

審査の結果の要旨

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Container transport has been so closely connected with macro economy since its birthday in 1956, and now more than half international seaborne trade in terms of value are carried by containers from frozen tuna to aircraft parts.

As port infrastructure are generally considered to be a long-term investment offering steady returns and container transport has exhibited quite potential due to its unique contribution to globalization, container terminal financing and investment has become one of the choices for government, asset managers, corporate investors and even public pension funds. Definitely, supply demand analysis in such kind of capital-intensive industry will be dealt seriously for every specific case.

Container throughput is taken as demand factor in supply demand analysis since container terminals charge carriers by container movement between terminal and vessel, namely container throughput. Therefore, container throughput research is always a hot topic in container transport field.

Due to its close connection with national or regional economic development, container throughput was always analyzed by macro indicators in regression approach, especially GDP data was always adopted integrally to make regression analysis with container throughput. However, most researches focused on statistical model comparison or optimization but rarely discussed economic facts behind container throughput and macro indicators.

Meanwhile, system structure evaluation was hardly found in most past researches while term of data series and data processing were seldom mentioned. However, a stable system structure was a sufficient condition for sound regression. Furthermore, this study did not find any structural analysis on relationship between container throughput and various industries in macroeconomic structure which could tell us more information of container throughput generation mechanism.

After literature reviewing, System of National Account (SNA) was recognized as a treasure for macroeconomic analysis when GDP data was just one of macroeconomic indicators. SNA did not only provide statistics data source but also many efficient methodologies for macroeconomic analysis, just like GDP expenditure approach or input-output analysis.

By use of SNA's methodologies, this study firstly raised question on GDP as a suitable variable to explain container throughput after examining economic facts behind GDP and container throughput and re-organized aggregate regression analysis methodology while proposing structural analysis methodology for national container throughput analysis before we tried to integrate aggregate and structural analysis together.

Firstly, this study confirmed causal but independent relationship between container throughput and macro indicators in national account. Secondly, this

study distinguished business model from statistical model and made first attempt to create business model against container throughput generation mechanism which divided gross container throughput into domestic, international and international transshipment segments by trade nature. Thirdly, gateway container throughput not gross container throughput was identified to be more easily correlated with macro economy while international transshipment throughput did not make remarkable contribution to hub's economy. Finally, data series' term and processing were strongly emphasized. Macro indicator data series in real term and input-output table by producer's price were selected to match the economic facts behind container throughput as much as possible in this study.

Besides these points, specific methodologies for both aggregate and structural analysis were developed. For aggregate analysis, macro indicators including value of domestic demand and international merchandise trade from GDP expenditure approach were selected as independent variables to correspond to domestic and international container throughput segments by most reasonable causality. Secondly, the evaluations of industry structure, trade structure and transport structure were proposed to qualitatively describe the economic background when aggregate regression analysis was made. Thirdly, both quantitative and qualitative analysis was integrated to explore exact causality and avoid nonsense regression in container throughput analysis.

For structural analysis, input-output table was chosen to make analysis on the mechanism between industries and container throughput. Leontief inverse matrix was used to establish function between container throughput segments and industries' final demand after conversion coefficients were calculated by trade statistics.

In line with above methodologies, the empirical analysis was made by macro indicators and container throughput data from Japan, China, Korea and Hong Kong SAR. Both aggregate and structural empirical analyses made use of same generation mechanism and data source from SNA evidently supported with each other and methodologies we proposed as well.

This study started with container throughput generation mechanism and the outcome further demonstrated the contents of this mechanism. Firstly, the relationship of container throughput with macro economy was discussed; international merchandise trade and other indicators in SNA were able to explain container throughput. Secondly, it was shown that different macroeconomic structure had different driving force on container throughput; industry structure was a decisive factor while transport structure mutually reinforced with container throughput as well as container terminal investment.

Structural analysis was conducted as quantitative study for industry structure evaluation in aggregate analysis. Aggregate analysis illustrated container throughput trend while structural analysis identified every industry's contribution to gateway container throughput. The key industries were identified by qualitative discussion of structural analysis. Structural analysis was found to be consistent with aggregate analysis while both approaches identified physical industries generated container throughput efficiently.

The dissertation consists of six parts and the structure is as follows.

Part 1 is the background and objective of this study after reviewing features of container, container transport and container throughput as well as their influence on

container terminal investment.

Part 2 is literature review and brief conclusion of past researches. Though container transport is just a small topic in economic research, a lot of well-known scholars confirmed its unique contribution to global economic development and many research have been made on container throughput. However, GDP was questioned as a suitable independent variable to explain container throughput in this chapter after independence between container throughput and macro indicators was confirmed.

Part 3 is the discussion on aggregate and structural analysis methodology. This study approached container throughput generation mechanism and integrated quantitative and qualitative analysis together. It clearly exhibited the difference between past GDP-based and new methodologies for regression analysis and proposed input-output analysis tool to make structural analysis on container throughput.

Part 4 is empirical aggregate analysis which was made by the data in last two decades from Japan, China, Korea and Hong Kong while China-plus-Hong Kong was verified simultaneously. Integrated analysis was implemented after data process and key macroeconomic structures evaluation were made.

Part 5 is empirical structural analysis to verify endogenous dynamics from industries development to container throughput. By use of Japanese Input-Output Table and trade statistics, this study tried to set up matrix function between final demand and container throughput even for non-physical industries.

Part 6 is the conclusion of research which summarized methodologies discussed in this study and made comparison with other frontier researches. This part indicated that SNA was treasure house with so many valuable data as well as methodologies and should be further developed.

This study developed a methodology to analyze the relationship between the economic facts behind macro indicators and container throughput, utilizing relatively simple statistical tools. Applicability of the presented scheme is verified by using real world data. Although further exploration about mathematical aspects of the data analysis is expected as future tasks, contribution to the concept development should be regarded significant. Parts 3 and 4 are conducted in collaboration with Mr. Yifei Zhao and Dr. Tatsuo Yanagita, but most analysis and computation are conducted by the applicant, Mr. Yang Dongming.

Therefore, the committee hereby confirms to confer a degree of the Doctor in International Studies to Mr. Yang Dongming (楊 東明) .

(1221 words)