The Asian Journal of Shipping and Logistics 31(4) (2015) 429-435

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Contents lists available at ScienceDirect

The Asian Journal of Shipping and Logistics

Journal homepage: www.elsevier.com/locate/ajsl

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The Revealed Competitiveness of Major Ports in the East Asian Region: An Additive Market Share Analysis*

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ARTICLE INFO

Article history:
Received 16 June 2015
Received in revised form 30 November 2015
Accepted 1 December 2015

Keywords:
Port Competitiveness
Additive Market Share(AMS)
Port Clusters
East Asian Ports
Container Throughput

ABSTRACT

In the single cargo market, the ordinary market share analysis method has been the representative tool for revealed competitiveness analysis. This paper develops and employs an applied market share index called the additive market share (AMS). Data are collected from 15 major container ports for the 1998-2013 period. In comparison to the results of an ordinary market share analysis, the highest AMS is observed for the Bohai Rim port cluster from 2008, not for the Yangtze River cluster or the Pearl River cluster. There are substitutable relationships between Yangtze River and non-Chinese ports and between Pearl River and Bohai Rim ports from 2001. Finally, there is an internal competition at Pearl River and Yangtze River ports, whereas Bohai Rim and non-Chinese ports show internally complementary relationships.

1. Introduction

Ports in the East Asian region experienced sharp increases in trade volume and severe internal competition for their status as hub ports in the 2000s. At the beginning of the century, five of these ports ranked among the world's top 10 as container ports. Here Singapore and Hong Kong, as city-states, served as traditional transit bases for trade, whereas others were simply gateway ports in each hinterland. Since 2012, however, 9 of the world's 10 largest container ports have been located in the region (Lloyd's List of Annual Top 100 Ports, 2013).

Scholars have provided several major explanations for this phenomenon. The most important one attributes it to the dramatic growth of China's economy and trade. Export-driven economic policies of countries in the region, including China, Japan, and Korea, represent a complementary explanation in conjunction with the growth of China's economy. The development of containerization as a tool for maritime cargo in trade is said to originate in East Asia. The long history of a strong maritime industry in the region is another explanation.

However, what should not be overlooked is the effort to achieve competitiveness in port operations by administrative and management sides of ports. In fact, government officials and scholars in East Asian countries have formulated new national development strategies. In particular, those in Korea have proposed the "Northeast Asian Transportation Hub," a strategy including the construction of new port facilities, the development of extended industrial sites in the port hinterland, and the formulation of various measures to increase the

* This work was supported by the research grant of Inha University

http://dx.doi.org/10.1016/j.ajsl.2015.08.008
2092-5212/

efficiency of ports and attract international shippers and liners. This indicates that they have not considered a port as a simple transit point for cargo and passengers. Instead, they have viewed a port an anchor for the economic development of areas near ports as well as for the development of the national economy, as conceptualized in Notteboom et al. (2005) and Langen et al. (2012).

Given existing efforts and outcomes of ports in East Asian countries, it is not surprising that almost a third of port studies between 1997 and 2008 have focused on Asian ports and related areas.[1] This paper contributes to the literature by evaluating the performance of East Asian ports from a different perspective, focusing on container handling and revealing port competitiveness. For this, data on container-handling volume are obtained from 15 major ports in East Asia based on their ranking among the top 50 world container ports for the 1998-2013 period.

The rest of this paper is organized as follows: Section 2 provides a review of previous research on port competitiveness and performance. Section3 discusses the methodology, the ordinary market share analysis, the revealed competitiveness advantage (RCA), and the additive market share (AMS) and describes the data. Section 4 presents the empirical results and their policy implications, and Section 5 concludes with a summary and some suggestions for future research.

2. Literature Review

Talley (2007) raises three issues for the evaluation scope of port competitiveness: evaluation over time (a single-port approach), evaluation relative to other ports (a multi-port approach), and evaluation from an engineering or economic perspective. A single-port approach compares actual performance to optimum performance and traces them over time. Here the major performance indicators include throughput, employment, value added, and the investment level, which are precisely investigated and suggested for improvement in Langen et al. (2007).

A multi-port approach compares performance indicators used in a single-port approach between ports in a competitive environment. However, this method is seriously limited in that it may mislead results as a result of ports operating in different economic, social, and fiscal environments (Talley, 2007). Therefore, multi-port comparison methods have evolved into the data envelopment analysis (DEA) technique for a comparison of ports' relative efficiency and the analytical hierarchy process (AHP) technique for giving weight to port choice criteria for shippers and liners.

For a comparative analysis of ports in the Asia-Pacific region, Liu (2008) uses the DEA method, whereas Yeo et al. (2008), the AHP method. Other methods have been used to estimate the efficiency of ports in a similar region as well. For example, Tongzon et al. (2005) use the stochastic frontier analysis model (SFM). Although the DEA method is flexible in accounting for multiple input and output variables, it is criticized for being non-statistical because it takes into account no measurement error in estimating efficiency. On the other hand, the SFM is a statistical technique that can address the limitations of the DEA method, but it is less flexible in accounting for multiple output variables.

Pallis et al. (2010) and Pallis et al. (2011) provide a collective literature review on ports by considering a total of 395 papers published in major journals during the 1997-2008 period and classifying them based on research communities, subfields, citation frequency, and sub-periods. According to their statistics, the fields of research, particularly during the 2002-2006 period, have concentrated on port (or terminal) competitiveness. Here the main research themes include port efficiency and choice, as explained earlier. This implies an increase in port competition since the 2000s, and the major sources of competitiveness include the promotion of efficiency and the attraction of shippers and liners.

However, despite the importance of port competitiveness, few studies have developed the methods of evaluation for them during this period. Several ordinary performance indicators such as throughput and the growth rate have been used as indices of ports' revealed competitiveness. It is just after the collective works by Pallis et al. (2011) when researchers have focused on developing new indicators of revealed competitiveness.

Low et al. (2009) use the port connectivity index and the port cooperation index to assess the hub status of major Asian ports. The port connectivity index is a ratio of the number of O-D pairs for a port connected to other ports in the region to the total number of O-D pairs for ports in the network. The port cooperation index of two ports is a sub-index of the port connectivity index and computed as a ratio of the number of O-D pairs for two competing ports serving together to the total number of O-D pairs for ports in the network. With these two indices, they identify the hub competitiveness and cooperative relationships of major ports in Asia. One serious limitation of their study is that they use data from anonymous liners, which means that the method may not be applicable to other studies with no confidential data from liners.

Another approach is the network analysis method in Notteboom (2009), who investigates the number of calls of liners at major ports in Northern Europe and analyses the complementarity and substitutability of those ports. He assumes that two ports have a substitutable relationship if they are called simultaneously in the same loop, whereas they have a complementary relationship if neighbouring ports are called selectively in the loop. In addition, he computes the share of port calls and the hinterland market share of each port in the region and identifies the competitiveness of substitutable ports. However, his research is limited in that competitiveness cannot be compared across all ports considered.

Tsamourgelis et al. (2013) introduce the generalized method of moments (GMM) to evaluate the relationship between port throughput and GDP in the hinterland. With exogenous environmental variables such as world fleet development and transportation costs controlled for through appropriate proxy variables, they analyse the level of synchronicity between port throughput and GDP and examine the effects of trade intensity, world fleet development, and the transportation cost on this synchronicity, demonstrating a positive relationship between GDP and port throughput and thus suggesting that ports function as trade gateways for their hinterlands. However, their study does not focus on the competitiveness of a port itself, instead showing the competitiveness of port hinterlands.

3. Methodology and Data

3.1. *Methodology*

This paper takes a more direct approach to evaluate the competitiveness of ports by using a data set that is easier to collect than those in the literature.

As discussed earlier, previous studies have focused mainly on three fields: the efficiency of ports, port choice criteria of shippers and liners,

[1] These statistics are based on Pallis et al. (2010) and Pallis et al. (2011).

and the competiveness of networks and hinterlands. However, although these may be potential, stated, or indirect measures of competitiveness, they are not real, revealed, or direct measures of port competitiveness, respectively. In particular, ports in East Asia have made substantial efforts to increase their efficiency, attract major liners and shippers, extend their networks, and develop hinterlands for more than a decade. In this regard, there is a need to measure the change of the real and revealed competitiveness of ports in East Asia during the period.

One popular method for evaluating the competitiveness or comparative advantage of an industry in a region is the revealed comparative advantage (RCA) method (Balassa, 1965). The RCA entails an index for measuring the ratio of the product or export volume of a certain industry in a country to that of the same industry in the world. If the index value is greater (less) than 1 in an industry of a country, then that industry is said to have a comparative (dis) advantage in the world trade market.

The Balassa index is criticized for lacking both a theoretical foundation and an empirical distribution, and therefore many applied studies have attempted to revise the index to reflect the original idea of the Ricardian comparative advantage.[2] However, the index remains important for its practical value in real-world analyses. In particular, several applied versions of the index have been proposed for evaluating port operation performance.[3]

One serious limitation in using the RCA to examine port competitiveness is the need for multiple products in multiple regions. If the data set includes only one product or region, then it is condensed into nothing but some share of the product or region in the whole market. The market share is frequently used as a performance indicator of ports either in a single- or multi-port approach. Although it provides meaningful insights into the revealed competitiveness of ports, it cannot be a new indicator.

This paper focuses mainly on the revealed competitiveness of East Asian ports, particularly since the 2000s, when major ports started engaging in serious competition to be a regional hub port. The demise of the Port of Kobe as a regional hub as a result of the 1995 earthquake triggered this competition, and China's dramatic economic growth in those years facilitated the competition. The region's policy of export-driven economic growth has focused mainly on the status of a port as a regional container hub.

Given the purpose and scope of this paper, a new method for calculating the market share is proposed based on a single product over a given period, namely the additive market share (AMS), which is measured as follows:

$$\mathrm{AMS_i}=\frac{\frac{P_t^i-P_{t-1}^i}{P_t^i}}{\frac{\sum_{i=1}^n(P_t^i-P_{t-1}^i)}{\sum_{i=1}^n P_t^i}}\times\frac{P_t^i}{\sum_{i=1}^n P_t^i}=\frac{(P_t^i-P_{t-1}^i)\times\sum_{i=1}^n(P_t^i)}{P_t^i\times\sum_{i=1}^n(P_t^i-P_{t-1}^i)}\times\frac{P_t^i}{\sum_{i=1}^n P_t^i}=\frac{(P_t^i-P_{t-1}^i)}{\sum_{i=1}^n(P_t^i-P_{t-1}^i)}$$

$$\sum_{i=1}^n \mathrm{AMS_i}=\sum_{i=1}^n\frac{(P_t^i-P_{t-1}^i)}{\sum_{i=1}^n(P_t^i-P_{t-1}^i)}=\frac{\sum_{i=1}^n(P_t^i-P_{t-1}^i)}{\sum_{i=1}^n(P_t^i-P_{t-1}^i)}=1$$

where P_t^i is the container volume of port i at time t. As can be seen from the formula, the first term on the left-hand side represents the relative growth rate, and the second term, the ordinary market share (OMS). In addition, the AMS is the weighted OMS in which the weight is the relative growth rate calculated by using the Paasche index instead of the ordinary Laspeyres index. The weight is greater (less) than 1 if the growth rate of a port is greater (less) than the market average. Based on this method, the left-hand side of the formula is automatically converted into the right-hand side, and the total AMS is 1. This means that the AMS has the property of both the OMS and the growth rate, and this is its most important characteristic. The advantages of the AMS method over the OMS method can be summarized as follows:

First, the OMS is the ratio of a port's total container volume to the total volume of the container in the market considered. Therefore, it shows the cumulative competitiveness of a port over time instead of the change in competitiveness on the spot. The determination of any change in the competitiveness of a port, particularly in the short term, requires the separate calculation of the growth rate of the port's container volume or the examination of changes in its market share over time. However, if the port is relatively small, any change in the OMS is negligible even when the growth rate is high. In such a case, any determination of port competitiveness remains limited.

By contrast, using the AMS, a short-term change in competitiveness can be easily detected. If a port gains competitiveness within a certain period of time, then the AMS increases faster than the OMS because the AMS is the market share from the increased volume of containers in the market during that period. This means that the short-term change in competitiveness, which may be hidden in the OMS, can be found only by observing changes in the AMS without separately calculating the growth rate.

Second, the AMS method can show the level of on-the-spot competitiveness for ports, which cannot be done using the OMS method. If a port improves its competitiveness relative to that of other ports, then its AMS ranks higher. However, in the OMS method, any improvement in a port's competitiveness may not appear because it is incorporated in the cumulated path of competitiveness.

This property is important, particularly when there are dynamic changes in the competitiveness of ports. If the competitiveness of a port for a given policy measure strengthens (weakens) relative to that of other ports, then its AMS increases (decreases) distinctively. With the OMS, however, such changes are difficult to determine, and therefore only slight increases (decreases) in the value of it. Therefore, the AMS method can be used to evaluate the effects of a policy measure on the market both directly and clearly.

Third, the AMS better reflects the effects of external shocks on the market than the OMS. An external shock may result in differentiated responses among ports and thus change the competitiveness of each port. This change may be instantaneously too small to be converted into overall competitiveness, that is, the OMS. However, it may be a sign to switch the direction of competitiveness. The AMS shows the spot impact of a shock by the port's response or environment, and its trend after the shock reflects the direction of the port's subsequent competitiveness.

Another important merit of the AMS is that changing trends and responses to shocks can be used to more clearly identify the complementarity or substitutability of ports. If the AMS moves in the same (different) direction after a shock for two ports, then they are assumed to have a complementary (substitutable) relationship.

3.2. *Data*

Data on the annual container-handling volume of 15 major ports in East

[2] A recent review of related studies can be found in Leromain et al. (2014).

[3] Lee et al. (2014) and Liu et al. (2013) provide examples demonstrating the competitiveness of East Asian ports by using the location quotient (LQ) method, which is similar to the RCA method and is applied to various types of revealed competitiveness for a region or product.

Asia for the 1998-2013 period are collected. These ports are chosen based on the following three criteria: First, they must be East Asian ports listed as part of the world's top 50 container ports (World Shipping Council, 2014). Second, they must handle at least 2 million TEUs of containers in 2013. Finally, each port must have its own direct hinterland.

The first and second criteria are selected to define the word "major." Most of the trade ports in East Asia handle containers, and some ports have their own exclusive hinterlands. However, if competition for international, not local, cargo is considered, then ports must be able to attract calls of international trunk lines, and for this, they must be able to handle some minimum annual volume of cargo. The first two criteria are set based on this reasoning, and 16 major ports are chosen from the list based on these criteria.

The third criterion is used to sort primary gateway ports. Some ports in the region have no direct hinterlands but handle an enormous volume of cargo. Such ports function as secondary gateways or transhipment points based on their huge international liner networks. If such ports are included in the analysis, then there may be some double counting of cargo in the region as well as the potential counting of transit cargo for other regions. Here a representative case is Singapore, which is excluded from the analysis. In addition, Hong Kong, Shenzhen, Busan, and Kaohsiung have similar problems because of their relatively high cargo transhipment ratios. However, they have their own hinterlands in the region to some extent, and a considerable part of cargo volume in the region cannot be explained without them. It is for this reason that these ports are included in the analysis.

The selected ports are classified into four sub-regions (zones) based on their locations and the extent of hinterland overlaps: Pearl River Delta ports, Yangtze River Delta ports, Bohai Rim ports, and non-China ports. Table 1 shows a list of these ports and the results of a descriptive analysis.

Table 1

Ports considered and descriptive statistics

Type	Total throughput (unit: thousand TEU)				Net throughput (unit: thousand TEU)			
Zone	Bohai Rim	Pearl River	Yangtze River	Non-Chinese	Bohai Rim	Pearl River	Yangtze River	Non-Chinese
1998	2,810	18,030	3,580	7,517	-	-	-	-
1999	3,705	21,230	5,020	8,319	895	3,200	1,440	802
2000	4,998	24,610	6,763	8,960	1,293	3,380	1,743	641
2001	6,056	25,930	7,865	8,644	1,059	1,320	1,102	-317
2002	7,255	30,690	10,846	8,561	1,199	4,760	2,982	-83
2003	9,203	36,190	14,468	9,435	1,949	5,500	3,622	875
2004	11,472	41,810	19,050	10,202	2,269	5,620	4,582	767
2005	14,400	46,830	24,270	10,524	2,928	5,020	5,220	322
2006	17,620	52,630	30,110	11,489	3,220	5,800	5,840	965
2007	21,750	58,930	37,490	11,495	4,130	6,300	7,380	7
2008	25,410	61,950	41,910	12,146	3,660	3,020	4,420	651
2009	26,070	55,170	38,520	10,630	660	-6,780	-3,390	-1,516
2010	30,670	64,580	46,080	12,096	4,600	9,410	7,560	1,466
2011	35,040	67,670	51,310	12,283	4,370	3,090	5,230	187
2012	40,570	67,810	54,380	12,850	5,530	140	3,070	567
2013	44,690	68,950	56,440	13,690	4,120	1,140	2,060	840
Mean	18,857	46,438	28,006	10,553	2,792	3,395	3,524	412
s.d.	13,206	17,622	18,245	1,777	1,521	3,541	2,684	680

Note: * Net throughput: increased volumes of cargo compared with previous year

** Bohai Rim: Dalian, Qingdao, Tianjin, Yingkou; Pearl River: Guangzhou, Hong Kong, Shenzhen, Xiamen; Yangtze River: Lianungang, Ningbo, Shanghai; Non-Chinese area: Busan (Korea), Keihin, Hanshin (Japan), and Kaohsiung (Taiwan).

Data: collected from the annual report of each port

4. Analysis Results

4.1 *OMS Analysis Results*

The OMS and the growth rate are the most popular indicators of port performance either in the single- or multi-port approach in existing researches. The former explains the relative competitiveness of a port at a certain point of time, whereas the latter shows the competitiveness change over time. Fig. 1 and 2 show the OMS and the growth rate of East Asian ports by zone.

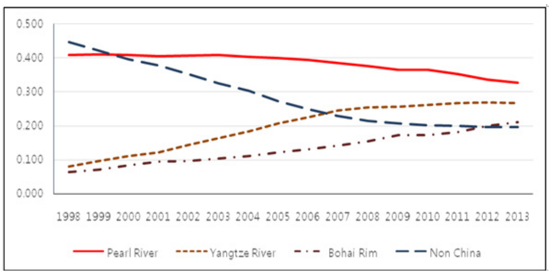

Fig. 1. OMS by zone

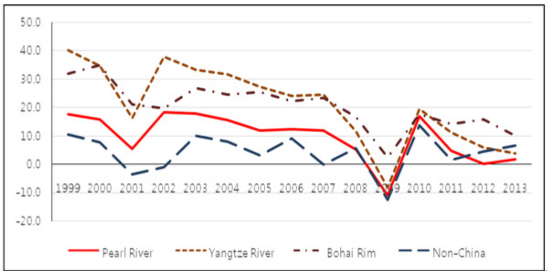

Fig. 2. Growth rate by zone

These two figures provide the following results:

First, despite some weakening, Pearl River Delta ports maintain their competitive superiority throughout the period. Non-Chinese ports lose their competitiveness rapidly, whereas Yangtze River Delta and Bohai Rim ports show strengthening competitiveness.

Second, gains in competitiveness by Yangtze River Delta and Bohai Rim ports exceed those by Pearl River and non-Chinese ports over the whole analysis period, which are consistent with the results in Fig. 1.

Third, there are two external shocks during the period, potentially affecting the competitiveness of each port, and the overall competitiveness of ports in the region shows a downward trend over time.

4.2 *AMS Analysis Results*

Fig. 3 shows the results of the AMS analysis. The AMS is calculated based on a three-year moving average to mitigate yearly fluctuation and determine a stable trend.[4]

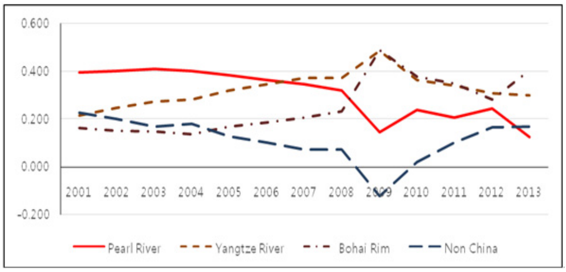

Fig. 3. AMS by zones (three-year moving average)[5]

The results in Fig. 3 can be summarized as follows:

First, as in the case of the OMS analysis, the competitiveness of Pearl River and non-Chinese ports weakens over time, whereas Yangtze River and Bohai Rim ports show strengthening competitiveness.

Second, consistent with the results for the growth rate, there is a serious external shock in 2009, although the first shock in 2001 is cleared through the use of the three-year moving average.[6]

These results are consistent with those for the OMS and the growth rate except that both can be identified in a single figure with no further analysis. However, more insights are obtained through the AMS analysis.

Third, the effect of the external shock varies widely according to the zone. After the shock, the competitiveness of Yangtze River and Bohai Rim ports weakens, but that of Pearl River ports remains unchanged. On the other hand, non-Chinese ports regain their competitiveness. This phenomenon cannot be detected using either the OMS or the growth rate without a more detailed analysis.

Fourth, the analysis yields unexpected relationships between zones. A closer look at AMS trends in each zone shows clearly symmetric relationships in trends between Yangtze River and non-Chinese ports and between Pearl River and Bohai Rim ports. This indicates that those zones with a symmetric structure have substitutable relationships in their competition for an increased container market in East Asia since the 2000s. More specifically, Yangtze River and non-Chinese ports compete with each other for about 20% of the AMS, and Pearl River and Bohai Rim ports, for about 30% of the AMS. The results suggest Yangtze River and Bohai Rim ports as the winners.

A simple accompanying analysis provides clearer evidence of (expected) outcomes of competition. More specifically, the AMS is divided by the OMS in the same year to investigate trends in terms of whether ports gain their competitiveness continually based on the value 1 as the reference mark. Fig. 4 shows the results.

As shown in Fig 4, Yangtze River and Bohai Rim ports gain their OMS continuously, whereas Pearl River and non-Chinese ports lose it. These results are consistent with those of the OMS analysis. However, based on trends after the external shock in 2009, possibilities which are different from the current situation can be expected. There is strong evidence that the competitiveness of Bohai Rim ports strengthens, whereas that of Pearl River ports deteriorates. Another point is that non-Chinese ports, which had lost their competitiveness continuously in the 2000s, regain it after 2009, causing Yangtze River ports to lose their competitiveness, although this loss does not extend beyond a critical point.

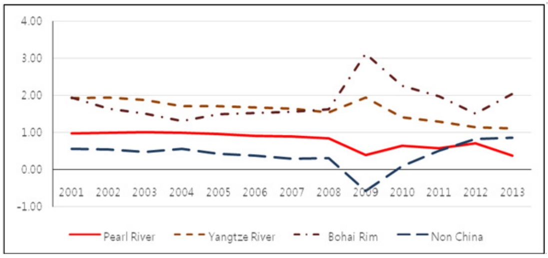

Fig. 4. Trends of AMS/OMS

4.3 *AMS Analysis Results by Ports*

The AMS analysis provides some new insights into the competeveness of zones. However, previous studies of competitiveness have focused mainly on port-level analyses. Based on the OMS, the most competitive port in the world as well as in East Asia in 2013 is the Port of Shanghai, followed by Shenzen, Hong Kong, Busan, Ningbo, and other ports, in that order, in the case of East Asia.

This paper identifies another aspect in port competition by examining AMS by ports; which port leads the trend of AMS in the zone and which port oppose it?

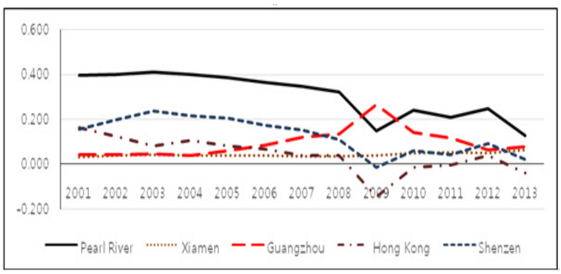

Fig. 5. AMS of Pearl River ports

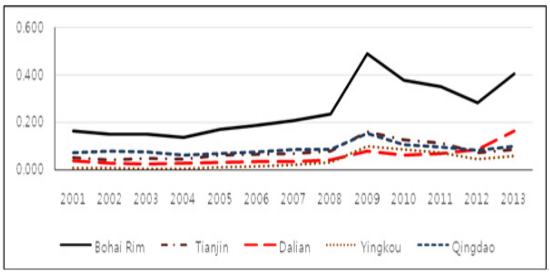

Fig. 6. AMS of Bohai Rim ports

[4] The same method is used in the OMS case, but the results show little difference from those of a yearly analysis, which may be due to the cumulative characteristic of the OMS method.

[5] The AMS is the market share of the added volume of cargo in the market, and therefore it, by its nature, may have negative values if the total volume of a port decreases, increasing that of others.

[6] Of course, evidence of the first external shock can be determined by calculating the AMS on the year-base method.

Fig. 5 and 6 show the AMS trends in Pearl River and Bohai Rim ports, respectively.

As shown in the figures, the overall AMS trend in Pearl River ports is led by fluctuations in the AMS of Hong Kong and Shenzen. However, the AMS trend in Guangzhou shows a symmetric relationship with the trends in Hong Kong and Shenzen, implying that Gunagzhou and other major ports in the region have substitutable relationships with one another.

The AMS trend in all major Bohai Rim ports shows a pattern similar to that for the region as a whole, which indicates that the major ports in the region have complementary relationships. Noteworthy is that Dalian, not Qingdao and Tianjin, recently leads the strengthening of competitiveness in the region.

The AMS trends in Yangtze River and non-Chinese ports are shown in Fig. 7 and 8, respectively. According to Fig. 7, the AMS trend in Yangtze River ports is led by Ningbo, not Shanghai, the largest port in the world. By contrast, Shanghai moves against the AMS trend in the region as a whole.

The AMS trend in non-Chinese ports is consistent with that in the region as a whole. Meaningful is that the AMS trend in the region is led by Korea (Busan) and that Japan (Keihin and Hanshin) plays a strengthening role.

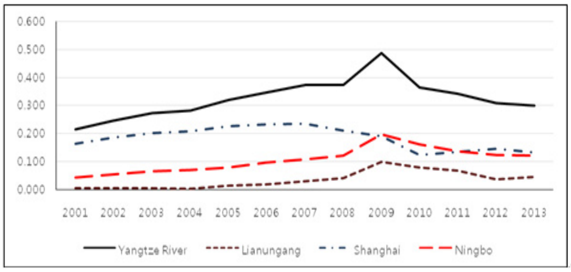

Fig. 7. AMS of Yangtze River ports

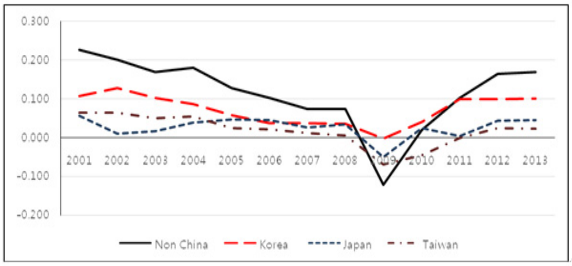

Fig. 8. AMS of non-Chinese ports

5. Conclusion: Implications and Limitations

This paper evaluates the competitiveness of ports in the East Asian region by using a simple but practical method called the AMS. The AMS has the properties of both the OMS and the growth rate and provides insights that cannot be provided only by using either one of these two measures. If the OMS is a performance indicator based on cumulative changes in external environments, internal capacity, and internal technological advances, among others, then the AMS demonstrates performance by their spot changes. Therefore, following the AMS trend can reveal the overall direction of changes in competitiveness, the time point of any change, and substitutable/complementary relationships between ports based on the direction of responses to a change.

In terms of changes in the competitiveness of East Asian ports in the 2000s, the major results can be summarized as follows: First, although Pearl River ports continue playing dominant roles in East Asia, there is a continued decline in their competitiveness. Second, Bohai Rim ports, not Yangtze River ports, show the fastest increase in competitiveness. That is, Yangtze River ports start to lose their competitiveness after the external shock in 2009. Third, Pearl River and Bohai Rim ports as well as Yangtze River and non-Chinese ports show strong substitutability. Fourth, non-Chinese ports regain their competitiveness since the external shock in 2009, although they do not recover that in the early 2000s.

This trend of the market competiveness change implies that the policy measures of infrastructure expansion of the ports in Bohai Rim seem to be successful to get the competitiveness over the ports in Pearl River, which had played the role of transhipment hub for the containers to/from Bohai Rim ports. Another implication from the findings is that the competitiveness of the ports in non-China region over the ports in Yangtze River has been recovered since the financial crisis in 2008. But this is not due to the crisis but to the capacity shortage of Shanghai port. Hence the competitiveness between the two areas will depends largely upon the policies of infrastructure provision.

This paper is seriously limited in that it does not identify the reasons behind changes in competitiveness or other results. This is because this paper evaluates "revealed" competitiveness. Because the data cover container-handling volume, an outcome of port operations, the paper does not determine how it is produced under which environments. In this regard, these topics are left for future research.

Despite these limitations, this paper contributes to the literature by proposing a new "revealed" indicator of port performance. The proposed indicator is verified to be more useful than the OMS or others in monitoring changes in the market.

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