

Article

The Impact of China's Overseas Economic and Trade Cooperation Zones on Sustainable Trade of Host Countries

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Abstract: Under the concept of “government-guided, enterprise-led, and market-oriented” operation, the Chinese Overseas Economic and Trade Cooperation Zones (COCZs) have developed a new type of international production pattern, which has become an effective way for developing countries to integrate into the global production network sustainably. Based on the COCZ data collected manually and country-level panel data from 1997 to 2019, this study innovatively analyzes the sustainable trade effect of COCZs with the difference-in-differences method. The research finds that the establishment of COCZs significantly boosts the import and export of the host country in a sustainable manner. Further analysis finds that COCZs can promote the sustainable trade growth of the host country in three aspects: economic, societal, and environmental. This sustainable trade effect is closely related to the institutional improvement and infrastructure construction generated by COCZs. By providing a comprehensive and rigorous analysis of the impact of COCZs on the host country's trade performance, the paper effectively responds to the criticisms on China's “going out” strategy, which is often based on biased assumptions and a lack of empirical evidence. It also provides policy implications for both China and the host countries to enhance the cooperation and mutual benefits of COCZs.

Keywords: overseas economic and trade cooperation zones; sustainable trade; host country; difference-in-differences; global supply chain



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1. Introduction

China's Overseas Economic and Trade Cooperation Zones (COCZs) are a replication of the successful operation of China's special economic zones. From the 1990s, Chinese enterprises have independently explored the construction of overseas parks. The COCZs adhere to the concept of “government-guided, enterprise-led, and market-oriented” operation and develop a novel international production pattern. They are a crucial means for China to break away from the trap development and enhance the new international production network, and they are also an effective way for the host country to obtain more added value and integrate into the global value chain. For the host country, the COCZs provide a “window effect” to share experience, provide technical support and capital export, and promote the market-oriented reform of the host country. According to the Ministry of Commerce of China, by the end of 2022, Chinese enterprises had invested a total of USD 57.13 billion in COCZs along the “Belt and Road”, paid USD 6.6 billion in taxes to the host country, and created 421,000 jobs for the locals. The economic and social impact on host countries has been expanding year by year, which has effectively promoted mutual benefit and common development between COCZs and host countries. For China, enterprises use COCZs as a platform to go abroad in groups; not only can they use the abundant labor and resources of the local area to achieve cost reduction, efficiency improvement,

and enhance their international competitiveness, but also can obtain enough space and resources for domestic industrial development and transformation through international capacity cooperation and build a new path for China's manufacturing industry to climb to the middle and high end of the value chain.

International trade is rooted in the need for mutual complementarity and the exchange of resources among countries. COCZs are an important platform for China to deepen international trade cooperation, promote deep integration with the host country's economy and trade, and achieve mutual benefit and win–win results. As the number and scale of COCZs increase, their impact has attracted widespread attention. However, most studies of COCZs have been from the perspective of Chinese enterprises [1–3]. Furthermore, they have primarily focused on case studies of specific COCZs [4–6], lacking detailed econometric analysis and coverage of sustainability issues. Based on the premise, this paper utilizes country-level panel data from 1997 to 2019 to construct a difference-in-differences (DID) model, which comprehensively evaluates the impact of COCZs on the trade of the host country. Furthermore, the contribution of COCZs to sustainable trade is examined from three perspectives: the economy, society, and environment, and we reveal the possible mechanisms for COCZs to produce sustainable trade effects. The study aims to provide a comprehensive evaluation of COCZs' impact on host countries' trade, considering sustainability from economic, societal, and environmental perspectives. Another purpose of this research is to delve into the mechanisms through which COCZs achieve sustainable trade, focusing on agglomeration and selection effects, technology spillovers, and improvements in institutions and infrastructure.

Our paper is also of practical importance. In recent years, some international public opinion has questioned the development achievements of COCZs, maliciously inferring China's purpose of developing COCZs with Western strategic intentions, and believing that China intends to strengthen its political control over the host country. These opinions ignore the facts and the benefits that COCZs bring to the local economy, society, and environment. They also distort China's intention of promoting win–win cooperation and mutual development with other countries. COCZs are not tools for China to expand its influence or interfere in other countries' internal affairs, but platforms for China to share its development experience and resources with the world. This paper comprehensively evaluates the sustainable trade effect of COCZs from the perspective of the host country and provides a good response to the opinion. The research conclusion provides empirical evidence that COCZs have become an engine for sustainable trade and the economic growth of the host country, which is also the realistic basis for understanding China's contribution to building a community of shared future for mankind. This paper could not only enhance the existing literature on COCZs, but also offer compelling evidence of China's commitment to cooperation, improving human welfare, and projecting an image of a responsible great power. The study seeks to comprehensively assess the effect of COCZs on trade in host countries, with particular attention to sustainability dimensions across economic, social, and environmental aspects. Additionally, this research delves into the mechanisms that enable COCZs to attain sustainable trade, centered on agglomeration and selection effects, technology spillovers, and enhancements in institutions and infrastructure. The study also aims to address worldwide skepticisms by providing empirical evidence of COCZs as sustainable engines for trade and economic growth. It also provides policy implications for fostering COCZs to achieve trade expansion, improve structures, and enhance sustainability.

The paper's potential contributions are as follows: First, it adopts a more holistic analytical perspective that facilitates a profound and comprehensive understanding of the positive impact of the COCZs on the host country's sustainable trade. Second, it enriches sustainability analysis by expanding on various aspects related to COCZs. It breaks down the trade effects into four dimensions: export price and quantity, product type, trading partner country, and value-added trade to provide beneficial evidence on the sustainable trade effects. It also considers, from a social angle, how COCZs uniquely enhance trade for

host countries with different characteristics, especially developing countries. In addition, it pays special attention to how COCZs promote exports of green products to demonstrate environmental protection efforts. Third, it has strong policy implications. This paper suggests that fostering COCZs deeply in host countries could be a viable way to achieve growth in trade volume, improvement in trade structure, and sustainability in trade for host countries. It also reflects China's responsibility as a major developing nation and how Chinese enterprises share a common fate with the world. This paper's findings respond timely to the current call for "upholding and practicing multilateralism, promoting a community with a shared future for mankind" and provide solid theoretical support for China and its COCZ partners to work together to overcome market fragmentation, coordinate supply systems, and strengthen economic and trade cooperation.

The paper is organized as follows. Section 2 offers a literature review of COCZ and sustainable trade. We present a theoretical analysis and give out our main research hypotheses in Section 3. A brief overview of the model and data is presented in Section 4. The primary results of the model are examined in Section 5. We further discuss the sustainable trade effects of COCZs from three perspectives: economy, society, and environment, as well as the mechanism, in Section 6. The paper concludes in Section 7.

2. Literature Review

This section offers a thorough review of current research, theories, and discoveries regarding sustainable trade and COCZs. It brings together well-established concepts and findings from a variety of sources to define and contextualize sustainable trade in a non-judgmental manner.

2.1. Sustainable Trade

Sustainable trade research is rooted in the concept of "sustainable development", which involves satisfying present needs while ensuring that future generations have the capacity to satisfy their own needs. According to the definition of the International Institute for Environment and Development (IIED, 2000) [7], international transactions of products and services conducted in a sustainable manner should be able to generate positive social, economic, and environmental benefits and comply with the four basic principles of sustainable development: increasing economic value, reducing poverty and inequality, conserving and utilizing environmental resources, and operating within an open governance framework. In addition, according to the International Chamber of Commerce (ICC, 2018) [8], sustainable trade is defined as "commercial behavior or activities that buy or sell bulk commodities, goods, and services that promote global sustainable development while minimizing negative social and environmental impacts." Subsequently, the World Economic Forum (WEF, 2019) [9] put forward five proposals to promote sustainable trade in underdeveloped countries around the world, including international cooperation and investment, technology and education support, emerging country development issues under new economic conditions, trade inclusion potential for poor countries, and their environmental impact in trade. UNCTAD (2021) [10] discusses the role of voluntary sustainability standards in promoting sustainable development and international trade. Overall, sustainable trade pays more attention to comprehensive sustainable development issues such as fairness, human rights, poverty reduction, etc., on the basis of green trade. Generally speaking, trades conducted in a sustainable manner are sustainable trades whose production supply chains are sustainable, environmentally friendly, and fair.

In recent years, many scholars have begun to focus on the topic of sustainable trade. Costanza et al. [11] argued that sustainable trade is a new paradigm for world welfare and proposed a framework for analyzing the ecological and economic impacts of trade. Existing studies have confirmed the positive effects of international trade on national economic development [12–14], but the findings of international trade's effects on the environment are inconsistent. Antweiler et al. [15] explored the effects of international trade on income and environmental quality by decomposing trade into scale, technology, and compositional

effects and showed that free trade not only increases per capita income, but also has a positive effect on the environment. Frankel et al. [16], using the instrumental variables approach, also came to similar conclusions: trade not only promotes national economic growth, but also when environmental quality is measured in terms of NO₂, SO₂, and CO₂, the results show that trade contributes to the improvement of the environment. Aller et al. [17] constructed national trade centrality indicators to study the relationship between trade participation and the environment, and the study showed that the participation of developing countries in world trade contributes to the improvement of environmental quality. Xu et al. [18] show that international trade positively affects the global process of achieving the nine environment-related Sustainable Development Goals (SDGs). Moreover, in addition to the studies that concluded a positive effect of international trade on environmental quality, according to a review study by Sorroche-del-Rey et al. [19], 20.68% of the studies showed that international trade has a negative effect on environmental quality, and this negative effect is due to the negative impact on the environment of developing countries as a result of the use of developing countries as “pollution havens” by developed countries. Wang et al. [20] investigate the impacts of structural changes in global trade on 13 SDGs, and the results showed that structural changes in trade have the greatest impacts on environmental indicators. A study by Wang et al. [21] reaches a similar conclusion: high-income countries are able to decouple their economic growth from environmental pollution in a better way, whereas low-income countries have difficulty decoupling economic growth from environmental pollution. Le et al. [22] even argue that trade openness positively affects environmental efficiency only in high-income countries.

Globalization has created an increasing geographical division between the production and consumption of goods, which has led to an unprecedented transfer of environmental and social consequences to developing country trade in international trade [23] and the imbalance of benefits and costs triggered in international trade between countries [24,25], making it more difficult for developing countries’ trade to achieve the Sustainable Development Goals (SDGs), which has triggered many scholars to give attention to the issue of sustainable trade in developing countries. Belloumi et al. [26] examine the impact of trade openness on sustainable development in Saudi Arabia, and the results of the study show that trade openness is associated with two sustainable development indicators, namely economic growth and environmental quality indicators, which have a long term relationship. The study of Daly et al. [27] also found that trade openness, on the one hand, promotes economic growth in Saudi Arabia, which leads to more resource consumption and pollution emissions, and, on the other hand, trade openness is able to improve the quality of the environment through the introduction of cleaner technologies and stricter environmental standards. Su et al. [28] explored the effect of natural resources on sustainable trade in the BRICS countries using long term panel data for 1988–2021; the results show that while mineral and natural resource rents have a positive contribution to sustainable trade, oil rents have a negative effect on sustainable trade, and expenditures on renewable energy have a negative impact on sustainable trade in the long run. Sudsawasd et al. [29] studied the impact of trade liberalization policies on sustainable development in Thailand. The results show that international trade helps developing countries to reduce poverty, increase productivity, reduce unemployment, and promote economic growth, income, and consumption.

2.2. Overseas Economic and Trade Cooperation Zones

Overseas economic and trade cooperation zones can be categorized as special economic zones (SEZs) that have facilitated the process of globalization since the last century, from the perspective of their essential attributes. The United Nations World Investment Report 2019 defines SEZs based on three key criteria: having clearly demarcated geographic areas, enjoying special administrative systems, and receiving infrastructure support. The sources of benefits include direct economic benefits (foreign exchange income, foreign direct investment, fiscal revenue, export growth) and indirect economic benefits (technological in-

novation, demonstration effect, export diversification) [30]. Establishing SEZs usually aims to achieve one or more of the following policy objectives [31–35]: attracting foreign direct investment, alleviating mass unemployment, implementing more open economic reform strategies, and serving as a testing ground for new policies and approaches. Empirical studies show that many SEZs have achieved success in attracting foreign direct investment, creating employment and exports [36–39]. Existing research also considers SEZs as an effective way to achieve national industrial development. Parks can provide bundled public services in concentrated areas, improve the utilization efficiency of government infrastructure budgets under limited conditions, and promote industrial agglomeration and cluster development [40].

In recent years, China's overseas economic and trade cooperation zones have also attracted a large number of domestic and foreign scholars' attention. Bräutigam et al. [5] discussed China's special economic zones and their role in attracting foreign investment to help the country industrialize, as well as the overseas trade and cooperation zone program initiated by Beijing in 2006, which assists Chinese companies in investing abroad while also building China's soft power through the transfer of a key component of China's development success. Zhang et al. [2] showed that the establishment of COCZs significantly promotes the economic development of host countries. Meng et al. [1] showed that COCZs play a crucial role in fostering inclusive and sustainable industrialization and urbanization of the host countries under the Belt and Road Initiative, but there is a lack of exploration of the mechanism, as well as questions and concerns from overseas scholars, issues of sustainable development, and other problems. Li et al. [41] found that the construction of offshore zones can significantly promote China's direct investment in host countries. Lu et al. [42] analyze the successful development mode of existing overseas economic and trade cooperation zones and found that actively playing the main role of enterprises in building zones, paying attention to the orderly integration of the motives for building zones and industrial positioning, clarifying the balanced relationship between the needs of development of multiple parties, and adhering to the concept of diversified development are important ways to promote the high-quality development of overseas economic and trade cooperation zones.

In addition, some other scholars have conducted case studies on some specific Chinese overseas trade parks. Meng et al. [43] study the impact of China's establishment of overseas parks in Vietnam on Vietnam, and the study showed that China's investment in Vietnam has led to Vietnam's economic growth. Chen et al. [44] examine the role of overseas parks in Chinese enterprises' outbound investment by taking Sihanoukville Special Economic Zone in Cambodia as an example, and the results showed that the overseas parks play an important role in promoting Chinese SMEs' outbound investment, providing buffer space and development soil for them to overcome the institutional and cultural differences in their overseas investment, and acting as the role of an "investment garden". Zheng et al. [45] analyze the role of international cooperation zones (IZAs) in promoting the coupling of regional development strategies in the global production network by taking the example of Rayong Industrial Zone in Thailand and China. The study shows that international cooperation zones as intermediaries have the functions of attracting investment and promoting business linkages between regional economies and global production networks.

The literature on sustainable trade has attained notable progress in comprehending the intricate interplay of international trade, economic development, and environmental considerations. However, previous research on COCZs has primarily focused on their economic implications, highlighting their role in foreign direct investment, export expansion, and the development of the host country.

However, despite these valuable developments, there remain research gaps in the understanding of sustainable trade, particularly with regard to the role of COCZs in facilitating sustainable development. The current literature does not thoroughly explore the mechanisms through which the COCZs affect sustainable trade, the potential benefits they bring to host countries, and the challenges they may pose. This paper conducts a

comprehensive analysis of the sustainable trade consequences of COCZs using a theoretical framework and empirical evidence. The study aims to provide original insights and to fill existing gaps in the literature by providing a more nuanced understanding of the sustainable trade dynamics influenced by COCZs.

3. Theoretical Analysis

This section engages in innovative thinking by formulating hypotheses and contributing original perspectives to the existing body of knowledge. It goes beyond synthesizing existing theories, leveraging case studies and empirical evidence to propose hypotheses specific to the impact of COCZs on sustainable trade.

After entering the host country, COCZs mainly promote the host country's import and export growth in a sustainable way through industrial agglomeration, technology spillover, and talent cultivation. These three approaches are considered sustainable because they all focus on optimizing the host country's production chain, upgrading the host country's production capacity, improving the host country's production structure, and having a positive and far-reaching impact on other upstream and downstream enterprises.

The COCZ's development enterprises promote intra-industrial agglomeration and establish a "horizontal grouping and vertical linking" industrial chain [46]. Additionally, development enterprises in COCZ frequently choose target enterprises that match the industrial positioning of COCZ and possess potential for growth. After a substantial increase in high-quality enterprises within COCZs, the allocation of resources and operational stability of COCZs has significantly improved. These improvements have contributed to the continued growth of product exports, further boosting the trade scale of related industries within the host country.

In terms of technological spillover, the advanced machinery, equipment, and production technology of COCZ enterprises can assist local upstream and downstream enterprises, enhancing their production efficiency and leading to equipment renewal and technological advancement. Take the Lekki Free Trade Zone in Nigeria as an instance. Nigeria has rich oil and gas resources; however, the oil refining and other manufacturing industries are weak. The newly constructed refinery in Lekki Free Trade Zone is the largest in Africa, and its presence is expected to significantly enhance the technical level of relevant industries, expedite the industrialization process, and promote diversified development roads.

In terms of talent cultivation, policies regarding talent and experience in planning, operation, and management may be transferred directly to the COCZ [47]. Outward-facing professionals and technical management personnel, trained by COCZ enterprises, can indirectly enhance the quality of local workers, enrich the management experience of local enterprises, and utilize their knowledge and skills to boost the production capacity and sustainable export of local companies.

Based on the above analysis, Hypothesis 1 is proposed.

Hypothesis 1: *COCZs can promote the host country's trade in a sustainable way.*

According to the Sustainable Trade Index 2022 (STI) released by HINRICH-IMP [48], we define the sustainable trade from three aspects: economic, societal, and environmental.

In terms of the economic aspect, COCZs become a new growth pole for regional economic development. The establishment and operation of COCZs enable more countries to take the "fast train" of the "Belt and Road" initiative, provide capital and technical support for the host country, fully utilize the radiation force of related industrial technologies, facilitate the formation of large-scale industrial chains and the "flying geese" effect, promote industrial development, transformation, and upgrading, help the host country achieve industrialization and modernization, and promote trade and economic growth.

In the societal aspect, COCZs enhance the communication between China and the host country [49]. The COCZs effectively bridge the gap between the two countries, foster a positive image of the enterprises in the COCZs among the people, help enterprises lower

the cost of cross-cultural communication, avoid conflicts caused by cultural differences, and thus further attract foreign investment enterprises to invest in the COCZs. There are various ways to bridge the gap between the people and the COCZ [50,51]. For instance, the enterprises actively engage in public welfare activities, care about social well-being, communicate widely with local communities, generously donate to charity and disaster relief, provide free internship opportunities for local schools and assign instructors to assist in achieving local cultural, educational, sports, and health development, and thus win the support of local people, achieving sustainable growth.

In terms of the environmental aspect, COCZs can promote the ecological progress of the host countries. They establish environmental management systems of varying degrees in the processes of park construction, investment attraction, and operation to avoid the failure of enterprises in the zones due to insufficient eco-friendliness. Jiang et al. [52] find that COCZs have a significant positive effect on the CO₂ emissions of the host countries, mainly by increasing the industrial value added of the host countries. For example, the Vientiane Saysettha Development Zone in Laos conducts professional assessments for potential investors and requires enterprises that may generate wastewater, exhaust gas, waste residue, and noise pollution to provide an environmental assessment report from the Lao Environmental Assessment Department before obtaining the construction permission. In large-scale infrastructure projects, the COCZs also control pollution and utilize renewable energy sources. For instance, the Suez Economic and Trade Cooperation Zone adopts a complementary power generation mode of wind and solar energy for all the main roads in the first phase project, becoming the first COCZ in Egypt to use green energy streetlamps on a large scale.

Based on the above analysis, Hypothesis 2 is proposed.

Hypothesis 2: *The promotion of host country's sustainable trade by COCZs is mainly reflected in three aspects: economic, societal, and environmental.*

The COCZs may achieve sustainable trade growth through channels such as institutional spillover and infrastructure. In terms of institution, the COCZs form replicable and scalable management system designs, which provide references for the supporting reforms of other industrial parks in the host countries, and thus enhance the production efficiency and foreign trade level of the surrounding parks [50]. The bilateral governments coordinate the legal protection and preferential policies for the COCZs and reach a cooperative framework that is consistent with the strategic goals. The development company of the COCZs is the most important link in the coupling structure, which promotes the investment attraction work of the COCZs, connects the domestic and foreign markets of the host countries, and builds a modern new city that integrates industry, city, finance, living, and technology research and development, cultivates the culture of the COCZs, and enhances the local influence.

At the infrastructure level, the entry of the COCZs provides strong support for the production, operation, and trade activities of the enterprises in the zones. Ye et al. [53] argued that the infrastructure construction of COCZs is mainly led by enterprises, focusing on production facilities, such as factories and warehouses, aiming to reduce production costs and increase efficiency. On the one hand, the enterprises that build the zones need to improve the infrastructure within the zone, provide complete factory buildings and public facilities, and carry out a lot of work in terms of “five connections and one leveling”—water supply, power supply, road access, communication, gas supply, and land leveling—saving the construction costs of the enterprises in the park.

Some of the enterprises that build the zones are experienced contractors, and they will generate information spillover in the process of building facilities within the zone, helping to improve the local infrastructure construction capacity and promote technological progress. On the other hand, the host government also improves the urban road and other infrastructure layout to facilitate the operation of the COCZs, bears a part of the construction

costs of the facilities within the zone, provides supply and maintenance services for related facilities, and pays attention to the good integration of COCZs and cities in terms of infrastructure in the urban master plan.

Based on the above analysis, Hypothesis 3 is proposed.

Hypothesis 3: *The mechanism for achieving sustainable trade in COCZs is to improve the quality of institutions and infrastructure.*

4. Data and Methodology

4.1. Model Specification

To verify whether the construction of COCZs can generate sustainable trade effects, this paper first constructs a two-way fixed effect model as shown in Equation (1):

$$\ln Trade_{it} = \beta_0 + \beta_1 COCZ_{it} + \gamma X_{it} + \mu_i + v_t + \varepsilon_{it} \quad (1)$$

The dependent variable $\ln Trade_{it}$ measures the overall level of imports and exports of the host country, and is expressed as the logarithm of the total import ($\ln import$) and export ($\ln export$) of the host country i in year t . $COCZ_{it}$ is the core in the dependent variable, which takes 1 if the COCZ starts construction in the host country in year t and 0 otherwise. The start time of the construction of each COCZ is different, which means that Equation (1) is a staggered difference-in-differences (SDID) model. SDID is a variation of the difference-in-differences method that allows for the staggered implementation of a policy or treatment across different groups or time periods. SDID has some advantages over the standard DID method, such as being more flexible, precise, and robust to unobserved confounding variables. β_1 measures the overall impact of the COCZs on the import and export trade of the host country I . If the construction of the COCZs can promote the trade of the host country, then β_1 will be significantly positive. Among other parameters, X_{it} are control variables, and according to the current literature [2,3], we mainly select the logarithm of population ($\ln pop$), per capita GDP ($\ln gdp$), and the natural resource output ratio ($Natural$) to reflect the host country's industrial structure. μ_i and v_t represent country and time fixed effects, respectively, to control for factors that do not change over time at the host country level and macro trend shocks. ε_{it} contains other unobservable factors in the model.

4.2. Data and Descriptive Statistics

The list of 103 COCZs for the benchmark analysis in this paper comes from the China Council for the Promotion of International Trade (CCPIT). Referring to the official channels such as the websites of the COCZ's development enterprises and the reports of the Ministry of Commerce, we obtained the start time of construction of the COCZs and cross-verified it with the information dataset of China's overseas industrial parks offered by Li et al. [54]. Since the COCZs established before 2005 were still in the embryonic stage of self-development by enterprises, two COCZs established before 2005 were omitted. Finally, 101 COCZs distributed in 16 host countries were obtained. The location of the COCZs covers most regions of Asia, Southeast Asia, Northern Eurasia, Western Europe, Southern Africa, and Eastern Africa, among which Asia is the most densely populated with 43, followed by Europe with 37, Africa with 19, and South America with only 2. Considering that the number of COCZs in Russia is as high as 24, far exceeding the average number of COCZs owned by other host countries, which may lead to outliers, we omitted this sample.

The trade data used in this paper come from the BACI trade data published by CEPII. These data integrate the United Nations Comtrade trade data, providing product-level bilateral trade data for more than 200 countries in recent years. Considering the availability of data, this paper selects samples from 1996 to 2019, and sums them up in different dimensions to obtain the dependent variables needed in this paper. In addition, this paper also uses the cross-border greenfield investment data of Chinese enterprises provided by fDi Markets and the EORA input–output table for necessary supplementary analysis. The

fDi Markets database belongs to the Financial Times and is the most comprehensive online database of cross-border greenfield investment, including 20 fields such as investment amount, target country, parent company name, subsidiary name, and employment creation. Other control variables are from the WDI database. Table 1 reports the descriptive statistics of the main variables.

Table 1. Descriptive statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
lnexportv	4534	15.238	2.689	5.996	21.164
lnimportv	4534	15.698	2.260	8.275	21.607
lnchnex	4466	12.801	2.796	5.186	18.445
lnchnim	4317	11.082	4.032	0.008	18.891
COCZ	4534	0.081	0.273	0	1
lngdp	4534	8.358	1.580	4.517	11.685
lnpop	4534	15.305	2.223	9.140	21.035
Natural	4534	6.660	11.063	0	87.459
year	4534	2007.720	6.846	1996	2019

5. Empirical Results

5.1. Baseline Results

Based on the panel data from 1996 to 2019, this paper first estimates Equation (1), and the results are shown in Table 2. All regressions control for country and year fixed effects, and the cluster-robust standard errors are clustered at the country level. As a comparison, columns (1) and (3) only include the core explanatory variable. The results show that the core estimated coefficient is significantly positive at the 1% significance level, indicating that the entry of the COCZs effectively expands the scale of imports and exports of the host country. In order to mitigate the impact of possible omitted variables, this paper controls for three key factors: per capita GDP, logarithm of population, and natural resource output ratio, respectively, and obtains columns (2) and (4). The findings reveal a significant decrease in the core estimated coefficient. However, it is still of statistical significance. Analyzing the coefficients' magnitude, the average export value of the host country increased by 13.1%, and the import amount increased by 14.5%, both of which were significantly positive at the 5% and 1% significance levels, respectively.

Table 2. Baseline results.

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	lnexportv	lnexportv	lnimportv	lnimportv	lnchnex	lnchnim
COCZ	0.265 *** (0.086)	0.131 ** (0.061)	0.248 *** (0.074)	0.145 *** (0.048)	−0.020 (0.087)	−0.020 (0.089)
lngdp		0.753 *** (0.069)		0.651 *** (0.048)	0.842 *** (0.119)	0.465 ** (0.181)
lnpop		1.104 *** (0.145)		0.914 *** (0.116)	1.022 *** (0.264)	1.359 *** (0.449)
Natural		0.021 *** (0.003)		0.002 (0.002)	0.007* (0.004)	0.024 * (0.014)
_cons	15.068 *** (0.007)	−8.095 *** (2.405)	15.571 *** (0.006)	−3.754 * (1.949)	−9.971 ** (4.268)	−13.982 * (7.218)
Country_FE	Yes	Yes	Yes	Yes	Yes	Yes
Year_FE	Yes	Yes	Yes	Yes	Yes	Yes
r2_a	0.966	0.979	0.967	0.983	0.960	0.913
Obs	4534	4534	4534	4534	4465	4316

Cluster-robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Replacing the dependent variable in the benchmark regression with the host country's exports and imports to China, the results are shown in columns (5) and (6) of Table 2. The

insignificance of the coefficients of the core explanatory variables of exports and imports can be seen, which indicates that the trade effect of the COCZ does not simply come from the export and import needs of Chinese enterprises to the host country, but from the sustainable trade effect generated by the COCZ's extensive deepening of the host country's trade radiation into the international market.

We can learn from numerous cases that the efficient functioning of the COCZ and consistent production of enterprises within it have an enduring influence on local and even the host country's trade activities. Jushi Egypt Glass Fiber Co., Ltd., located in the Suez Cooperation Zone of Egypt, established a world-class large-scale glass fiber production base in Egypt with an annual production capacity of 200,000 tons, filling the gap in the glass fiber production industry in Africa. The annual production value of the project exceeds USD 220 million, making Egypt the third largest glass fiber producer in the world after the United States and China.

It is worth noting that the impact of the COCZs on the host country's export scale is smaller than that of imports, mainly due to the long construction period of the COCZs, which requires a lot of infrastructure construction work such as municipal roads, water and electricity equipment, and housing before operation, resulting in a large demand for building materials imports; after operation, enterprises gradually settle in, and the related import demand is continuously extended on the timeline. Most of the COCZs focus on processing and manufacturing industries such as energy refining, textile leather, building materials machinery, and electricity, which require a large amount of imports of intermediate products and core technology equipment. After all, the benchmark analysis preliminarily confirms that the construction of COCZs has played a significant role in promoting the sustainable trade of the host country.

The above analysis can confirm Hypothesis 1 of this paper.

5.2. Validity of DID

The premise of the DID model to identify causal relationships is that the experimental group and the control group samples satisfy the parallel trend assumption, that is, the change in the trade level of the host country before the construction of the COCZ is consistent with other countries in the world without the construction of the COCZ. To this end, we first redefine the sample time, taking the year when the COCZ first entered the host country as the base year, and then set up a model like Equation (2) to estimate the difference of trade in the host countries before and after the base year.

$$\ln Trade_{it} = \beta_0 + \beta_1 \sum_k \beta_k COCZ_{ik} + \gamma X_{it} + \mu_i + v_t + \varepsilon_{it} \quad (2)$$

In Equation (2), $COCZ_{ik}$ represents whether the COCZ entered the host country in the k th year; if yes, it takes the value of 1, but otherwise 0. In order to observe more intuitively the change and significance of β_k , Figure 1 plots the coefficients of β_k in the interval of $-7 \leq k \leq 7$ and their 95% confidence intervals, where the explained variable in the left figure is the logarithm of the host country's exports, and the right figure is the logarithm of the host country's imports. From the figure, it can be seen that in the part of $-7 \leq k \leq -2$ in both the left and right figures, the confidence interval of β_k contains a zero value, that is, at the 5% significance level, the coefficient is not significant. This means that the parallel trend assumption holds. And in the interval of $k \geq 0$, the estimated coefficient of β_k gradually increases, indicating that the trade effect of the COCZs gradually emerges. In the part of $k \geq 6$ in the left panel and $k = 5$ and $k = 7$ in the right panel, β_k is significantly positive, indicating that there is a significant and sustainable trade effect of COCZ.

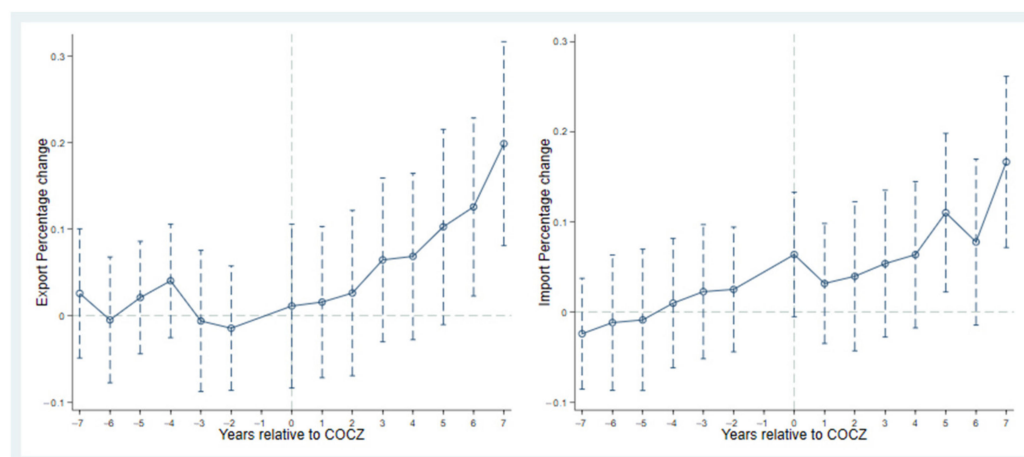


Figure 1. Validity of DID.

5.3. Placebo Test

This section carries out two placebo tests to further verify the robustness of the baseline regression results.

(1) Similar to Topalova [55], the first placebo test involves regressing with a fictitious event time, that is, to set the time when the COCZ enters the host country at some period before the actual construction time, and at the same time, delete the sample when the event actually occurred in the treatment group and subsequent years in order to examine whether there is still a sustainable trade effect. The premise of DID is that there is no significant difference in host country's trade before the entry of COCZs, so if the entry time of the COCZ is artificially advanced and observations after actual entry of COCZ are removed, then the estimated coefficient of the core variable in this period is expected to be insignificant. On the contrary, if the estimated coefficient of the fictitious event variable *COCZ_false* is significant, it means that there are different systematic trends between treatment group and control group countries. Excluding the impact of COCZs, there are some potential unobservable factors that affect the host country's trade.

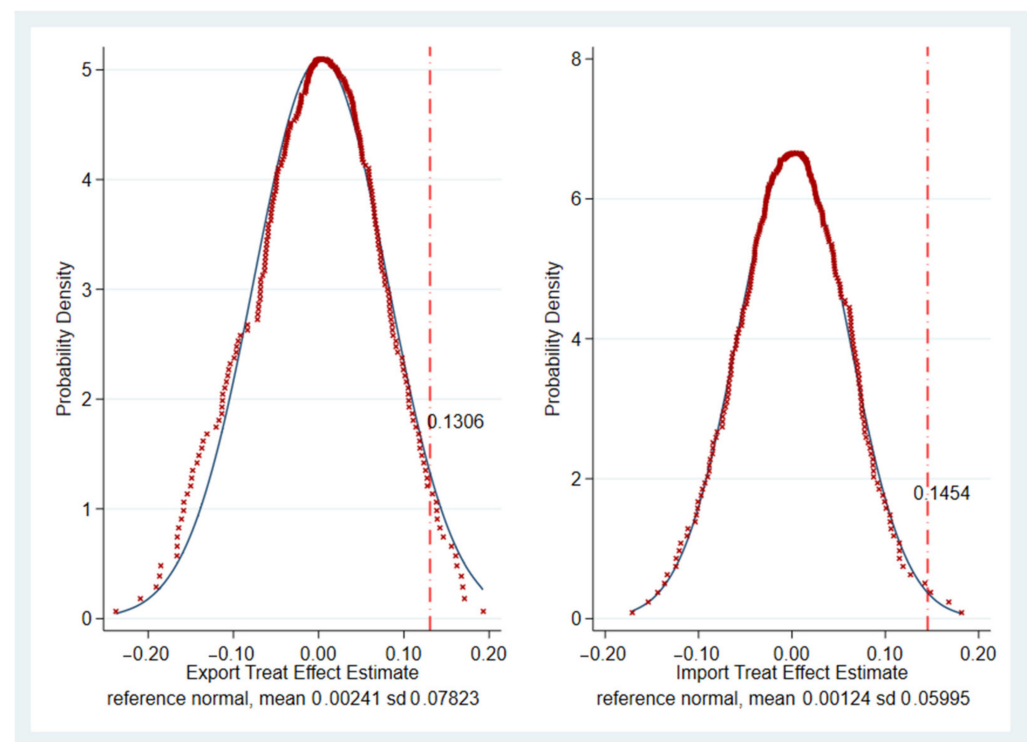
In order to ensure the robustness of empirical results, this section sets the fictitious event shock time as 2–5 years before the actual entry year of COCZs, and columns (1) to (4) of Table 3 report, respectively, the corresponding estimation results with host country exports as the explained variable. We found that although the core variable estimation coefficient is positive, it is not significant, allowing us to exclude other potential unobservable events impacting host country trade to a certain extent.

(2) Randomly selecting the experimental group. Similarly, we also randomly select the host countries of COCZ as the treatment group and conduct a random sampling placebo test. The sample of this chapter includes 175 countries and regions, of which 37 have COCZs. From this, a dummy variable was generated by randomly extracting 37 countries from the total sample of 175. Since the “pseudo” treatment group is randomly generated, it should not have a significant impact on the host country's imports and exports, otherwise there will be identification bias in the baseline model. We repeated the aforementioned process 500 times and performed regression analysis in turn. The coefficients of the dummy variable obtained are shown with red symbol in Figure 2. It is apparent that the coefficient's mean value is near 0. However, the actual estimated coefficients of 0.1306 and 0.1454 which are shown in red dashed line are prominent outliers in the figure. These outliers suggest that the benchmark regression's conclusions are reliable.

Table 3. Placebo test: conduct a fictitious event shock.

	(1)	(2)	(3)	(4)
Variables	Before 2 Years	Before 3 Years	Before 4 Years	Before 5 Years
COCZ_false	0.033 (0.049)	0.033 (0.052)	0.052 (0.053)	0.061 (0.055)
lngdp	0.732 *** (0.073)	0.731 *** (0.073)	0.731 *** (0.073)	0.730 *** (0.073)
lnpop	1.105 *** (0.164)	1.105 *** (0.165)	1.105 *** (0.165)	1.105 *** (0.165)
Natural	0.020 *** (0.003)	0.020 *** (0.003)	0.020 *** (0.003)	0.020 *** (0.003)
_cons	−7.921 *** (2.688)	−7.920 *** (2.688)	−7.915 *** (2.689)	−7.917 *** (2.689)
Country_FE	Yes	Yes	Yes	Yes
Year_FE	Yes	Yes	Yes	Yes
r2_a	0.978	0.978	0.978	0.978
Obs	4167	4167	4167	4167

Cluster-robust standard errors in parentheses. *** $p < 0.01$.

**Figure 2.** Placebo test: randomly sampling.

5.4. Robustness Checks

(1) Generalized synthetic control method. The baseline regression may also be affected by reverse causality. In the host country selection, development enterprises may prefer countries with greater economic development potential and friendly political relations with China, and the host country's trade growth may be the result of self-selection. The existing literature mostly uses the propensity score matching (PSM) method to solve this problem, looking for an ideal control group for each host country and conducting counterfactual analysis. However, when this method is applied to country-level data with a small sample size, it may produce inappropriate matching problems due to the violation of the common support assumption, resulting in inaccurate estimation results. In contrast, the synthetic control method is more suitable for quasi-natural experiments with a small sample size [56].

Since the number of selected COCZs is large, it is difficult to reflect the overall effect of COCZs by evaluating them individually, and the classical synthetic control method can only evaluate the treatment effect of a single treatment group individual, so this paper uses the generalized synthetic control method [57] to evaluate the impact of COCZs at the same time. The generalized synthetic control method combines the traditional synthetic control method with linear interactive fixed effects. On the one hand, it makes the COCZ construction related to unobservable individual heterogeneity and time heterogeneity, which is more in line with the parallel trend assumption condition of the DID model; on the other hand, it can construct counterfactual control groups for multiple host countries at the same time, improving the interpretability of the final results.

Figure 3 shows the estimation results with the logarithm of total exports of host countries as the dependent variable. It can be seen that there is no significant difference between host countries and the constructed counterfactual control group. The export effect of COCZ begins to appear in the year when COCZ construction begins, and this effect increases year by year. It remains significantly positive at the 1% level in the years after COCZ entry, indicating that the results in the baseline regression are robust.

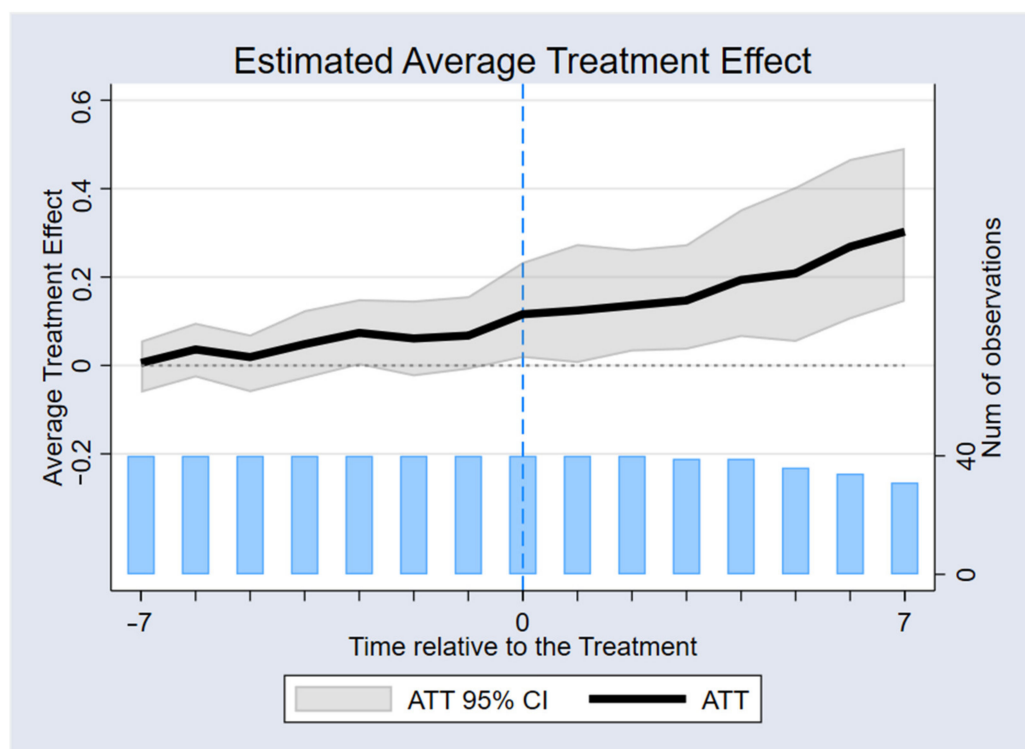


Figure 3. Robustness check: generalized synthetic control.

In addition to using the generalized synthetic control method for estimation, we also adopt the traditional matching method and select the neighboring countries of all the COCZs as the control group for the robustness test. The coefficients of the core explanatory variables in the regression results are reduced, but still remain significant. The detailed results are shown in Table 4, which further verifies the robustness of the baseline regression conclusion.

Table 4. Robustness check: using adjacent countries as control group.

	(1)	(2)
Variables	lnexportv	lnimportv
COCZ	0.055 * (0.029)	0.121 *** (0.024)
lngdp	0.748 *** (0.028)	0.677 *** (0.023)
lnpop	0.947 *** (0.063)	0.786 *** (0.052)
Natural	0.023 *** (0.001)	0.001 (0.001)
_cons	−5.606 *** (1.079)	−2.012 ** (0.893)
Country_FE	Yes	Yes
Year_FE	Yes	Yes
r2_a	0.981	0.983
Obs	2159	2159

Cluster-robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

(2) Changing the scope of COCZ. There are 103 COCZs included in the statistical scope announced by the CCPIT. In addition to the above-mentioned COCZs, there are also many COCZs that have completed planning and construction and are operating normally, but have not been included in the statistical scope of the CCPIT for reasons such as relatively late construction time, relatively small profit scale, etc. Therefore, based on the Chinese Overseas Industrial Park Information Dataset [54], this section systematically identifies relevant official announcements and reports from the Ministry of Commerce and various official websites. The available information on COCZs is then integrated to obtain a total of 208 unique COCZs. The scope of COCZs is subsequently reset to 208, followed by re-running the baseline regression. As presented in Table 5, the results do not differ significantly from the baseline regression outcomes, apart from a slight rise in the regression coefficients. This suggests that the estimation results of the baseline regression are stable.

Table 5. Robustness check: changing the scope of COCZ.

	(1)	(2)
Variables	lnexportv	lnimportv
COCZ208	0.120 *** (0.027)	0.137 *** (0.020)
lngdp	0.748 *** (0.025)	0.645 *** (0.019)
lnpop	1.100 *** (0.062)	0.909 *** (0.047)
Natural	0.021 *** (0.001)	0.003 ** (0.001)
_cons	−7.995 *** (0.987)	−3.635 *** (0.740)
Country_FE	Yes	Yes
Year_FE	Yes	Yes
r2_a	0.979	0.983
Obs	4534	4534

Cluster-robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$.

(3) Adding more control variables. We further include the number of free trade zones (*ftan*) of the host country in that year obtained from the WTO website, control variables reflecting the level of infrastructure of the host country, including the proportion of population with electricity (*Elc*) and the logarithm of annual air passenger volume

(*lnair*) of the host country, and control variables reflecting the completeness of the financial system, including the nominal exchange rate (*lnrate*) and the ratio of broad money to GDP (*lnM2*) of the host country. The final regression results are shown in Table 6. As evident from the table, adding a considerable number of control variables did not result in any significant difference compared to the baseline regression, except for a decrease in sample size attributable to data availability. This indicates that our estimation results are robust.

Table 6. Robustness check: adding more control variables.

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	<i>lnexportv</i>	<i>lnimportv</i>	<i>lnexportv</i>	<i>lnimportv</i>	<i>lnexportv</i>	<i>lnimportv</i>
COCZ	0.080 ** (0.031)	0.120 *** (0.023)	0.065 ** (0.026)	0.103 *** (0.019)	0.067 ** (0.029)	0.102 *** (0.020)
<i>lngdp</i>	0.696 *** (0.027)	0.589 *** (0.020)	0.521 *** (0.026)	0.592 *** (0.019)	0.480 *** (0.028)	0.564 *** (0.020)
<i>lnpop</i>	1.241 *** (0.085)	0.760 *** (0.063)	0.883 *** (0.077)	0.646 *** (0.058)	1.168 *** (0.082)	0.922 *** (0.058)
Natural	0.024 *** (0.002)	0.002 (0.001)	0.019 *** (0.002)	0.002 (0.001)	0.021 *** (0.002)	0.003 *** (0.001)
<i>ftan</i>	0.009 *** (0.002)	−0.009 *** (0.001)	0.006 *** (0.002)	−0.006 *** (0.001)	0.018 *** (0.003)	0.005 *** (0.002)
<i>Elc</i>			0.007 *** (0.001)	0.008 *** (0.001)	0.006 *** (0.001)	0.007 *** (0.001)
<i>lnair</i>			0.021 ** (0.008)	0.018 *** (0.006)	0.023 ** (0.009)	0.016 ** (0.007)
<i>lnrate</i>					0.045 *** (0.013)	0.046 *** (0.010)
<i>lnM2</i>					0.283 *** (0.034)	0.350 *** (0.024)
cons	−9.760 *** (1.349)	−0.740 (1.004)	−3.175 ** (1.285)	0.466 (0.963)	−8.795 *** (1.375)	−5.409 *** (0.979)
Country_FE	Yes	Yes	Yes	Yes	Yes	Yes
Year_FE	Yes	Yes	Yes	Yes	Yes	Yes
<i>r2_a</i>	0.981	0.986	0.985	0.989	0.984	0.990
Obs	3488	3488	2591	2591	2147	2147

Cluster-robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$.

(4) Using the most recent data. In 2020, global trade suffered a severe blow due to the COVID-19 pandemic. The pandemic severely impacted the global supply chain, industry chain, and value chain, leading to a significant decline in global goods trade expectations in the coming months, even worse than the 2008 financial crisis. Our baseline regression analysis exclusively uses data that predate the emergence of COVID-19 to mitigate its potential impact. For this section, we conduct regression analysis using the most up-to-date country-level panel data from 1997 to 2021 and the COCZs list, which is presented in Table 7. The regression coefficient for the core explanatory variable does not significantly deviate from the baseline regression, suggesting that the use of the latest data has no effect on the results of this study. The findings of the baseline regression are robust.

5.5. Three Pillars of the Sustainable Trade Effect

In this section, we will conduct a detailed analysis of the COCZ's sustainable trade effects from three pillars: economic, societal, and environmental. After obtaining the relevant measurements, the paper will discuss the analysis in more detail in Section 6.

Table 7. Robustness check: using the data of 1997–2021.

	(1)	(2)
Variables	lnexportv	lnimportv
COCZ	0.123 *** (0.028)	0.141 *** (0.020)
lngdp	0.562 ** (0.240)	1.019 *** (0.064)
lnpop	0.896 (0.681)	0.897 *** (0.180)
Natural	0.021 * (0.011)	0.008 ** (0.003)
_cons	−12.041 (11.611)	−2.015 (2.897)
Country_FE	Yes	Yes
Year_FE	Yes	Yes
r2_a	0.973	0.981
Obs	4945	4945

Cluster-robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

5.5.1. Economic Pillar

The economic pillar measures an economy's ability to ensure and promote economic growth through international trade. After confirming the trade effect of the COCZs on the host country in benchmark regression in the previous section, this section will decompose this trade effect in different dimensions, so as to better understand the impact of the COCZs on the sustainable trade of the host country in the economic pillar.

To do so, first, the total import and export of the host country are decomposed into the product of export quantity and export price using the BACI database and regressed as explanatory variables, respectively, to explore the different effects of the COCZ on the export price and quantity of the host country. Second, the import and export products are categorized into capital goods, intermediate goods, and consumer goods, and the impact of the zone on the import and export of different types of products is evaluated. Third, we categorize the host country's trading partners and examine the specific countries with which the host country has experienced a significant increase in trade activity. Finally, we also use the global input–output table data to decompose the total exports of the host country using the idea of value added in exports and explore whether the zone can promote the value-added exports of the host country.

(1) Trade price and quantity. We break down the entire exports and imports of the host country into export and import quantities (lnexportq, lnimportq) as well as export and import prices (lnexprice, lnimprice). These serve as dependent variables for conducting regressions comparable to the baseline analysis. The findings are presented in Table 8. The effects of introducing COCZ on export quantity and export price are shown in columns (1) and (2) of Table 8, respectively. The findings indicate that the construction of COCZs considerably augments the export quantity of the host country while slightly decreasing the average export price. In addition, COCZs enhance both the quantity and price of imported goods, as evidenced in columns (3) and (4) of Table 8. We will further discuss the above outcomes in Section 6.

(2) Product type. Given the variety of export products in the host countries, the impact of COCZs on the import and export of different types of products may vary. In this section, we have utilized six-digit HS codes of import and export products offered by BACI along with comparison standards provided by WITS to classify them into BEC categories. Furthermore, we have divided the overall import and export into three groups, i.e., capital goods, intermediate goods, and consumer goods, to utilize them as independent variables for regression. The detailed regression outcomes can be found in Table 9. Overall, the results indicate that COCZs have a notable positive impact on the import and export of all

types of goods. A closer examination of product-specific coefficients reveals that COCZs mainly facilitate the export of capital goods and consumer goods, as well as the import of intermediate goods.

Table 8. Decomposition of trade effect: by quantity and price.

	(1)	(2)	(3)	(4)
Variables	lnexportq	lnexprice	lnimportq	lnimprice
COCZ	0.230 *** (0.044)	−0.099 *** (0.036)	0.089 *** (0.034)	0.057 ** (0.025)
lngdp	0.558 *** (0.037)	0.196 *** (0.030)	0.510 *** (0.028)	0.141 *** (0.021)
lnpop	0.827 *** (0.093)	0.277 *** (0.076)	1.565 *** (0.070)	−0.652 *** (0.052)
Natural	0.021 *** (0.002)	−0.000 (0.002)	0.004 ** (0.002)	−0.002 (0.001)
_cons	−2.184 (1.468)	−5.912 *** (1.200)	−12.518 *** (1.114)	8.764 *** (0.823)
Country_FE	Yes	Yes	Yes	Yes
Year_FE	Yes	Yes	Yes	Yes
r2_a	0.958	0.767	0.960	0.665
Obs	4534	4534	4534	4534

Cluster-robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$.

Table 9. Decomposition of trade effect: by product type.

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Capital Goods Export	Intermediate Goods Export	Consumer Goods Export	Capital Goods Import	Intermediate Goods Import	Consumer Goods Import
COCZ	0.206 * (0.119)	0.131 * (0.071)	0.195 * (0.103)	0.104 ** (0.053)	0.180 *** (0.054)	0.147 *** (0.044)
lngdp	0.730 *** (0.113)	0.778 *** (0.069)	0.311 ** (0.143)	0.798 *** (0.052)	0.669 *** (0.057)	0.670 *** (0.050)
lnpop	1.112 *** (0.273)	1.069 *** (0.148)	0.648 ** (0.312)	0.890 *** (0.125)	1.032 *** (0.137)	0.915 *** (0.098)
Natural	0.002 (0.006)	0.025 *** (0.003)	0.005 (0.005)	0.007 ** (0.003)	0.004 ** (0.002)	0.001 (0.002)
_cons	−11.284 ** (4.446)	−8.526 *** (2.389)	0.816 (5.389)	−6.448 *** (2.087)	−6.556 *** (2.337)	−5.474 *** (1.638)
Country_FE	Yes	Yes	Yes	Yes	Yes	Yes
Year_FE	Yes	Yes	Yes	Yes	Yes	Yes
r2_a	0.940	0.979	0.963	0.974	0.980	0.983
Obs	4534	4534	4534	4534	4534	4534

Cluster-robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

(3) Trade partner. Columns (1) and (2) of Table 10 show the regression results with the logarithm of the import and export between the host country and its partner countries as the dependent variable, while columns (3) and (4) show the regression results with the logarithm of the import and export amounts between the host country and its non-partner countries as the dependent variable. It can be seen that the coefficient of the core explanatory variable COCZ in columns (1) and (2) is significantly positive, with the export result in column (1) being greater than that in the benchmark regression, while the coefficients in columns (3) and (4), although positive, are not statistically significant. This indicates that partner countries of the host country are the main driving force behind its trade growth. The use of a common language and similar colonial history can reduce communication costs between both parties, and cultural similarity has a positive impact on bilateral trade. Columns (1)–(4) also indicate that production and import–export activities of enterprises in

the zone still conform to the basic assumptions of traditional gravity models, with finished products flowing mostly to countries with lower trade costs.

Table 10. Decomposition of trade effect: by destination country.

	(1)	(2)	(3)	(4)
Variables	lnexpc	lnimpc	lnexpnc	lnimpnc
COCZ	0.232 ** (0.105)	0.250 ** (0.099)	0.039 (0.068)	0.081 (0.051)
lngdp	0.652 *** (0.097)	0.640 *** (0.087)	0.722 *** (0.092)	0.584 *** (0.052)
lnpop	1.493 *** (0.262)	0.868 *** (0.215)	0.693 *** (0.182)	0.994 *** (0.169)
Natural	0.019 *** (0.007)	0.005 (0.004)	0.016 *** (0.005)	0.001 (0.002)
_cons	−14.714 *** (4.186)	−4.366 (3.444)	−2.220 (3.107)	−5.147 * (2.759)
Country_FE	Yes	Yes	Yes	Yes
Year_FE	Yes	Yes	Yes	Yes
r2_a	0.974	0.979	0.971	0.979
Obs	4353	4353	4353	4353

Cluster-robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

(4) Value-added export. According to the framework proposed by Wang et al. [58], a country's total exports can be divided into four categories: domestic value added (DVA), returned domestic value (RDV), foreign value added (FVA), and double-counted items (FDC). DVA represents the domestic value added that is ultimately absorbed by foreign countries in all exports, while RDV refers to the portion of domestic value added that is first exported to foreign countries, but then re-imported by the home country and finally consumed domestically. FVA refers to the value added from exporting countries and other third countries used in producing a country's export products. In addition, due to the multiple border crossings required for intermediate goods trade between countries, these intermediate goods are often counted multiple times in overall export accounting and are referred to as double-counted items.

By using cross-border input–output table data for 189 countries and 26 sectors provided by the EORA database from 2001 to 2015, regression results for each of these categories can be obtained as shown in Table 11. Comparing the estimated results of columns (1) and (3), it can be seen that the promotion effect of COCZ construction on the host country's DVA reached 5.0% and had a statistical significance of 10%. In contrast, the promotion effect of COCZs on FVA was only 3.2% and was not statistically significant. This indicates that the mode of production division change brought about by COCZs is more about processing by setting up factories locally and transferring more production links to host countries, which is significantly different from the low-value-added processing trade production activities that most developing countries are engaged in.

Further comparison of the coefficients in each column shows that the promotion effect of COCZs on RDV is the largest, reaching 17.4%, and has a statistical significance at the 1% level. RDV has the characteristic of being exported first and then re-imported, ultimately focusing on domestic demand in the home country, to some extent representing a new mode of foreign trade dominated by domestic demand.

5.5.2. Societal Pillar

The societal pillar matters in regard to an economy's capacity to trade internationally over the long term. Economies are measured on the environment that encourages and supports the development of human capital, such as the extent of education and labor standards. This pillar also captures factors that influence public support for trade expansion.

They include income inequality, political stability, goods produced by forced and child labor, and the government response to human trafficking.

Table 11. Decomposition of trade effect: by value-added export.

	(1)	(2)	(3)	(4)
Variables	lnDVA	lnRDV	lnFVA	lnPDC
COCZ	0.050 * (0.027)	0.174 *** (0.043)	0.032 (0.044)	0.020 (0.046)
lngdp	0.484 *** (0.026)	0.820 *** (0.042)	0.131 *** (0.043)	0.095 ** (0.044)
lnpop	0.614 *** (0.074)	1.156 *** (0.121)	0.155 (0.123)	0.078 (0.128)
Natural	0.007 *** (0.001)	0.002 (0.002)	0.006 ** (0.002)	0.006 ** (0.002)
_cons	1.520 (1.193)	−17.074 *** (1.943)	9.912 *** (1.982)	10.395 *** (2.057)
Country_FE	Yes	Yes	Yes	Yes
Year_FE	Yes	Yes	Yes	Yes
r2_a	0.988	0.989	0.973	0.972
Obs	2818	2819	2839	2839

Cluster-robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

This section mainly verifies the sustainable trade effect of COCZs from two aspects. Firstly, due to the significant differences in the economic foundation and industrial structure of different host countries, the role played by COCZ will also be different. This paper will focus on exploring whether COCZs have a stronger trade promotion effect in economically underdeveloped areas and can thus make a more important contribution to sustainable development. Secondly, we demonstrate the sustainable trade effect of COCZs from a social perspective by examining their investment and poverty reduction effects.

(1) Heterogeneity analysis based on host country. This section added the interaction terms between the core explanatory variables and control variables to the benchmark regression model to explore the heterogeneous impact of COCZs on the host country. Columns (1) and (4) of Table 12, respectively, added the interaction terms between COCZ and host country's per capita GDP, and the coefficient of the interaction term was significantly negative, indicating that COCZ can better boost the import and export scale of host countries with relatively low per capita GDP. Columns (2) and (5) added the interaction terms between COCZ and host country's natural resource output ratio, and the coefficient of the interaction term was significantly positive, indicating that COCZ has a greater impact on areas with abundant natural resources. This is also a significant feature of most countries and regions along the Belt and Road. Therefore, we further included the interaction terms between "Belt and Road" countries and core explanatory variables in columns (3) and (6), and the results were consistent with expectations, with a positive coefficient indicating that COCZs located in "Belt and Road" countries have a stronger promotion effect on import and export in host countries.

(2) COCZ's effect on FDI and unemployment. The sustainable development effect of the COCZs on the host country is also reflected in the fact that the COCZs can bring a large amount of foreign investment to the host country, thereby creating a large number of job opportunities for the host country and achieving the effect of reducing poverty. Foreign investment can directly provide capital support for the country, expand the volume of domestic investment, and solve the problem of insufficient domestic funds by supplementing the capital required for enterprise production to promote economic growth. Foreign investment can also bring technology and management experience to the host country, promoting industrial upgrading and transformation. In addition, foreign investment can create a large number of job opportunities for the host country, alleviate the problem of

high unemployment rate, and improve residents' income level and regional tax revenue. These effects help to achieve the sustainable development goals of the host country.

Table 12. Heterogeneity analysis based on host country's characteristics.

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	lnexportv	lnexportv	lnexportv	lnimportv	lnimportv	lnimportv
COCZ	0.517 *** (0.143)	0.119 *** (0.033)	0.063 * (0.037)	0.951 *** (0.105)	0.141 *** (0.025)	0.050 * (0.027)
COCZ#lngdp	−0.047 *** (0.017)			−0.096 *** (0.012)		
COCZ#Natural		0.005 * (0.003)			0.004 * (0.002)	
COCZ#belt			0.123 *** (0.047)			0.187 *** (0.035)
lngdp	0.772 *** (0.022)	0.780 *** (0.022)	0.774 *** (0.022)	0.627 *** (0.016)	0.645 *** (0.016)	0.635 *** (0.016)
lnpop	1.018 *** (0.055)	1.029 *** (0.056)	1.031 *** (0.055)	0.818 *** (0.041)	0.847 *** (0.042)	0.858 *** (0.041)
Natural	0.025 *** (0.001)	0.025 *** (0.001)	0.025 *** (0.001)	0.002 * (0.001)	0.002 * (0.001)	0.002 ** (0.001)
_cons	−6.931 *** (0.897)	−7.183 *** (0.910)	−7.137 *** (0.887)	−2.086 *** (0.663)	−2.686 *** (0.678)	−2.781 *** (0.660)
Country_FE	Yes	Yes	Yes	Yes	Yes	Yes
Year_FE	Yes	Yes	Yes	Yes	Yes	Yes
r2_a	0.982	0.982	0.982	0.987	0.987	0.987
Obs	4107	4107	4089	4107	4107	4089

Cluster-robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

To verify the above analysis, in columns (1) and (2) of Table 13, we replace the dependent variable of the benchmark regression with the logarithm of the host country's FDI and the ratio of the host country's FDI to its GDP, respectively. The results show that the construction of the COCZs increased the host country's total foreign investment by 10.3%. In addition, the COCZs also significantly increased the share of the host country's total foreign investment in its GDP. Furthermore, we select the unemployment rate indicator of the host country as the dependent variable and perform regression. The results are shown in column (3) of Table 13, indicating that the construction of the COCZs can significantly reduce the unemployment rate level of the host country. In addition to using the above macro data for analysis, we use 6386 cross-border greenfield investment data of Chinese enterprises from fDi Markets from 2003 to 2019 and aggregate them by the year and host country of investment. We obtain panel data at the country-year level and connect it with the COCZ data mentioned above to generate corresponding dependent variables for regression. The regression results are shown in columns (4) and (5) of Table 13. The dependent variable in column (4) of Table 13 is the amount of China's greenfield investment in the host country obtained by aggregating micro data. The results show that at the 10% significance level, the coefficient of the COCZ variable is significantly positive, and its numerical size is not much different from the benchmark result, which further verifies that the investment effect of the COCZ is significant. Column (5) of Table 13 further replaces the dependent variable with the number of jobs created by greenfield investment projects in the host country and aggregates them for regression. The results show that the core variable coefficient is significantly positive, indicating that the COCZs have fully driven local employment, creating a large number of jobs in construction and operation, production within the zone, and surrounding secondary industries.

Table 13. COCZ's investment and poverty reduction effects.

	(1)	(2)	(3)	(4)	(5)
Variables	lnFDI	Fdiratio	Unemployment Rate	Greenfield	Jobs Created
COCZ	0.103 * (0.062)	0.915 *** (0.339)	−0.505 * (0.300)	0.487 * (0.258)	0.505 * (0.300)
lngdp	1.019 *** (0.065)	−0.189 (0.353)	−2.502 *** (0.151)	−0.469 * (0.268)	−0.421 (0.310)
lnpop	0.897 *** (0.180)	0.617 (0.983)	−0.521 (0.396)	−1.068 (0.802)	−0.845 (0.881)
Natural	0.008 ** (0.003)	0.005 (0.018)	0.014 * (0.007)	0.010 (0.019)	0.008 (0.021)
_cons	−2.015 (2.897)	−3.072 (15.806)	36.793 *** (6.565)	23.526 * (13.145)	20.031 (14.647)
Country_FE	Yes	Yes	Yes	Yes	Yes
Year_FE	Yes	Yes	Yes	Yes	Yes
r2_a	0.886	0.592	0.957	0.482	0.498
Obs	2885	2899	3982	2248	2248

Cluster-robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

5.5.3. Environmental Pillar

The environmental pillar measures the extent to which an economy's trade supports sustainable resources. The factors include measurements of non-renewable natural resources in trade and the management of externalities that arise from economic growth and participation in the global trading system. While an economy's capacity to participate in the global trading system is dependent on economic development, achieving sustainable trade requires prudent stewardship of natural resources and limiting externalities in an economy's economic calculus to promote its overall environmental capital.

Following Liu et al. [59], we define three classes of green products based on different standards. Class A EGs incorporate all industrial goods for providing environmental services, including “end-of-pipe products(A1)”, “cleaner technologies and products(A2)”, and “Other EGs(A3)”. Class B EGs are more environmentally friendly compared to their substitutes and complement in their production, end-use, and disposal, including “Clean Technologies(B1)” and “Environmentally Preferable Products(B2)”. Both Class A and Class B of EGs are based on the definitions of the OECD and APEC. Class C EGs are drawn from the list in Trade in Environmentally Sound Technologies published by the United Nations Environment Programme (UNEP), including “products on air pollution control(C1)”, “Solid and hazardous waste management(C2)”, “Wastewater management and water treatment(C3)”, “Clean up or remediation of soil and water(C4)”, “Renewable energy(C5)”, “Environmentally preferable products (C6)”, and “EST-EGs with clearer environmental end-use(C7)”.

We sum up the above items and use them as the dependent variables for regression. The regression results are shown in Table 14. The coefficients of the COCZs in columns (1) and (2) of Table 14 are significantly positive at the 1% significance level, indicating that the production and operation activities within the COCZs significantly promote the export of green products in the host countries. Comparing the coefficients in columns (1) and (2) with those in the benchmark regression in Table 2, we can see that the driving effect of the COCZs on green products is much higher than that on the total exports of the host countries. Further replacing the dependent variable with the products in columns (4) and (5) of Table 14, we can see that although the regression coefficients have decreased, they still remain significant at the 10% level, which further verifies the robustness of our conclusions.

Table 14. COCZs' trade effect of environmental goods: Class A and Class B EGs.

	(1)	(2)	(3)	(4)	(5)
Variables	IngreenA1	IngreenA2	IngreenA3	IngreenB1	IngreenB2
cocz	0.186 *** (0.063)	0.295 *** (0.081)	0.087 (0.092)	0.122 * (0.070)	0.102 * (0.067)
lngdp	0.635 *** (0.062)	0.678 *** (0.080)	0.447 *** (0.091)	0.504 *** (0.069)	0.263 *** (0.074)
lnpop	1.082 *** (0.170)	0.726 *** (0.218)	1.090 *** (0.249)	0.924 *** (0.189)	0.408 ** (0.201)
Natural	0.005 (0.003)	0.007 (0.004)	−0.008 (0.005)	−0.000 (0.004)	0.013 *** (0.004)
_cons	−11.646 *** (2.662)	−7.982 ** (3.420)	−11.718 *** (3.911)	−8.566 *** (2.960)	0.469 (3.152)
Country_FE	Yes	Yes	Yes	Yes	Yes
Year_FE	Yes	Yes	Yes	Yes	Yes
r2_a	0.959	0.943	0.922	0.951	0.941
Obs	3451	3442	3428	3450	3423

Cluster-robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Furthermore, we replace the dependent variable with different types of green products, and explore the impact of the COCZs on the export of different types of green products. The results in Table 15 show that the coefficients of the explanatory variables are all positive in all regressions, and the coefficients in columns (2), (3), (4), and (6) are significantly positive, indicating that the construction of the COCZs not only generates trade effects, but also greatly improves the export of solid waste and sewage treatment products in the host countries.

Table 15. COCZs' trade effect of environmental goods: Class C EGs.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	IngreenC1	IngreenC2	IngreenC3	IngreenC4	IngreenC5	IngreenC6	IngreenC7
cocz	0.097 (0.087)	0.166 ** (0.082)	0.134 * (0.080)	0.228 * (0.121)	0.110 (0.087)	0.462 *** (0.108)	0.137 (0.099)
lngdp	0.448 *** (0.087)	0.345 *** (0.082)	0.665 *** (0.079)	0.379 *** (0.129)	0.630 *** (0.087)	0.295 *** (0.110)	0.305 *** (0.099)
lnpop	0.383 (0.237)	1.298 *** (0.222)	1.089 *** (0.215)	1.662 *** (0.338)	0.868 *** (0.236)	0.841 *** (0.298)	0.754 *** (0.271)
Natural	−0.004 (0.005)	−0.001 (0.004)	0.007 * (0.004)	0.018 ** (0.007)	−0.009* (0.005)	0.002 (0.006)	0.007 (0.005)
_cons	−1.868 (3.732)	−14.014 *** (3.501)	−13.969 *** (3.376)	−23.590 *** (5.459)	−9.814 *** (3.713)	−7.763 (4.763)	−6.915 (4.290)
Country_FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year_FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
r2_a	0.933	0.937	0.942	0.870	0.934	0.912	0.922
Obs	3393	3423	3437	2930	3422	3223	3344

Cluster-robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

The above analysis can confirm Hypothesis 2 of this paper.

5.6. Mechanism

This section attempts to empirically test the mechanism proposed in theoretical analysis using econometric models. First, appropriate proxy variables are sought for institutional quality and infrastructure construction. Then, Equation (3) is constructed to examine the impact of COCZ on intermediate variables. If the coefficient of the core explanatory variable in the regression of Equation (3) is significant, it can be judged that the mechanism proposed earlier in this paper to generate sustainable trade effects is reasonable. Furthermore, based on the theoretical analysis in the previous section and the existing literature

on institutional quality [60–62] and infrastructure construction [63] affecting trade, we can construct a transmission chain for promoting sustainable trade development in host countries of COCZ.

$$Z_{it} = \alpha_0 + \beta \text{COCZ}_{it} + u_i + v_t + X_{it} + \varepsilon_{it} \quad (3)$$

At the institutional level, we use the Doing Business database and construct the scores of construction permits, property registration, and financing convenience as proxies for formal institutions and examine the impact of the COCZs on each sub-indicator. The dependent variables in columns (1)–(3) of Table 16 are the scores of construction permits, property registration, and financing convenience, respectively. The results show that at the 5% significance level, the coefficients of the core explanatory variables are all significantly positive, indicating that the COCZ significantly improves the quality of formal institutions. In terms of construction permits, the management committee of the COCZ provides a “one-stop” service for enterprises in the zone, assists in arranging the bidding process for factory construction, and handles relevant procedures such as factory building permits, factory start-up certificates, and acceptance licenses. In terms of property registration, the development enterprises of the COCZ actively establish a contact mechanism with the foreign investment management department or investment promotion agency of the host country, provide relevant consulting services for enterprises in the zone to register in the host country, and assist enterprises in the zone to handle registration, environmental impact assessment, and planning design approval of investment projects, effectively shortening the time for enterprise registration, reducing the risk and difficulty of investing in the zone. In terms of financing convenience, the host government, the Chinese government, the provincial government where the development enterprise is located, and financial institutions all provide various fiscal and financial support policies for enterprises investing in the COCZ. Taking the Suez Economic and Trade Cooperation Zone as an example, the Tianjin Municipal Government provides a 5% annual subsidy based on the actual amount of Chinese investment in the registered capital for production and service enterprises established in the COCZ, and provides full subsidies for operating costs such as rent and electricity for service institutions such as catering, barber shops, clinics, and schools established in the COCZ.

At the informal institution level, this section examines the impact of COCZs on the host country’s informal institutions by using the Global Competitiveness Index (GCI) database and selecting the government ethics score and corporate ethics score as proxy variables. The regression results in columns (4) and (5) of Table 16 demonstrate that the COCZs effectively enhance the quality of the host country’s informal institutions. In terms of governmental ethics, COCZs have a “window effect” which can facilitate the establishment of free economic zones and even foster market-oriented reforms in the host countries. The efficient operation and strong profitability of COCZs have led some host countries to recognize the importance of COCZs in fostering local economies and supporting industrial transformation and advancement. This has helped to overcome the limitations in the local government’s understanding of international economic cooperation strategies. In terms of corporate ethics, companies within the zone can create a spill-over effect of experience by partnering with local upstream and downstream businesses and improving the management methods of local enterprises. The committed and hardworking corporate culture of Chinese enterprises within the zone can impact the operating style of nearby businesses and strengthen their self-discipline concerning supply quality, contract execution, and other related matters.

At the infrastructure level, investing in infrastructure construction in COCZs accelerates the connectivity of the host country’s transportation and electricity infrastructure. According to the results in column (1) of Table 17, the core explanatory variable is significant at 10%, revealing that the entry of COCZs overall stimulates the construction of transportation infrastructure in the host country. The dependent variables in columns (2) and (3) of Table 17 are road construction quality (roadquality) and railway construction mileage (railkilo), respectively. Column (4) employs the electricity infrastructure score (electricity)

as the dependent variable. The results demonstrate that the key explanatory variable remains significant. The construction and operation of COCZs have significantly expanded the scale and quality of the host country's infrastructure that provides transportation services for residents' travel and product transportation, such as highways, railways, ports, airports, and urban roads. Some trade and logistics COCZs include transportation hub construction in their layout, which creates a convenient transportation network and provides an industrial foundation for the growth of the local transportation and logistics industry. For example, China Communications Construction Co., Ltd. (Beijing, China), which has built the Ethiopia–China Communications Industrial Park in Ethiopia, also undertook the Ethiopia–Mojo–Hawassa Expressway Project. The China–Russia Tomsk Timber Industry and Trade Cooperation Zone has four railway lines totaling 15 km. The glue workshop of the particleboard project has a dedicated railway line for entering the warehouse. The China–Russia Agricultural Industrial Cooperation Zone has a 9.1-km railway line connecting with the Siberian Railway, and has three railway freight stations within the zone.

Table 16. Mechanism at the institution level.

	(1)	(2)	(3)	(4)	(5)
Variables	Construct	Property	Credit	Ethic_Gov	Ethic_Firm
COCZ	6.923 ** (2.961)	4.626 ** (1.873)	5.209 ** (2.439)	0.184 *** (0.067)	0.205 *** (0.064)
lngdp	−0.068 (3.150)	0.658 (1.753)	9.383 *** (2.917)	0.456 *** (0.105)	0.334 *** (0.125)
lnpop	−7.065 (9.568)	−5.672 (7.485)	18.376 ** (8.832)	−0.227 (0.364)	−1.026 ** (0.435)
Natural	0.033 (0.144)	0.128 (0.084)	0.055 (0.123)	−0.003 (0.004)	−0.008 (0.006)
_cons	170.985 (156.984)	142.944 (122.273)	−319.129 ** (140.676)	3.241 (5.981)	17.858 ** (7.219)
Country_FE	Yes	Yes	Yes	Yes	Yes
Year_FE	Yes	Yes	Yes	Yes	Yes
r2_a	0.768	0.881	0.811	0.944	0.966
Obs	2363	2499	2499	1173	869

Cluster-robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$.

Table 17. Mechanism at the infrastructure level.

	(1)	(2)	(3)	(4)
Variables	Transport	Roadquality	Railkilo	Electricity
COCZ	0.071 * (0.039)	0.093 * (0.055)	0.030 ** (0.015)	2.623 ** (1.048)
lngdp	0.263 *** (0.062)	0.295 *** (0.073)	0.028 (0.024)	3.268 ** (1.336)
lnpop	−0.946 *** (0.213)	−0.100 (0.229)	0.256 *** (0.082)	−39.171 *** (4.654)
Natural	−0.008 *** (0.003)	−0.007 * (0.004)	−0.006 *** (0.001)	−0.014 (0.055)
_cons	16.797 *** (3.477)	3.010 (3.723)	3.689 *** (1.353)	649.203 *** (74.960)
Country_FE	Yes	Yes	Yes	Yes
Year_FE	Yes	Yes	Yes	Yes
r2_a	0.972	0.925	0.995	0.873
Obs	869	1173	865	1722

Cluster-robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

The above analysis can confirm Hypothesis 3 of this paper.

6. Further Discussion

In this section, we will provide a detailed discussion about the role of COCZs in promoting sustainable trade through a variety of case studies and comparative analyses with the other literature.

6.1. Economic Sustainability

Economic sustainability is the approach whereby economic activities are conducted in such a way as to preserve and promote long-term economic well-being. In Section 5.5.1, the paper obtains results on different levels of decomposition in terms of trade prices and volumes, product types, trading partners, and value-added exports, all of which provide information on the role played by the zone in promoting sustainable trade.

For the results of trade price and quantity, COCZs can facilitate scale production through industrial agglomeration while implementing a low-profit and high-sales operation strategy, resulting in decreased export prices of related products. Furthermore, COCZs can reduce production costs by sharing infrastructure and importing higher quality machinery and equipment from China at relatively lower prices. Lastly, the entrance of COCZs changes the product structure of the host country's imports, from previously importing only primary products to importing electronic components, transportation equipment, and other intermediate inputs, making the import varieties more diverse and quality improved; thus, COCZs increase the quantity and price of the host country's imported products.

The heterogeneity of trade effects among different products may be due to the different categories of dominant industries selected by the COCZs. According to our manually collected data, approximately 10% of COCZs participate in the production of transportation equipment, with their finished goods primarily consisting of large-scale machinery such as cranes and excavators, which are classified as capital goods. The manufacturing of such machinery necessitates the importation of engines, chassises, glass, and other components from foreign countries by the COCZs. Therefore, COCZs result in an increasing need for intermediate goods imports. Additionally, 12% of these zones specialize in the textile and leather industry, focusing on producing various consumer goods such as finished fabrics, clothing, and leather products. As a consequence, these COCZs can significantly enhance consumer goods exports.

The decomposition of trade partners provides strong evidence that the promotion effect of imports and exports in COCZs is achieved in a sustainable manner that conforms to economic laws. For example, in Egypt's Suez Cooperation Zone, a giant Egyptian fiberglass manufacturer produces 99% of its capacity for export, with the Middle East and Turkey accounting for about 40% of the total capacity. In 2020, enterprises in Cambodia's Sihanoukville Special Economic Zone had an import–export volume of USD 1.565 billion, with ASEAN countries being their main export market.

The discussion above on economic sustainability is largely consistent with the existing literature [2,43,64] on trade in sustainable development. The regression results of this paper provide a more comprehensive conclusion for research in this field.

Finally, the decomposition of value-added trade shows that COCZs can promote more complex trade for host countries while creating more economic value. For example, in Russia, most of the COCZs, such as the Ussuriysk Economic and Trade Cooperation Zone, are dominated by the logging and wood processing industries. They adopt a cross-border chain processing mode of "Russia–China–Russia", conduct rough processing of logs in the COCZ, export semi-finished products with low or zero tariffs to the domestic market, fill the gap between supply and demand for Chinese logs, process boards into furniture products in port cities such as Dongning, and then export them back to Russia for sale. The furniture manufacturing industry in Russia's Far East has not yet formed a scale, and there is a large gap between strong demand and production bottlenecks. Chinese manufacturers produce according to drawings and samples provided by Russian merchants, which conforms to local living habits. This finding may be somewhat at odds with existing findings [3] that

cooperative districts limit the growth of their positions in GVCs to some extent and may require further investigation in the future.

6.2. Social Sustainability

Social sustainability ensures that social factors such as fairness and labor standards are taken into account, thereby contributing to a more balanced and sustainable approach to international trade. Jaffee [65] posits that while trade promotes economic growth, it can potentially undermine social sustainability, while Pelletier et al. (2018) [66] also confirm the importance of a life-cycle-based assessment of social risks to support policies for socially sustainable production and consumption. Our previous results in Section 5.5.2 show that COCZs can have a positive effect in achieving social sustainability through trade. Countries with lower per capita GDP and higher dependence on natural resources usually have poor institutional quality, strong barriers to foreign investment entry, and surplus local labor. COCZs can solve these problems well, thus promoting sustainable import and export in host countries.

The social sustainability of COCZs is also reflected in the fact that they can promote the development of related industries in the host country, increasing the industrial value added and competitiveness of the host country. For example, China's Phnom Penh Economic Zone in Cambodia attracted more than 100 Chinese and foreign enterprises to settle in, covering clothing, electronics, machinery, food, and other fields, creating nearly 20,000 jobs for Cambodia and promoting the optimization and upgrading of Cambodia's economic structure. The COCZs, as a high-level platform for opening up, have fully realized the co-construction, co-sharing, and win-win cooperation in the process of undertaking China's OFDI and have made the Chinese-style modernization achievements benefit the people of the host countries more and more equitably.

6.3. Environmental Sustainability

Sustainable trade can be achieved by promoting environmental protection, reducing greenhouse gas emissions, and conserving natural resources [52,67]. However, there is a controversy in the existing literature regarding the trade-offs among economic development, international trade, and environmental protection. Some scholars argue that international trade and economic development have a negative impact on the environment, while others argue the opposite. Some of the literature [68] proposes the "pollution haven hypothesis", which suggests that developed countries have stricter environmental regulations so that pollution-intensive industries move to developing countries with more lenient environmental regulations, making developing countries "pollution havens". Some of the other literature [69] suggests that international trade and environmental protection are not necessarily mutually exclusive but can be mutually reinforcing. Some studies have shown [70] that international trade can promote the transfer of environmental technologies and improve environmental governance. Overall, there is still much controversy surrounding this issue, and further research and discussion are needed.

Based on our research in Section 5.5.3, we find that many COCZs prioritize the introduction of green enterprises in the process of attracting investment. They encourage enterprises in the zone to adopt low-carbon production processes, energy-saving and water-saving technologies, and to fully exploit the potential for energy conservation. For example, the Thai-Chinese Rayong Industrial Park, in line with the BOI's investment incentive policy, positions itself as an environmental industrial park and requires enterprises to fill the domestic industrial gap or have advanced production processes. Enterprises that are highly polluting, energy intensive, and have low value added may not be allowed to enter.

7. Concluding Remarks

7.1. Conclusions

In conclusion, this study comprehensively analyzed the sustainable trade promotion impact of China's Overseas Economic and Trade Cooperation Zones (COCZs) using panel

data that span from 1996 to 2019 through a difference-in-differences model. The results validate three principal hypotheses. Firstly, our findings strongly support Hypothesis 1, indicating that the introduction of COCZs expands the size of the host country's import and export trade in a significant and sustainable manner, with average growth rates of 14.54% and 13.06%, respectively. Secondly, the study confirms Hypothesis 2, which identifies three dimensions that COCZs utilize to promote sustainable trade. These dimensions are economic, improving industrial competitiveness in the host country; societal, creating employment opportunities and attracting foreign investment; and environmental, by promoting eco-friendly industrial development and exporting green products. Lastly, Hypothesis 3 is validated, demonstrating that the mechanism underpinning sustainable trade in COCZs revolves around the improvement of institutional quality and infrastructure. Therefore, this comprehensive analysis confirms not only the considerable sustainable trade impact of COCZs but also elucidates the detailed dimensions and mechanisms by which these COCZs contribute to the economic, societal, and environmental sustainability of the host country, aligning with the stated hypotheses.

7.2. Policy Implications and Suggestions

While demonstrating its contribution to development, the construction of COCZs is also facing a series of challenges, including unclear division of responsibilities among the management organizations of the zones and a weak industrial correlation between inside and outside COCZs. Based on the two levels of the Chinese government and zone developers, the study provides solutions to the problems exposed at the current stage of COCZs.

For the Chinese government, it should elevate the strategic height, incorporate it into the overall strategy of foreign investment, and lay out the construction of COCZs in a forward-looking manner. fully understand the development laws of different types of COCZs, flexibly formulate assessment and management methods for COCZs in combination with local resource endowments, policies and regulations, and set up incentives and penalties to guide the standardized and orderly development of zones.

For the development enterprises of COCZs, site selection decisions should be made carefully to take full advantage of the location of the host country. They should strengthen their social responsibility and pay attention to the localization of the zone. They should conduct detailed research on local entry thresholds and market demand, increase the proportion of local talents, and deepen communication and understanding with local departments and enterprises.

7.3. Limitations and Areas of Future Research

Firstly, the study is based on reduced-form regression analysis, which intuitively explains the trade effects generated by the COCZ. However, reduced-form estimation often relies on strong data assumptions and cannot conduct detailed counterfactual analysis. In future research, structural-form models can be constructed using detailed macro and micro data on trade in order to gain a deeper understanding of the COCZ's mechanism. Secondly, there are data limitations. Due to data availability, most of the study focuses on macro or industry-level analysis. In future research, more lists of companies in the COCZs can be identified and matched with micro databases to construct regression analysis based on firm-level data, thereby obtaining more robust conclusions and richer policy implications.

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