



TRANSHIPMENT TRAFFIC AND GATEWAY VOLATILITY

EXAMINING HUBS IN THE MED & EUROPE

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Ports that handle a high level of transshipment traffic are often considered vulnerable due to these flows being highly contestable. It is less clear whether the vulnerability of transshipment ports leads to more throughput volatility compared to gateway ports (i.e. hinterland-bound cargo) or ports with a mixed cargo base (i.e. transshipment and gateway flows). This contribution examines the relationship between throughput volatility and the sea-to-sea transshipment incidence/dependency of 61 ports in northern Europe and the Mediterranean.

THE RISE OF TRANSHIPMENT HUBS

Since the 1990s, transshipment hubs have emerged at strategic locations in the global maritime container network. Many of the transshipment hubs are located close to strategic passageways such as the Straits of Gibraltar (e.g. Tanger Med, Algeciras, Sines), the Suez Canal (Damietta, Port Said, Alessandria), the Panama Canal (e.g. Colon, Balboa) and the Malacca Straits (Singapore,

Port Klang, Tanjung Pelepas). These hubs often share similar characteristics in terms of nautical accessibility, proximity to main shipping lanes and ownership (i.e. in whole or in part by carriers or international terminal operators).

Some markets like the Mediterranean, South-East Asia and the Caribbean appear to offer the right conditions for the emergence of more than one transshipment hub, while other port systems do not feature any sea-to-sea transshipment activity (e.g. North America, partly due to the Jones Act in the USA). Next to the 'pure' transshipment hubs, there are ports combining significant gateway cargo flows with transshipment flows (mixed ports) and ports only handling gateway cargo (gateway ports).

A TYPOLOGY OF PORTS BASED ON TRANSHIPMENT INCIDENCE

In view of analysing the relationship between throughput volatility and the sea-

to-sea transshipment traffic, we first group ports in three dependency classes:

- Gateway ports are very much hinterland-focused and only handle small sea-to-sea transshipment flows as a sort of by-product of the gateway cargo loaded and discharged at the terminals. Less than 25% of these ports' traffic is transshipment.
- Mixed ports combine gateway/inland cargo with the transshipment business. Here, the transshipment traffic is between 25% and 65%.
- Pure transshipment hubs have a transshipment traffic of more than 65%. The transshipment activity is the "raison d'être" of these ports and lies at the core of their operational and commercial base. Most 'pure' transshipment hubs are located in the Mediterranean Sea.

MEASURING THROUGHPUT VOLATILITY

Throughput volatility is defined as the variability or the dispersion of the cargo throughput in a port in a given period.



We use two volatility measures. The first is the standard deviation applied to the times series of the ports' year-on-year total TEU growth in percent (i.e. the STDEV approach). The higher the standard deviation, the higher the volatility. The second measure for volatility is obtained by comparing the actual throughput volumes with trend-based volumes on a year-on-year basis (i.e. the trend line approach). We used annual container throughput data for the period 1990-2016.

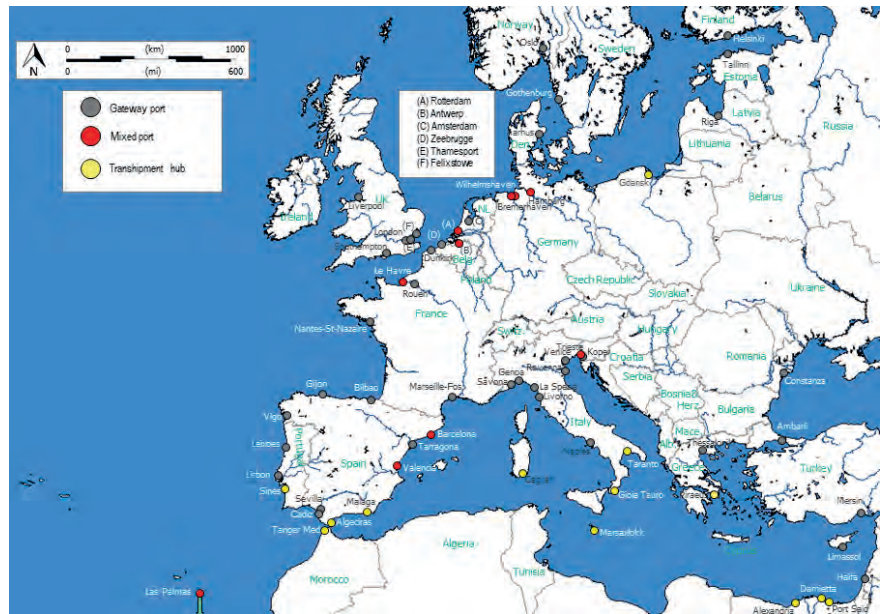
The results show that transshipment ports have a higher throughput volatility than the other port groups. When following the STDEV approach, only 7.1% of the transshipment hubs show a volatility below 12%, while this share is almost 73% for the mixed ports and 44% for the gateway ports. The trend line approach results are very similar. At the other side of the spectrum, we find that in the STDEV approach 71% of the transshipment hubs have a throughput volatility above 20% compared to a share of 22% for the gateway port category and 9.1% for the mixed ports. For the trend line approach, these differences among port classes are a bit less pronounced.

The relationship between transshipment traffic and throughput volatility was further examined using statistical tests. The details of these tests can be found in the full paper mentioned at the end of this contribution. Using an ANOVA test and a Kruskal-Wallis' test, we can conclude that there are statistically significant differences between the port groups' throughput volatility. Transshipment ports show the highest volatility, with the difference between transshipment hubs and the two other groups of ports (mixed and gateway) being statistically significant. The difference in volatility between mixed and gateway ports is not statistically significant.

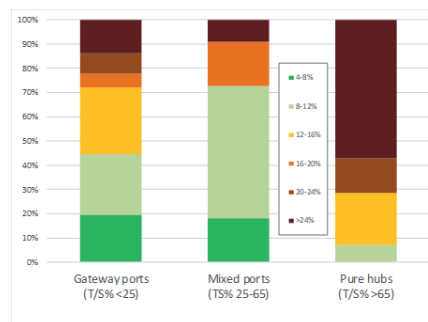
IMPLICATIONS

Pure transshipment hubs experience higher throughput volatility than other ports. This might be due to their dependence on a narrow number of terminal operators and carriers' strategic decisions related to shipping networks, as well as the more severe competitive environment in the transshipment market. A high throughput volatility can affect terminal operators' financial base.

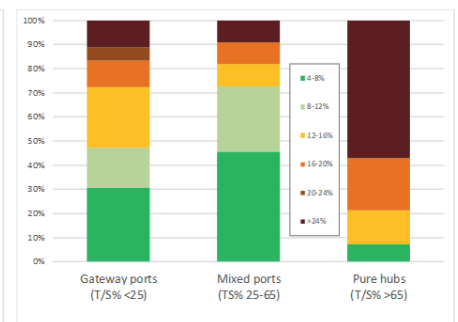
Furthermore, it generally results in strong fluctuations or even shocks in terminal capacity utilization levels and in the associated demand for dock labour. Strong fluctuations in the cargo volumes handled at a terminal can have profound operational and financial repercussions for a terminal operating company. A high throughput volatility can also lead to strong fluctuations in port dues received by port authorities.



STDEV approach



Trendline approach



The resulting uncertainty can undermine the port's future development and scare off potential (risk-averse) investors. By arguing that throughput volatility becomes much higher when a port has a very strong focus on transshipment activities, the results suggest the structure of container port demand should be carefully monitored. By striving for diversification (i.e. gateway cargo and transshipment cargo), port operators and policy makers involved in port management

can expect to reduce throughput volatility and related negative externalities.

This contribution summarizes the findings of the academic paper "Notteboom, T.E., Parola, F. and Satta, G., 2019. The relationship between transshipment incidence and throughput volatility in North European and Mediterranean container ports. Journal of Transport Geography, 74, 371-381".

ABOUT THE AUTHOR

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ABOUT THE ORGANIZATION

PortEconomics is a web-based initiative aiming at generating and disseminating knowledge about seaports. It is developed and empowered by the members of the PortEconomics group, who are actively involved in academic and contract research in port economics, management, and policy. Since October 2012, Port Technology International and PortEconomics have been engaged in a partnership.

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