by trade frictions, enterprises ought to reinforce technological innovation, augment R & D investment, ameliorate product quality and performance, develop high-end and green steel products with independent intellectual property rights, fortify cooperation with universities and research institutions, and enhance technological innovation capabilities, thereby optimizing the product structure, augmenting the added value of products, reducing the export of low-value-added products, and amplifying the production and export of high-end and green products. At the government level, it should encourage enterprises to engage in technological innovation and product upgrading, propel the transformation and upgrading of the steel industry, and enhance export competitiveness. Impose energy taxes, carbon taxes, and the like on the export of primary and low-value-added steel products, and ceaselessly optimize the tariff schedules of steel products to incentivize the export of high-end steel products.

In response to the issue of the declivity in export scale, industry associations should institute a sound trade friction risk pre-warning mechanism and give full play to the platform and resource functions of industry associations, scientific research institutes, and institutions of higher education. On the one hand, organize and coordinate all links of the industrial chain, expand steel consumption in key industries, broaden the application spectrum of steel, and formulate efficacious domestic demand support. On the other hand, harness the professionalism and leadership of industry associations to intensify the analysis of the impact of carbon border adjustment mechanisms and other factors on Chinese steel products, and formulate meticulous countermeasures in response to vicissitudes in national trade standards and rules.

Furthermore, the government should also actively partake in the formulation of global trade rules, and strive for a more equitable and rational trade environment via multilateral and bilateral trade negotiations. Strengthen communication and coordination with other countries, jointly oppose trade protectionism, and safeguard the global trade order. Implementing appropriate production control, reduction, and capacity clearance policies is also a crucial measure to equilibrate the domestic supply and demand of steel, which can also meliorate the profitability of the entire steel industry, and concurrently attenuate international trade frictions and foster the healthy and orderly development of the domestic steel industry.

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