

[TWO ASPECTS OF ENERGY TRANSITION IN SHIPPING: CARRYING AND USING FUELS]

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Overview

The shipping industry has responsibility for energy transition from two different aspects: one is that ships consume fossil fuels and emit greenhouse gases, and the other is that ships transport fossil fuels. These two aspects are related to each other in terms of shipowners' business decisions, and if the means to handle the two aspects are not properly designed, encouraging one may slow down the other, thus reducing the overall effectiveness of the energy transition.

In this study, we examined the Panamax bulker, a type of bulk carrier that carries coal as its primary cargo. To find any inconsistency between the two aspects, the year of delivery and owner for each ship are summarized and compared with a forecast for the adoption of zero-emission fuel and the coal share in the Panamax bulker trade.

The findings include the following:

The concentration of Panamax bulker ownership is very low. Therefore, an approach to appeal to the reputation of leading companies would not work well. Instead, an approach to set up regulations and incentives that would affect all owners would be required.

Panamax bulkers are usually scrapped at around 20 years of age. This means that over 40% of the existing fleet will be replaced in the early 2030s. By this time, zero-emission fuel engines for marine use will not have matured enough, and incentives would be needed for adoption.

The current share of coal in the Panamax bulker trade is 56.8%. This share will not decline significantly by 2030. The share as of 2030 is 49.4% in the IEA STEPS scenario and 39.9% in IEA SDS scenario. This means that the majority of Panamax bulker owners will likely prefer to keep carrying coal in the early 2030s. If incentives for zero-emission fuel engines are conditioned on not carrying coal, many owners would be excluded from the program, which would greatly hinder the adoption of zero-emission marine fuels.

The above results provide useful clues in developing incentives for the adoption of marine zero-emission fuel engines for Panamax bulkers.

Methodology

The author mainly used data obtained from databases that are widely recognized as a standard in the shipping industry.

Vessel data were obtained from the Shipping Intelligence Network database of Clarksons, the most authoritative data provider in the shipping industry. The database contains information on the delivery year and owner of each vessel.

The share of each delivery year in the entire existing fleet is calculated from the above database. The market concentration is examined by the share of major owners (top 1 and top 10) as well as the Herfindahl–Hirschman Index, which is widely used to evaluate market concentration.

The coal shares in the Panamax bulker trade are calculated using the below steps.

(1) Estimate of the trade volume of commodities carried by all types of bulk carriers (including Panamax bulkers). These commodities are coal, grains, iron ore, and minor bulk

(2) Estimate of the trade volume of Panamax bulkers for each commodity by applying the share of Panamax bulkers to entire trade volumes of each commodity

As for trade volumes, 2020 actual trades and 2030 estimated trades other than coal are quoted from NYK Outlook 2021. As for 2030, estimated coal trades are calculated from IEA WEO 2021 scenarios (STEPS, APS, NZE).

As for the share of Panamax bulkers in the entire bulk carrier trade for each commodity, estimates by IHS Markit, a major shipping research organization, are used.

As for the forecast for the adoption of zero-emission fuel in the Panamax bulker fleet, there are no detailed quantitative data such as above. Instead, this study refers to more generic forecasts, such as the NYK ESG Story 2022.

Results

The size of the Panamax bulk carrier fleet as of January 2022 was 2,925 vessels.

The concentration of Panamax bulker ownership was very low. The share of the biggest owner was 1.7% and that of the top 10 owners was 12.9%. The Herfindahl–Hirschman Index was 40.7.

Delivery of the Panamax bulker fleet peaked in 2012. In this year, 11.3% of the entire fleet was delivered (Figure 1.) Delivery in the five-year period around 2012 (2010-2014) accounting for 40.6% of the entire Panamax bulker fleet.

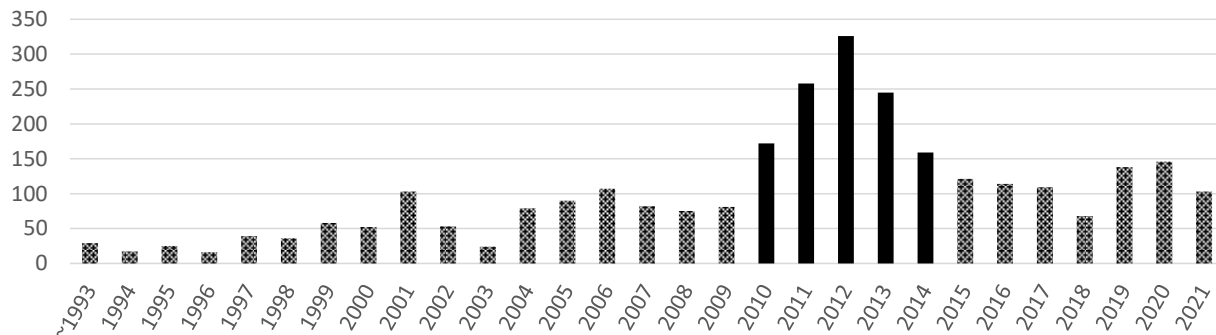


Figure 1. Number of Panamax bulker vessels in each delivery year

In 2022, the share of coal in the entire Panamax bulker trade was 56.8%. As for the outlook for 2030 in IEA WEO 2021, the share of coal is 49.4% in the most conservative STEPS scenario, 45.0% in the APS scenario, and 40.0% in the SDS scenario (note that IEA WEO 2021 does not contain the coal trade outlook for the most ambitious NZE scenario).

As for the adoption of zero-emission marine fuel engines in the shipping industry, it is widely assumed that these engines will not mature enough to compete economically with conventional oil engines by the early 2030s. As a result, some kind of support, such as reputation or incentives, is required for adoption.

Conclusions

The above results suggest the below outcomes.

The low level of concentration in the Panamax bulker fleet means that reputation is not an effective measure for adoption of the technology. In general, in highly concentrated markets, leader firms have strong power but are sensitive to reputation. Therefore, appealing to their reputation is a good measure to promote the adoption of an immature technology. Once leader firms decide to introduce that technology, some effects to support adoption will occur, such as mass production, infrastructure diffusion, and decline of obsolescence risk. As a result, follower firms find it easier to introduce that technology. Because such leader firms do not exist in the Panamax bulker fleet, more direct measures to support adoption are required, such as various regulations and incentives (subsidies, low-interest loans, etc.).

The fact that almost half the fleet will be replaced during five years in the early 2030s means that the adoption of zero-emission fuels in this period will determine the structure of the Panamax bulker fleet for a long time. If the adoption does not progress enough during this period, it will restrict the diffusion of the infrastructure of zero-emission fuels. Also, it will reduce the liquidity of zero-emission fuel vessels in the secondhand vessel market. These factors would reduce the market value of zero-emission fuel vessels, thus hindering the adoption of zero-emission fuel even beyond the late 2030s.

Because the share of coal in the entire Panamax bulker trade remains high at 40-50%, incentives for zero-emission fuel engines should not be conditioned on not carrying coal. Because most Panamax bulkers carry multiple cargoes such as coal, grain and minor bulk, the share of vessels that may carry coal is much higher than this 40-50%. As a result, most owners of Panamax bulkers would not use incentives if conditioned on not carrying coal. This condition may be helpful to attract political support for incentives to the shipping industry, but it will greatly hinder the adoption of zero-emission fuels.