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Difference of the Seasonality in Charter Rate and Supply-Demand Ratio in Dry Bulk Shipping Market

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- Preceding discussions about seasonality in the shipping market
- Statistical identification of the existence of seasonality
- Extraction of seasonal fluctuations and comparison among them
- Summary

- Seasonality refers to the presence of predictable variations that occur at specific regular intervals in a year.
- More statistically, it means that underlying cyclical variation can be extracted from the original time-series.
- This extraction can be done by seasonal adjustment methods.
 - These methods decompose a time-series into three components: trend, irregular, and cyclical.

- Seasonality in the shipping market is widely known to exist and is generally believed to stem from the seasonality of the trade volume, such as the crop seasons of grains or the demand peak of fossil fuels.
- However, another opinion suggests that overall market sentiment has a more substantial influence than the trade volume in a submarket (e.g., the Panamax market is influenced by the Capesize market more strongly than by Panamax trade volume).
- Identifying the cause of seasonality in the shipping market will help to make business decisions, and is therefore essential.

The purpose of this study is as follows:

- To use a statistical method to confirm the existence of seasonality.
- To extract seasonal fluctuations and examine their characteristics.
- To compare multiple seasonality (charter rate and supply/demand ratio, Panamax and Capesize) and check the relationship, similarity, and difference.
- To examine long-term situation, supply/demand ratio is used instead of trade volume.

- As seasonality is a well-known concept in the shipping industry, standard textbooks such as Stopford (2009) provide descriptions. However, they don't include sufficient theoretical and statistical analysis.
- Academic studies are carried out when modern time-series analysis methods are introduced into maritime economics. For example, Kavussanos and Alizadeh (2001) showed that stochastic seasonality exists in charter rate time-series, but deterministic seasonality does not. In recent days, academia has not had much interest in this subject.

- To statistically validate the seasonality (i.e., variance of each month is not the same), one-way ANOVA is used over monthly deviation from annual average (monthly value / annual average value).
- To extract seasonal (cyclical) fluctuation, DECOMP (Kitagawa and Gersch, 1984) is selected as a seasonal adjustment method.
- To examine the relationship, similarity and difference, visual inspection is applied.
 - In future studies, appropriate statistical methods will be selected and applied.

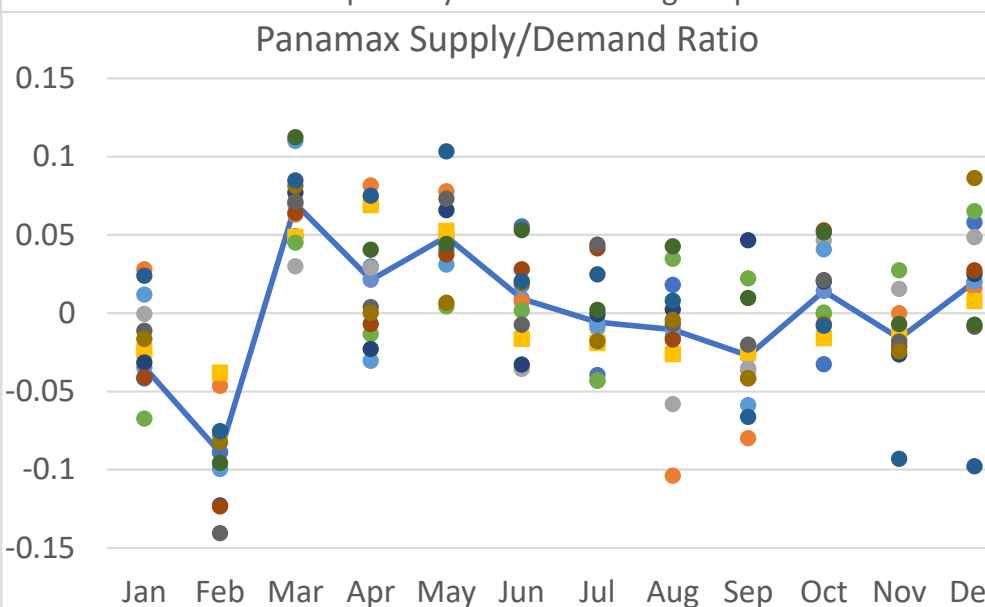
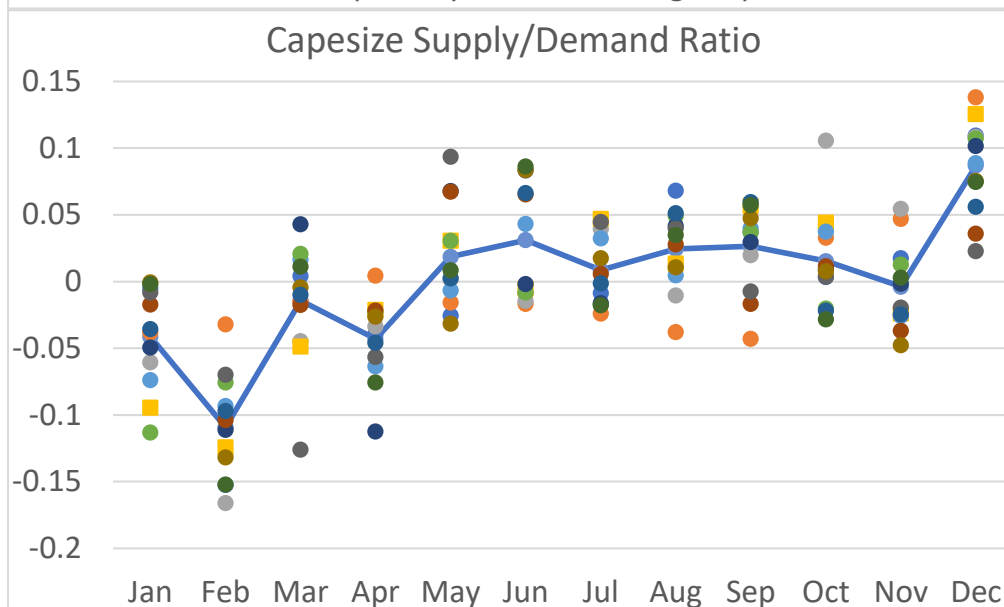
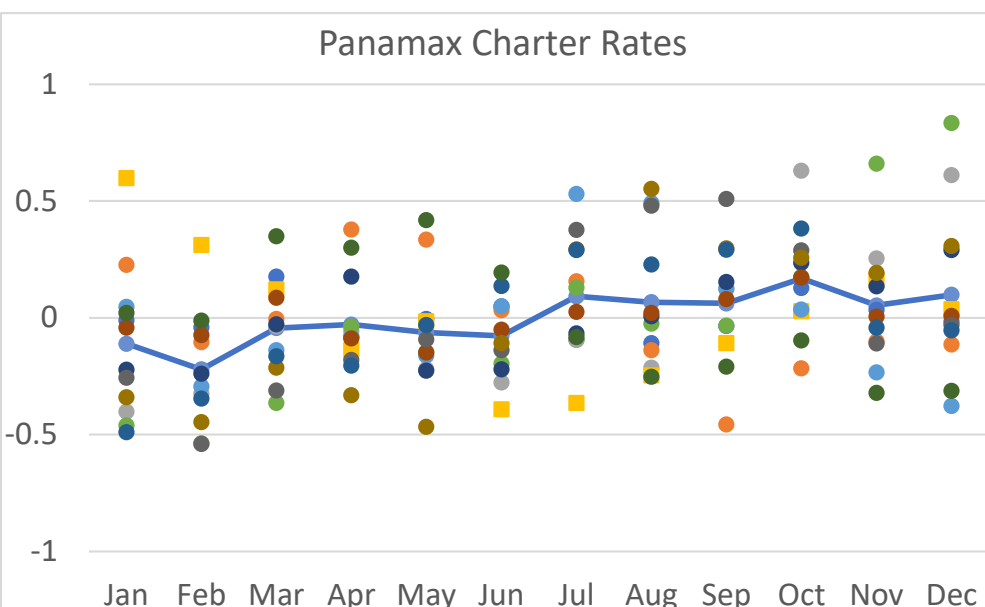
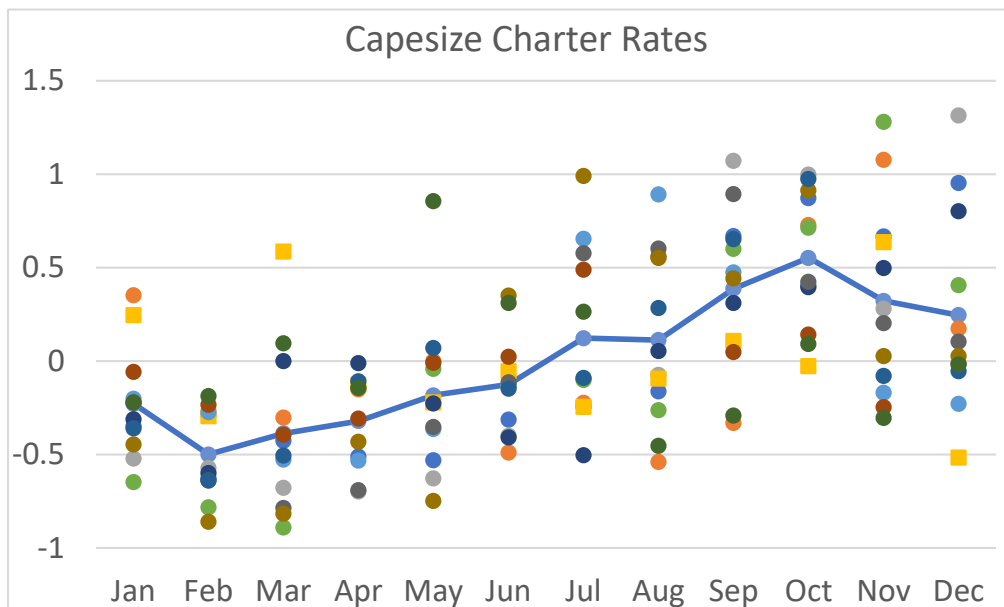
- The examined period is from Jan. 2011 to Dec. 2022 (144 months).
- Capesize and Panamax are selected as submarkets of the whole dry-bulk shipping market.
- For the shipping market indicator, Baltic 4T/C average charter rates are used for both Capesize and Panamax.
- For supply and demand indicators, fleet capacity in DWT and trade volumes from major export countries are used, respectively.
- The supply/demand ratio is calculated simply by dividing the latter by the former.

Significance of Seasonality

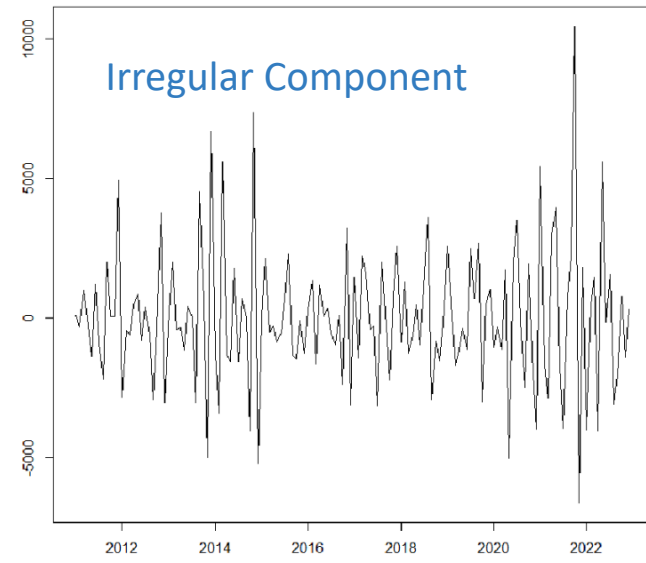
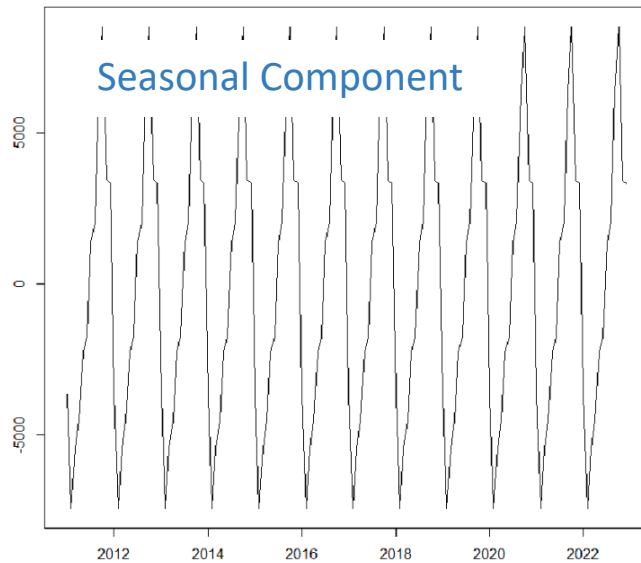
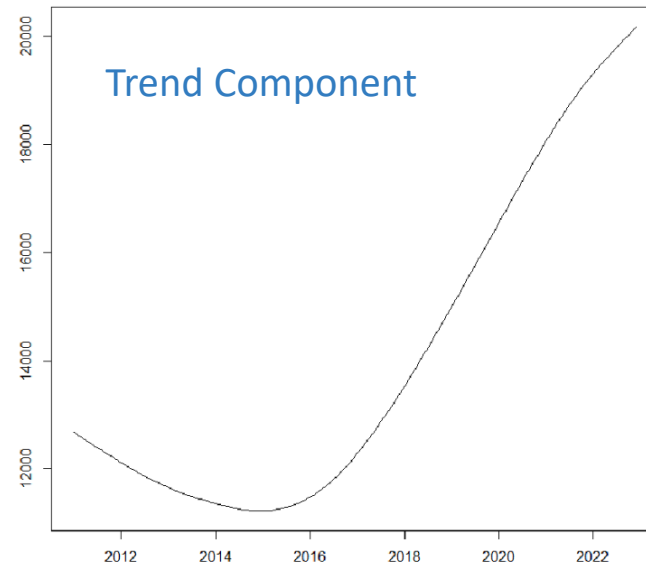
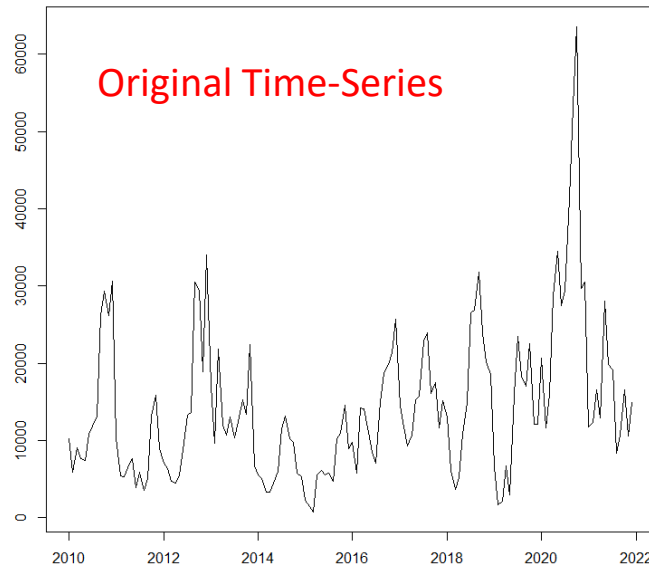
- H0 of one-way ANOVA is that the average of monthly deviation (value of the month / annual average value) of 12 months are equal.
- For all four time-series (charter rates and sup/dem ratio for both Capesize and Panamax), H0 is rejected with 95% significance.

		F Value	95% Significance
Capesize	Charter Rate	8.52	*
	Sup/Dem Ratio	21.97	*
Panamax	Charter Rate	2.15	*
	Sup/Dem Ratio	13.75	*

Seasonality in Panamax and Capesize

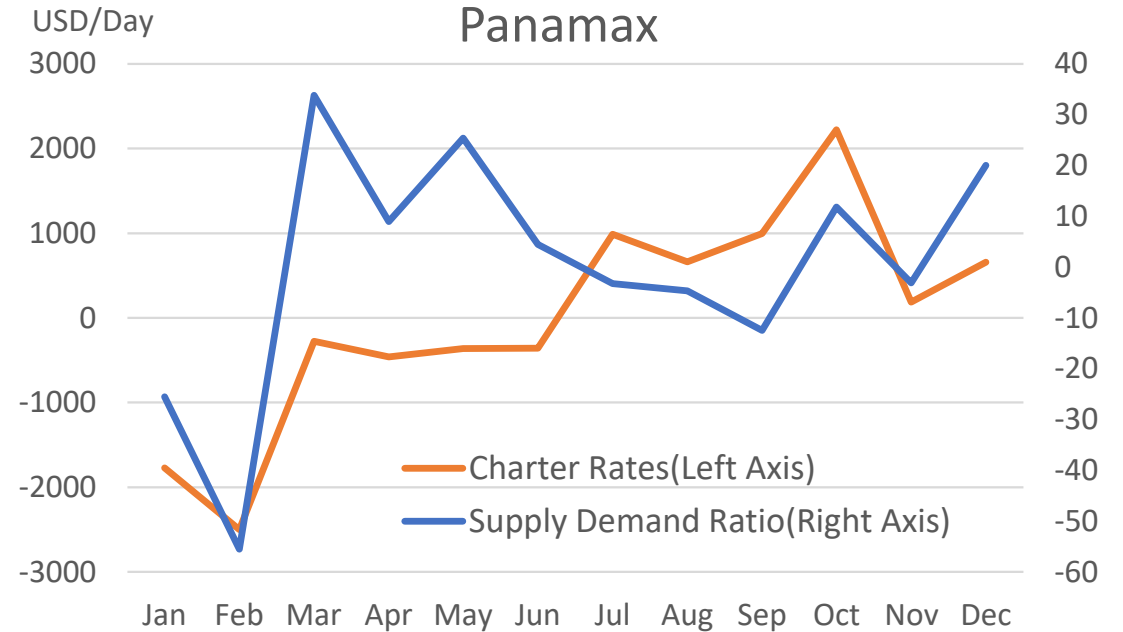
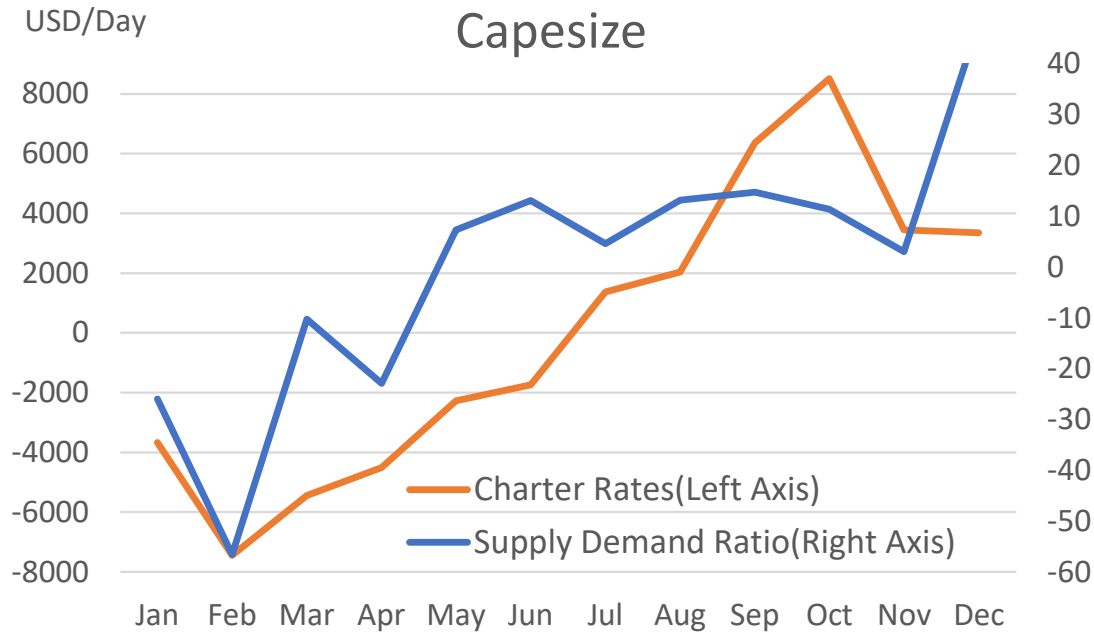


Decomposition of Fluctuation



- Using the DECOMP seasonal adjustment method, the fluctuation of the original time-series is decomposed into three components: trend, seasonal, and irregular.

Relationship among Seasonal Fluctuations



- As for a relationship between charter rates and supply/demand ratio, one seems to exist for Capesize but not for Panamax.
- Also, a relationship between Capesize and Panamax charter rates seems to exist.

- The existence of a seasonal fluctuation in charter rates and supply/demand ratio is confirmed statistically.
- Through visual inspection, the charter rates of Panamax do not appear to be related to the supply/demand ratio; the charter rates of Panamax appear to be related to the charter rates of Capesize.
- In future study, the significance of the relationship should be validated by statistical method.
- The simultaneous effects of the Panamax supply/demand ratio and the Capesize charter rates on the Panamax charter rate should be examined.



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