

Study on the Influence of New Coronavirus Epidemic on Container Cargo in China and Europe

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Abstract: Based on the data of container import and export cargo throughput of major coastal ports in China from February 2020 to November 2021, the Difference-In-Difference (DID) model was used to explore the impact of the widespread prevalence of the Delta variant of COVID-19 on the import and export cargo volume of marine containers between China and Europe. Different from the general market judgment, this study shows that the new coronavirus epidemic has a significantly positive impact on the import and export volume of containers in Central Europe. In this regard, shipping companies, port operators and relevant government departments should respond to new changes in the impact of the epidemic reasonably and effectively.

1. Introduction

The outbreak of the COVID-19 Pandemic (hereinafter referred to as the COVID-19) has brought a wide range of impacts on human production and life around the world. The shipping industry, as an indispensable channel of China's global value chain and industrial chain, has been greatly impacted [1]. For the shipping industry, the new coronavirus epidemic is a sudden external shock without any warning signals, which greatly affects the supply chain of shipping trade [2].

Although container shipping trade is showing signs of life with the economic recovery of many countries, the uncertainty of global epidemic situation has further increased with the emergence and widespread prevalence of variant strains of COVID-19 such as Delta. In October 2020, Delta variant strains began to spread widely in global regions. Among them, Europe was the most affected, and the World Health Organization announced on 26 October that Europe was in the "epicentre" of the COVID-19. As a result, the uncertainty of European container shipping market has greatly increased.

Based on the above epidemic changes, this paper attempts to study the operation of the maritime container freight market in China and Europe through the following innovations. First of all, this paper takes the second full outbreak of COVID-19 in Europe as the time node to explore the trend of the import and export volume of maritime containers between China and Europe. Secondly, against the background that Delta variant strains are widely spread in Europe, while Australia, New Zealand and Southeast Asia are not significantly affected, the import and export container volume between China and Europe is taken as the experimental group, and the import and export of containers between China, Australia, New Zealand and Southeast Asia is taken as the control group. The impact of new changes in the epidemic on the import and export container volume is compared and analysed.

2. Literature Review

The global shipping market has been greatly impacted. In terms of existing research, many scholars have studied the impact of the epidemic on shipping from the perspectives of ports, containers and dry bulk. For example, Narasimha et al. studied the impact of the epidemic on India's port transportation and maritime supply chain [3]; Millefori et al. used AIS data to calculate trends in maritime liquidity for all categories of commercial shipping [4]; Xu et al. used panel data of 14

major ports in China from January to October 2020 to analyse the impact of the epidemic on port throughput from two aspects : the severity of the epidemic and government control [5].

In the literature on the impact of the epidemic on shipping, some scholars also focused on the container transport market. Koyuncu et al. used time series models to test the relationship between short-term estimates of the RWI / ISL global container throughput index and COVID-19 to predict the negative impact of the COVID-19 pandemic on container markets [6].

By summarizing the relevant literature, it can be found that the research on the impact of the epidemic on the shipping market has involved many angles, but there are still the following shortcomings: Firstly, the current research mainly focuses on the direct impact of the early outbreak of the epidemic on shipping, and the development of the shipping industry in the post-epidemic era is relatively small. Secondly, most of the literature starts with the first outbreak of the epidemic at the beginning of 2020, and the research time is only one year. Few literature studies the different impacts of the second or even multiple outbreaks of the COVID-19. In view of the above research deficiencies, this paper takes the second outbreak of the COVID-19 as the time node to analyse the impact of the epidemic on container trade in the two years from 2020 to 2021, so as to provide reference for the study of the long-term impact of the epidemic on the development of the shipping industry.

3. Research Design, Indicator Selection and Data Sources

3.1. Research Design

In order to control the time factor and regional factor at the same time, this paper adopts the DID model, with October 2020 as the boundary, with China's container import and export freight to Europe as the experimental group, and China's container import and export freight to Australia, New Zealand and Southeast Asia as the control group, to empirically analyse the impact of the second outbreak of the epidemic on the volume of container import and export goods. The research model of this paper is as follows:

$$\ln ECT_{i,t} = \beta \text{treat}_i \times \text{time}_t + \gamma X_{i,t} + \mu_i + \delta_t + \varepsilon_{i,t} \quad (1)$$

$$\ln ICT_{i,t} = \beta \text{treat}_i \times \text{time}_t + \gamma X_{i,t} + \mu_i + \delta_t + \varepsilon_{i,t} \quad (2)$$

In the model (1) and (2), the explained variable $ECT_{i,t}$ represents the volume of container exports, $ICT_{i,t}$ represents the volume of container imports. Assuming that there are n samples in the T phase experiment, including p as the experimental group, $n-p$ as the control group, and the time node of the double difference model is October 2020, then n samples can be divided into four groups : (a) If $\text{time}_t = 1$, $\text{treat}_i = 1$, representing the experimental group after the second outbreak of the epidemic ; (b) If $\text{time}_t = 0$, $\text{treat}_i = 1$, represent the experimental group before the second outbreak ; (c) If $\text{time}_t = 1$, $\text{treat}_i = 0$, represent the control group after the second outbreak ; (d) If $\text{time}_t = 0$, $\text{treat}_i = 0$, represent the control group before the second outbreak. $X_{i,t}$ represents a series of control variables, μ_i and δ_t represent regional and monthly fixed effects, which are used to characterize regional and temporal characteristics that are difficult to measure by indicators, and $\varepsilon_{i,t}$ are introduced random errors. Among them the coefficient β is the most important indicator to measure the impact of the COVID-19.

3.2. Indicator Description

Two explanatory variables in this paper are container export volume and import volume. In order to make the choice of the experimental group and the choice of time more random, this paper also joined the control variables, Descriptive statistics are shown in Table 1. The number of confirmed cases in all regions of the world comes from the WHO official network. The number of confirmed cases in each province of China is from the national and provincial and municipal health committees; the strict index comes from OxCGRT. In order to reduce heteroscedasticity and improve the accuracy of the model, the explained variables are logarithmically processed. The strict index has hysteresis, so the first-order lag variable is adopted [7].

Table 1 Descriptive Statistics

Variable	Description	Sample	Mean	SD	Min	Max
ECT	Container monthly export cargo volume	616	105924	141100	204.0	636934
ICT	Container monthly import cargo volume	616	103265	137207	164.5	602172
Wcase	Monthly number of confirmed cases by region of the world	616	172565	226128	13	968452
Ccase	Monthly number of confirmed cases by province in China	616	75.83	124.0	1	829
Wstri(-1)	Monthly Stringency Index by Global Region	616	61.84	16.85	4.630	90.74
Cstri(-1)	China Monthly Stringency Index	616	72.92	8.237	54.17	81.94

Note: Figures in brackets (-) indicate lagged values, where (- n) is the nth month before the day examined.

4. Empirical Tests

In this paper, the samples are divided into two stages (February 2020 – October 2020 and November 2020 – November-2021) to examine the average changes in the import and export volume of containers between China and different areas. As can be seen from table 2, the impact of the second outbreak of COVID-19 on container import and export is positive. The reason for the high export coefficient of containers may be that the increasingly severe epidemic situation has greatly increased the demand for anti-epidemic materials. After the gradual resumption of reproduction, the export of anti-epidemic materials in China has increased significantly, and the export scale of anti-epidemic materials has continued to expand. The reason for the high import coefficient of containers may be that, after the impact of the COVID-19 in early 2020, foreign economic turmoil is relatively small and supply is relatively stable, while domestic economic development trend is positive and import demand is steadily increasing due to the control of the epidemic.

Table 2 Baseline Regression Results

	lnECT	lnECT	lnICT	lnICT
treat×time	0.090*** (0.017)	0.048*** (0.014)	0.091*** (0.017)	0.049*** (0.014)
Wcase		0.000*** (0.000)		0.000*** (0.000)
Ccase		-0.001*** (0.000)		-0.001*** (0.000)
Wstri(-1)		0.002*** (0.000)		0.002*** (0.000)
Cstri(-1)		0.001 (0.001)		0.001 (0.001)
cons	10.500*** (0.008)	10.382*** (0.052)	10.471*** (0.008)	10.357*** (0.052)
Regional fixed effect	Yes	Yes	Yes	Yes
Month fixed effect	Yes	Yes	Yes	Yes
N	616.000	616.000	616.000	616.000
F	28.77	77.50	29.01	76.41
r ²	0.047	0.399	0.047	0.396

Note: Standard errors in parentheses, where ***p < 0.01, **p < 0.05, *p < 0.1. Figures in brackets (-) indicate lagged values, where (- n) is the nth month before the day examined.

The increase in confirmed cases in all regions of the world has a positive impact on container import and export. For container export, it is because with the increasingly severe overseas epidemic situation, the demand for epidemic prevention products increases. For container imports, The import volume of China's main imports such as raw materials will rise with the recovery of domestic industrial production.

The increase in confirmed cases in each region of the world has a negative impact on the import and export of containers. The reason may be related to the inspection and quarantine procedures of the port. The more serious the epidemic situation in the port location is, the more stringent the

inspection and quarantine of port entry-exit containers will be, which will reduce the efficiency of port container loading and unloading, and thus cause the tension of port logistics. But the impact of strict domestic index on container import and export is not obvious.

5. Conclusion

According to the fact that Europe is more affected by the delta variant, with the help of the DID model, this paper finds that COVID-19 has a significant positive impact on the import and export of container shipping between China and Europe. This paper puts forward the following countermeasures and Suggestions according to the above analysis conclusion.

(1) Shipping enterprises adapt to the new economic situation, formulate the epidemic management plan, and prepare for the sudden outbreak of the epidemic in the port area; to understand the epidemic prevention and control policies in the cities where the port is located in advance and comply with the local epidemic prevention and control policy requirements.

(2) The government should strengthen the capacity-building of port infrastructure, improve the level of port intelligence, promote the construction of automation and intelligent shipping, and improve the efficient level of shipping supply chain.

(3) Countries should strengthen global collaboration in the context of the epidemic. Countries around the world should build on their respective advantages, create more opportunities for cooperation, create a mutually beneficial situation and contribute to the common development of all mankind and the fight against the COVID-19.

This paper studies the impact of the second large-scale outbreak of the COVID-19, that is, the widespread spread of Delta variant strains on China 's container import and export trade. At present, the epidemic of new coronavirus pneumonia is still spreading globally, and the impact on the world economy and international trade and investment is still continuing. The new variant strain named Omicron began to spread widely. In view of the different influence of Omicron in different regions of the world, the research model in this paper still has reference significance. Inadequacy lies in, this article only carries on the analysis in the container transportation market plate, and the later research may further expand the market, the analysis epidemic situation to the different shipping market influence.

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