Erasmus University Rotterdam

MSc in Maritime Economics and Logistics

2024 – 2025

“Freight Rate Volatility and Asset Price Cycles in the Dry Bulk Market: A Post-COVID Analysis for Sale & Purchase Decision-Making”

By

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Acknowledgements

It is still hard to believe that the academic year of 2024-2025 has come to an end. I still remember the first time that I made the decision to search for the master's programme and start the application process. When I was finally accepted, I started to reach at to known family members and friends that have lived in the Netherlands and share me their insights of how they experienced the country's resources and lifestyle. Now I could be the one that could share his moments and experiences through my academic year regarding the master programme and certainly the living experience in Rotterdam. Over the past year, I have faced moments of challenge, growth, and self-reflection each requiring my full dedication, resilience, and adaptability. Now the MEL year 2024/2025 is near to an end, and the satisfaction of completing my master's and internship responsibilities showed me that whenever there is a goal and a purpose in your life, with hard work and desire to keep achieving the goal, everything is achievable.

Writing a thesis is a new experience for me and has been one of the most intellectually stimulating and personally transformative tasks I have taken on. I chose a topic which I had never imagined was going to research about before my enter to the Mel program. Thanks to the professors and lecturers, the program that gave me the vital stimuli I became more and more interested in this field. My main purpose in writing the thesis was to contribute and share valuable insights from my point of view on the field of maritime economics. Despite the ups and downs through this journey I would like to express how thankful I am to the incredible people who supported me along the way.

First and foremost, I want to express my heartfelt gratitude to my family. Despite them being unaware of the maritime field, they never stopped me from chasing my goal instead, they showed me support financially and psychologically throughout the whole year. Your encouragement, patience, and belief in me were the foundation that kept me going. I would not be able to experience any of this, if you were not always on my side and supporting me, even when things were difficult.

I would also like to thank my supervisor, Dr. Arjen van Klink for his guidance, feedback and continuous support throughout the whole thesis. The communication we had with Dr. Arjen van Klink, was one of the most important things that helped me structure my

thoughts and build a robust scenario for a competitive result. I am truly grateful to have him as a mentor during this important phase.

My appreciation also goes to all MEL faculty members and guest lecturers, who enriched this year with their knowledge and international perspectives. Special thanks as well to the MEL office for their assistance and for ensuring that everything ran smoothly throughout the program.

Last but not least, I would like to thank my classmates and friends from the MEL program, who supported me and shared many new experiences. Without this incredible group of people, the demanding and competitive schedule would have been much harder to manage. You made this journey not only achievable but genuinely enjoyable.

"The only way to do great work is to love what you do." – *Steve Jobs*

Abstract

Dry bulk carriers move the world's raw materials globally, yet it is often unclear when second-hand asset prices actually change. This study examines how freight rate volatility changes the secondhand vessel values during the 2021-2025 age period, a timing that geopolitical disruptions and trade tensions arise. The research tests a clear idea: prices re-rate when earnings stay at high levels, the forward market agrees while taking into consideration the environmental rules that affect both earnings and asset values. The study combines a focused literature review and a descriptive analysis of post 2020 market signals (one-year time-charter rates, the Forward Freight Agreement curve, and simple cash-flow checks), and a qualitative, semi-structured interview with a shipbroker. The thesis reviews a prior work, presents market evidence from shipping organizations and private companies in Chapter 4, while integrates further with an interview by a market analyst where the scope was to provide key insights into the study based on his market experience, in chapter 5. In the final chapter of the thesis, chapter 6, the study concludes with specific market evidence and provides further recommendations for further research.

Results in the thesis showed that prices move selectively and with lag, brief spot spikes do not change the asset values. Instead, re-pricing occurs when earnings look durable, and the forward curve is supportive and not moving backwards. All the results that are being described in chapter 4 and chapter 5 highlight that there are differences between different segments in dry bulk. Capesize carrier's rates move faster and larger than Panamax-Kamsarmax-Ultramax vessels. Also, in live deals anchor bids to four checks: the 1-year time-charter level, the FFA curve's shape, the scrap floor for older tonnage, and each vessel's efficiency/compliance. The thesis therefore ends with a three-gate rule durability, forward support, and viable cash flows as guide for timing and Sale and Purchase decision making that helps investors avoid risk and chasing spot noise while buying assets that holds value.

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List of Abbreviations

Abbreviation	Full Form
AR-GARCH	Autoregressive–Generalized Autoregressive Conditional Heteroskedasticity
ARCH-GARCH	Autoregressive Conditional Heteroskedasticity–Generalized ARCH
ARIMA	Autoregressive Integrated Moving Average
AXS	AXSMarine (industry data provider)
BCG	Boston Consulting Group
BCI	Baltic Capesize Index
BDI	Baltic Dry Index
BFI	Baltic Freight Index
BIMCO	Baltic and International Maritime Council
BPI	Baltic Panamax Index
BPI-82	Baltic Panamax Index (82,000 DWT basket)
BPI-82 4TC	Baltic Panamax Index (82k DWT, four time-charter routes)
BRS	BRS Group (shipbroking/research)
BSI	Baltic Supramax Index
CII	Carbon Intensity Indicator
CoGH	Cape of Good Hope
COVID-19	Coronavirus Disease 2019
CPT	Cumulative Prospect Theory
DCF	Discounted Cash Flow
DNV	DNV (classification society; originally Det Norske Veritas)
DWT	Deadweight Tonnage
EEXI	Energy Efficiency Existing Ship Index
EU	European Union
EU ETS	European Union Emissions Trading System
ETS	Emissions Trading System (generic)
FFA	Forward Freight Agreement (singular)
FFAs	Forward Freight Agreements (plural)

GDP	Gross Domestic Product
HEI	Health of Earnings Index
IMF	International Monetary Fund
IMO	International Maritime Organization
LDT	Light Displacement Tonnage
MPP	Multipurpose (ships)
NAV	Net Asset Value
OECD	Organization for Economic Co-operation and Development
PMS	Piraeus Maritime Studies
ROA	Real Options Approach / Real Options Analysis
S&P	Sale and Purchase
SCA	Suez Canal Authority
SIN	Clarksons Shipping Intelligence Network
TC	Time Charter (rate/contract)
TCE	Time Charter Equivalent
UK	United Kingdom
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
US	United States
USD	United States Dollar
VIX	CBOE Volatility Index
VLOC	Very Large Ore Carrier
WS	Worldscale (Index)

1 Introduction

1.1 Background

Shipping is a fascinating business. Since the first cargoes were moved by sea more than 5,000 years ago it has been at the forefront of global development. The epic voyages of Columbus, Diaz and Magellan opened the maritime highways of the world (Radcliffe, 1985). Dry bulk shipping is crucial to the worldwide flow of raw materials, however, it is also vulnerable to boom-and-bust cycles, speculative investments, and periods of irrational optimism (German, 2005). The dry bulk sector is currently representing more than 40 % of seaborn trade by volume, being strategically significant and economically impactful (Clarksons Research, 2024). The market is structured around vessel categories primarily Capesize, Panamax, Supramax, and Handysize, each serving specific cargo sizes and trade routes. These vessel classes differ in terms of operational flexibility, port access, and exposure to freight market cycles (Kavussanos & Alizadeh-M, 2001).

Global dry bulk shipping market is an important element of global economy and trade. Since new building and secondhand vessels are often traded as assets and the freight rate is the key determinant factor of vessel price, it is important for shipping market participants to understand the market dynamics and price transmission mechanism over time to make suitable strategic decisions (Dai, Hu, & Zhang, 2015). Freight rates are determined by the balance between fleet supply (driven by newbuild deliveries, scrapping, and slow steaming) and cargo demand (linked to global GDP, commodity flows, and regional trade patterns) (Stopford,2009, Alizadeh & Talley, 2011).

Volatility is a defining feature of the dry bulk shipping industry. First and foremost, there are four shipping markets where shipowners and charterers trade with each other. The freight market is the most important among the four, as the interaction between demand and supply for vessel tonnage determines the freight rates (Stopford 2009). These, in turn, serve as the main input to the other three markets, influencing the participants' decision to invest or divest in ships. Empirical results reveal that significant volatility transmission effects exist in each market sector, i.e. Capesize, Panamax, Handymax and Handysize.

Besides, the market volatility transmission mechanism varies among different vessel types (Dai, Hu, & Zhang, 2015).

Furthermore, freight rates are subject to sharp fluctuations due to the sector's low elasticity of supply, cyclical investment behavior, and the time lag required to adjust fleet capacity (Kavussanos, 1996; Adland & Cullinane, 2006). Another important factor is that dry bulk commodities, such as coal and iron ore, are inherently cyclical due to their strong linkage with global economic activity. Demand for these raw materials typically rises and falls with industrial production, infrastructure development, and energy consumption, especially in emerging economies like China and India. For example, iron ore demand tends to surge during construction and manufacturing booms, while declining during recessions. This underlying cyclicality causes pronounced swings in freight demand, vessel utilization, and consequently, volatility in freight rates (Stopford, 2009). These commodity cycles are amplified in shipping markets due to the capital-intensive nature of fleet supply, which responds with time lags, creating periods of overcapacity or scarcity. As a result, the market frequently experiences volatile periods, for economists this is called periods of no equilibrium, where the balance between supply and demand is hard to be consistent. Moreover, this instability could also be caused by external shocks which are connected with the shipping market such as geopolitical instability, financial crises and natural disasters.

Volatility in 2020–2025 was episodic, surging in 2021–22 and moderating thereafter. We therefore treat volatility as time-varying and episode-driven, without assuming a persistent post-2020 increase. The analysis asks, conditional on observed volatility, how instability in earnings transmits to second-hand values and which simple signals aid S&P timing. Consistent with evidence on clustered volatility (Kavussanos, 1996, Adland et al., 2018), shocks are treated as independent episodes, prices tend to re-rate when earnings improvements are sustained (e.g., 1-year TC), not on one-off spot spikes.

This study therefore does not assume that elevated volatility will persist. The focus is conditional: given observed volatility in 2020–2025, how does instability in earnings transmit to secondhand vessel prices, and which signals are useful for timing sale-and-purchase (S&P) decisions? In line with prior evidence on heavy-tailed, clustered volatility

in dry bulk (Kavussanos, 1996; Adland et al., 2018), the analysis treats shocks as episodic and tests a persistence channel—spot spikes are transient, whereas sustained improvements in earnings (captured by HEI and 1-year T/C) are the conditions under which prices re-rate. The framework is regime-agnostic: it remains informative whether volatility stays high or normalizes.

Given the strategic importance of the dry bulk market and its high volatility, there is a pressing need for research that can support more informed decision-making in the sale and purchase (S&P) sector. Understanding how freight rate volatility functions, and analyzing secondhand vessel prices, offers both academic insight and practical value to stakeholders attempting to navigate market uncertainty. While prior research has applied statistical models such as ARIMA, GARCH, and panel regression to forecast freight rates and vessel values, these methods often rely on historical stability and overlook the interpretive decisions made by market participants under unprecedented conditions such as COVID-19. This creates a gap in the literature regarding how sentiment, uncertainty, and real-time disruptions shape investment behavior especially in the post-pandemic context. This thesis contributes to the evolving body of maritime economics by offering a post-pandemic theoretical analysis combining real-world investment challenges.

1.2 Problem Formulation

Dry bulk freight rates have become a focal point for a broad range of maritime stakeholders including shipowners, investors, brokers, and analysts due to their direct impact on earnings, asset values, and investment returns. It is widely known that the shipping sector is capital intensive, vessel acquisition and on the other hand disinvestment decisions involve capital exposure. While there is uncertainty in the market and freight rates fluctuate, investments are highly sensitive to expectations about future freight market performance. Secondhand vessel prices are closely linked with time charter earnings and that makes freight rate volatility a central source of risk in the sale and purchase (S&P) market (Adland & Jia, 2020; Alizadeh & Nomikos, 2007). When volatility increases, freight rate forecasting future earnings is difficult to predict. Understanding volatility is crucial for investors and traders alike, as it directly impacts risk assessment, options

pricing, portfolio management, market sentiment, and strategic planning (Hoorelbeke, K. 2024, July 12).

Furthermore, asset prices do not adjust linearly to changes in earnings, instead they exhibit nonlinear responses and time lags, particularly in periods of extreme uncertainty (Dai, Hu, & Zhang, 2015). As a result, even people with experience in the market struggle to differentiate short-term rate spikes and structural shifts in market fundamentals. For instance, Covid 19 and Suez Canal disruptions but also other major geopolitical shocks show that there is no historical pattern between freight rates and asset values as these external shocks have introduced new volatility patterns.

It has been mentioned that the freight market is the most important out of the four and as a result is also the one that influences decision making for the investors in shipping (Stopford, 2009). According to Stopford, the shipping industry is driven by four interconnected markets: the freight market, the sale and purchase (S&P) market, the new building market, and the demolition market. These markets are influenced by similar macroeconomic forces, but it is the freight market that serves as the immediate signal of supply-demand conditions. Freight market volatility directly influences timing, pricing, and risk assessment in vessel S&P decisions. It is relatively hard for investors, shipowners, to decide their moves either to buy or sell their vessels when an external force influence the whole market. Shipping is relatively a conservative industry and most of the time investors act in this way, missing valuable opportunities. On the other hand, they act prematurely and fear price escalations.

Periods of elevated uncertainty can lead to mispricing in the secondhand market, as asset values temporarily diverge from long-run earning capacity (Papayiannis, 2022). During the COVID-19 rebound, for example, sharp rises in freight earnings were followed by a price correction in late-2022 as congestion unwound. These episodes illustrate how short-run sentiment can deviate from fundamentals and why a clear language around volatility shocks, i.e., sudden increases in the variance of freight-rate returns relative to their recent baseline is useful for interpretation. Moreover, volatility shock is a change in variance, not necessarily a jump in the level of rates, and is typically associated with new information or temporary logistical frictions (e.g., port congestion, rerouting). Prior studies show that

such variance shifts can distort perceived risk and timing, with implications for S&P behavior (Kavussanos, 1996; Adland et al., 2018). The present thesis therefore focuses on how volatility transmits to secondhand values and which simple signals help distinguish transient rate spikes from persistent improvements.

1.3 Research Questions and Sub-Research Questions

Acknowledging how important the freight market is and especially freight rates for decision making it is vital to examine how external shocks could impact the shipping market. This thesis aims to explore how freight rate volatility since the pandemic of Covid-19 in 2020 has influenced secondhand vessel price cycles in the dry bulk shipping market, while examining the implications of this relationship with Sale and Purchasing decisions under this uncertainty. This research seeks to find a pattern between shocks that influence investment decisions. For that reason, the following research question needs to be answered:

"**How has freight rate volatility since 2020 influenced secondhand vessel price cycles in the dry bulk market, and what are the implications for sale and purchase (S&P) decision-making?"**

The decision to focus on the post-2020 period stems from the unprecedented volatility and uncertainty triggered by the COVID-19 pandemic, followed by major geopolitical and regulatory disruptions. These events had an immediate and measurable impact on freight rates and investor behavior. Secondhand vessel prices were selected because they respond more quickly to freight rate changes than newbuild contracts, making them a more sensitive indicator of market sentiment. The S&P market was chosen as it reflects real investment decisions under uncertainty, rather than theoretical asset valuations. While prior studies model these relationships statistically, this research aims to interpret them through market narratives and decision-making patterns during extreme volatility.

This research is conducted systematically, and to address the main research question, it is essential to include several sub-research questions to ensure credibility of the final results. The main research question is addressed through the following sub research questions:

How has the relationship between time-charter rates and secondhand vessel prices evolved across major dry bulk segments (e.g., Capesize, Panamax) in the post-2020 period?

What impact have key post-2020 market disruptions such as the Suez Canal blockage, and Red Sea tensions had on freight rate volatility and secondhand asset price behavior?

What lessons can be drawn from recent volatility patterns to support better timing decisions in the dry bulk sale and purchase (S&P) market?

The first sub-research question examines the relationship between the freight market earnings and the vessel prices, focusing on the pattern and questioning if this relationship has changed after the geopolitical disruptions shipping faces the past few years. In this case it should be mentioned that the paper is not focusing on the period before 2020 although it is looking for similar patterns of volatility that were being noticed earlier. Additionally, the second sub-research question will examine the global disruptions in shipping and their significant influence. It will explore how volatility events have disrupted asset valuation patterns and challenged the assumptions that traditionally support timing decisions in the S&P market. Finally, sub-question number 3 examine how the freight market fluctuates, after the year of 2020, providing key insights to shipowners, shipbrokers and investors to simultaneously improve their strategic timing and thinking in Sale and Purchase transactions when there is uncertainty.

1.4 Research Objectives

The purpose of this study is to examine how freight rate volatility, since 2020, has influenced secondhand vessel price cycles in the dry bulk market, and to explore the implications for sale and purchase (S&P) decision-making under uncertainty. As has already been mentioned, the dry bulk sector experienced a period of high volatility these past years. In addition, there is not a strong relationship with previous years' external shocks, making this study more valuable. Global disruptions such as financial crisis, the trade war between the U.S. and China and geopolitical issues with the Suez Canal and strait of Hormuz cause serious uncertainty. As the shipping sector is capital intensive and mostly conservative vessel acquisition and disinvestment decisions, a deeper understanding of the market is crucial for decision-making.

This study contributes to both academic and practical knowledge. First and foremost, it provides key insights for shipowners, shipbrokers and investors who daily take valuable decisions under uncertain market conditions, especially in the freight rate market. Academically, there are several thesis and studies that searched deeply the relationship between the freight rate market and second-hand prices for instance (Kavussanos & Alizadeh-M, 2001), (Adland, R. and Strandenes, S. 2006), there is limited research after the 2020 period where global distributions impacted the world of shipping. Also, geopolitical disruptions have further influenced the market with more uncertainty as countries that export vital dry bulk commodities are in danger. The period is treated as a set of independent episodes COVID-19 congestion (2020–2021), the Suez blockage (Mar-2021), the Russia–Ukraine war (from Feb-2022), the China property slowdown (2022–2023), and Red Sea diversions (from late-2023). No causal link among these shocks is assumed and no single event is privileged, each is used only as context for interpreting observed market movements.

To address the research questions in this study, use a mixed-methods approach, qualitative and quantitative. The qualitative dimension is essential to this study, as it integrates expert-based interpretation from high-authority industry sources, including BIMCO outlook reports, Clarksons intelligence briefs, and trade media such as Hellenic Shipping News to uncover how market participants perceived, responded to, and strategized around episodes of freight rate volatility and asset price uncertainty. The aim of this thesis is not to build a new econometric model to describe market behavior, but instead to collect key insights from observed patterns and market responses in periods of high uncertainty.

Access to micro-level Sale and Purchase transaction data is limited by confidentiality. Although market-level patterns are observable, a direct mapping from individual S&P decisions to short-run volatility cannot be tested with transaction-level evidence. Accordingly, this thesis adopts a descriptive–analytical approach based on published benchmark earnings indices and aggregated age-cohort prices. Full details of variables and procedures are provided in Chapter 3 (Methodology). The emphasis is on observable market behavior and managerial implications rather than on causal econometric modelling.

To keep this chapter focused on theory and generic concepts, the formal research aims and questions are presented once in Section 1.3 and are not repeated here. This chapter, therefore, sets the conceptual framework linking earnings, volatility, and second-hand asset values, which will guide the empirical analysis in the subsequent chapters.

1.5 Assumptions and Limitations

The scope of the thesis is to examine how post-2020 freight rate volatility relates to secondhand vessel price cycles across major dry bulk segments (e.g., Capesize, Panamax) and the implications for S&P decision-making. It uses descriptive, qualitative analysis from public market reports and interviews with shipbrokers and market experts.

Assumptions were also made for the scope of the thesis, for instance public reports are assumed to reasonably reflect market conditions and decisions, though S&P deals may be incompletely disclosed. Volatility patterns are interpreted without an econometric model, prioritizing expert/narrative insight over statistical inference.

This thesis faces limitations due to uneven and secondary public data, introducing potential bias. Multiple overlapping shocks since 2020 (such as COVID-19, geopolitical tensions, regulatory changes) make it difficult to isolate single-cause effects and limit historical comparability (Stopford, 2009). Additionally, outcomes are influenced by market participants' behavior, which is acknowledged but not directly measured because of limited survey data. This parameters frame the analysis applied in Chapter 4 to relate freight-rate volatility to secondhand prices.

1.6 Structure of Thesis

This thesis is structured in 6 chapters in order to answer the main research question and sub questions. After chapter 1, introduction, which includes the background of shipping and dry bulk sector, the research questions and explains the methodological approach and contribution of study, follows chapter 2. In Chapter 2, Literature Review, this chapter is dedicated to presenting the key theoretical insights and findings of the existing literature. First, the overview of the dry bulk sector is going to be discussed followed by insights of freight rate volatility, secondhand vessel pricing, market disruptions, and decision-making under uncertainty. In the end, identifies research gap. Moreover, in chapter 3, Methodology,

this chapter explains the research design, data sources and analytical techniques. It explains the rationale of the study and indicators used to study freight rates and asset price cycles.

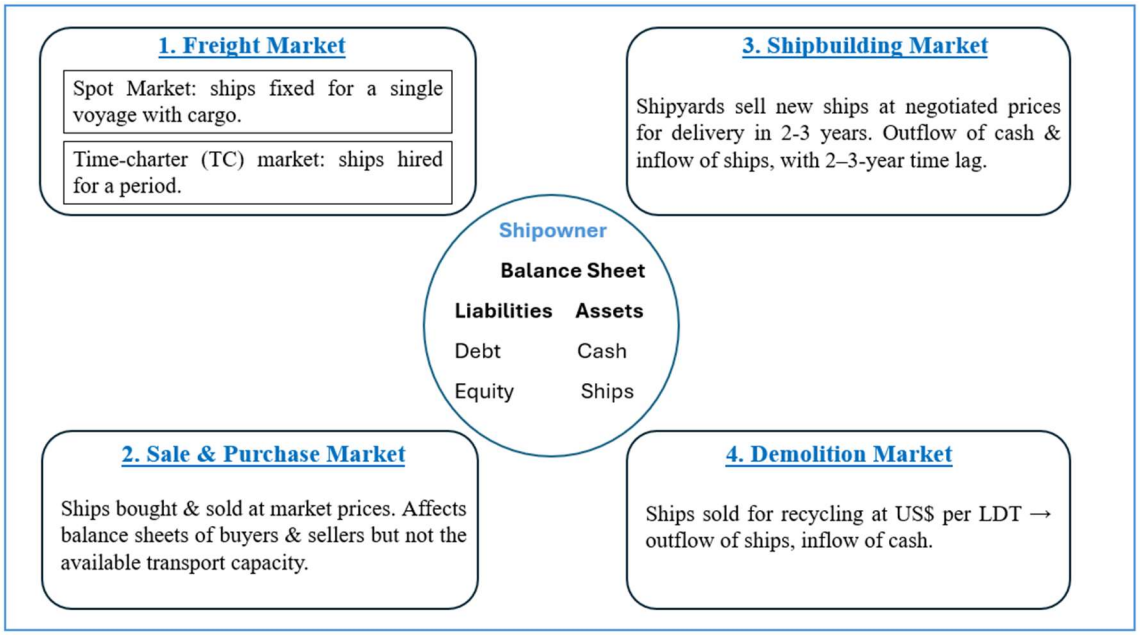
Chapter 4, Data and Descriptive Analysis, outlines the dataset and presents descriptive statistics related to freight rates, secondhand vessel prices, and volatility across major dry bulk segments. This chapter discusses how the data are being handled and what insights we observe from global disruptions in shipping after 2020. The fifth chapter contains the Empirical Analysis and Results. This chapter analyzes the relationship between freight rate and secondhand vessel pricing. The results arise by answering research questions and this chapter is divided into sub-chapters per sub-question focused on how volatility influence S&P decisions. The research concludes with a concise summary of the results, addressing the research questions. Last but not least, there is the limitation section, existing gap, and encourage future research in maritime asset markets. As the content and structure of the thesis are now clear, it is necessary to start with the literature review.

2 Literature Review

2.1 Overview of the Dry Bulk Market

Since the early contributions of Tinbergen (1931, 1934) and Koopmans (1939), freight rates have been central to maritime economics. As Beenstock and Vergottis (1989) note, they are the key price signal behind almost all shipping choices from deployment to the timing and location of vessel purchases. In dry bulk, which intermediates essential raw materials, this centrality is framed by the four-markets model: movements in the freight market feed through to asset values, with second-hand prices capitalizing expected earnings adjusted for age, capacity and efficiency (Stopford, 2009; Alizadeh & Nomikos, 2011). Because supply adjusts slowly, earnings display clustered volatility, shaping S&P behavior and valuation under uncertainty. Figure 1 summarizes these links: freight generates cash flows; the S&P market transfers ownership, the newbuilding market converts cash into future capacity (typically after 2–3 years), and demolition reconverts ships into cash, each reflected on the shipowner's balance sheet.

Figure 1: The Four Shipping Markets and the Shipowner's Balance Sheet



Source: Stylized interaction of the four shipping markets. Freight generates cash flow, S&P transfers ownership, newbuilding converts cash to future capacity (delivery after

~2–3 years), and demolition converts ships to cash (priced in US$/LDT). Author's illustration, adapted from Stopford (2009)

2.1.1 Vessel Types and Key Commodities

Dry bulk shipping moves unpackaged raw materials, principally iron ore, coal, grains, bauxite/alumina, fertilizers loaded directly into a ship's cargo holds rather than containers (AXS Marine, 2025). Capacity is measured in deadweight tonnage (DWT), and vessels are grouped by size: Handysize (~10–40k DWT), Handymax/Supramax–Ultramax (~40–66k), Panamax/Kamsarmax (~65–85k), Post-Panamax/Mini Cape (~87–120k), Capesize (≥120–200k), and very large classes such as VLOC/Valemax/Chinamax (200–400k+). Larger ships mainly carry iron ore and coal on long-haul routes; smaller ships handle grains and minor bulks and access ports with draft or infrastructure limits (Clarksons, 2023). Operational features number of holds/hatches and whether the vessel is geared (own cranes) or gearless differentiate utilization and trading patterns. Figure 2 summarizes typical ranges and key characteristics.

Figure 2: Classification of Major Bulk Carrier Types by size and design characteristics

Vessel Types	Typical Size Range (Deadweight Tonnage)	Key Structural and Operational Specifications
Handysize	20,000 - 35,000	Four holds/hatches or five holds/hatches
Handymax	36,000 - 49,000	Five holds/hatches. Geared with 25–30-ton cranes
Supramax / Ultramax	50,000 - 66,000	Geared with 25–40-ton cranes, usually fitted with own grabs
Panamax/Kamsarmax	65,000 - 82,500	Seven holds/hatches. Usually gearless, although some 65/68,000 dwt vessels have gear

Post Panamax/Mini Cape	87,000 - 120,000	Seven holds/hatches. Gearless
Capesize	120,000 -200,000	Nine holds/hatches
VLOC / Valemax, Chinamax	220,000 -400,000	Seven holds/hatches. Gearless

Source: Compiled by the author using information from the Baltic Exchange, "Main Vessel Types"

As the industry is evolving and trade continues to grow, due to economies of scale vessel size also grows based on the needs of the world. Capesize used to range between 80,000 to 100,000 DWT but because of the needs of industry carriers become larger and wider. Since Capesize vessels are too wide and large to travel via Panama Canal they travel mostly via Cape of Good Hope, that's how the name Capesize was born. These ships are divided into Small Capes that can carry from 100,000 to 130,000 DWT, Normal Capes that can carry from 130,000 to 200,000 DWT, and Large Capes, also known as Very Large Bulk/Ore Carriers which can carry over 200,000 DWT and can carry up to 400.000 DWT (Plomaritou & Papadopoulos, 2017).

As has already been mentioned, dry bulk cargoes are categorized into four main groups: grain, iron ore, coal, minor bulk. Grain including wheat, corn, and soybeans, represent around 10% of trade, sourced mainly from the United States, Brazil, and Argentina, this segment is increasingly affected by climate change and geopolitical disruptions, such as the Ukraine conflict. Moreover, Iron ore is the dominant commodity, accounting for over 30% of global dry bulk trade by volume, with exports concentrated in Australia and Brazil and over 70% of imports destined for China. Coal, comprising just under 25% of the trade, is driven by both thermal (power generation) and coking (steel production) demand, with Indonesia, Australia, and Russia leading exports. Finally, minor bulks such as steel, bauxite, fertilizers, and forest products make up the remaining 35%, typically carried on smaller vessels and characterized by more seasonal or regional trade dynamics (AXS Marine, 2025).

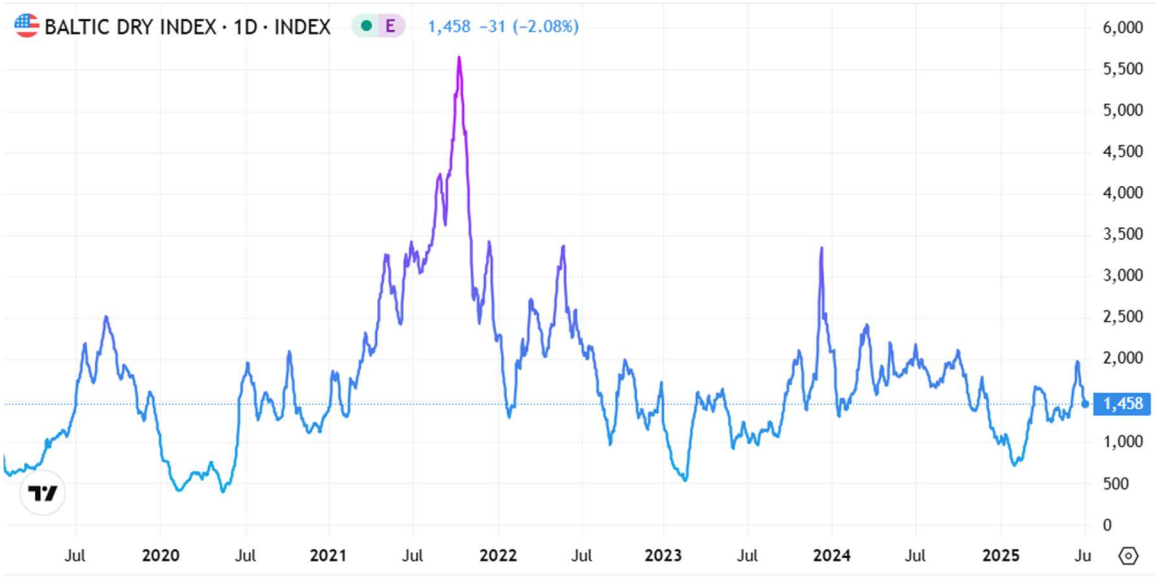
2.1.2 Market Structure

The dry bulk shipping market is characterized by its open, decentralized and competitive structure. There are 4 markets in the shipping world: newbuilding market, freight market, demolition market and Sale and Purchase market (Stopford, 2009). The freight market is the most important out of the four because of its influence to the remaining three markets. So, freight contracts are primarily arranged on the spot market or via short to medium-time charters. Often, the contracts are negotiated through shipbrokers benchmarked by indices such as the Baltic Dry Index (BDI) and Baltic Capesize Index (BCI). Unlike container shipping, where few dominant players control and influence the market, in dry bulk shipping there are a lot of shipowners and charterers of various sizes (Stopford, 2009). The market structure is decentralized and cyclical. There are no long-term fixed freight rates, pricing is influenced mostly by the balance or imbalance between supply and demand. This makes the dry bulk sector more vulnerable to rate volatility compared to other sectors. In summary, the dry bulk market is highly competitive because of the easy access for new players to enter, an information-sensitive environment and influenced by external shocks and macroeconomic forces. Understanding this structure is essential to interpreting the relationship between freight rate volatility and secondhand vessel pricing.

2.2 Freight Rate Volatility

The Baltic Freight Index (BFI) launched on 11 June 1984 with a base of 1000 tracks charter rates earned by shipowners and is closely aligned with freight-rate movements, making it a barometer of the dry-bulk sector's health (Cullinane et al., 1999; Stopford, 2009). A freight rate is the unit cost of marine transport, in other words, the revenue per day/tonne for chartering a vessel (Duco, 2010). The Baltic Dry Index (BDI) is the market benchmark, aggregating rates on 23 routes across dry bulk vessel segments, it has long guided chartering decisions and is used to read trade conditions (Lei, 2009, Trading Economics, 2025). Like the VIX in equities, BFI/BDI convey both levels and volatility, though, unlike the options-derived VIX, the BDI is grounded in physical freight contracts.

Figure 3: The Baltic Dry Index month-to-month



Source: Trading Economics: The Baltic Dry Index month to month data (2025)

2.2.1 Drivers of Volatility

Freight rate volatility in the dry bulk market arises especially from macroeconomic factors or conditions, sector fundamentals and expectations in financial instruments such as forward freight agreements (FFAs). According to Lim, Nomikos, and Yap (2019), who conducted one of the most comprehensive and important empirical analyses of these dynamics in the dry bulk market, identifying both demand and supply variables as key factors such as vessel supply growth, commodity demand (particularly iron ore and coal), global GDP, and bunker fuel prices (Lim et al., 2019). Chen and Wang (2004) showed a significant negative relationship between returns and volatility for three different types of dry bulk vessels. Based on (Black, 1976) there is a stronger effect in downturns of the market rather than in upturns, which shows an inverse relationship between spot rate levels and freight rate volatility, consistent with the notion of a leverage effect. Moreover, Xu et al. (2011) found that a change in fleet size positively affects freight rate volatility, especially in larger fleet sizes. In addition, Kavussanos (1996) examined volatility as a measure of risk in the dry-bulk ship market and found that time-charter rates are more volatile than spot rates, with small vessels rates being less risky than larger carriers. Alizadeh and Nomikos (2009) and Tsouknidis (2016) studied dynamic volatility spillovers using multivariate DCC-GARCH econometric models. These papers highlight the idea of

interconnectivity between Capesize and Panamax, dry bulk carriers categories, but also identified differences of these classes. Finally, Alizadeh and Nomikos (2011) examined how changes in the term structure of period charter rates relate to fluctuations in freight rate volatility, showing an asymmetric relationship: volatility tends to be higher when there are periods of backwardation in the freight market a market condition where spot freight rates are higher than expected future rates, often reflecting immediate scarcity of vessels compared to times of contango, where future freight rates exceed spot rates, indicating expectations of rising demand or easing supply constraints.

In summary, freight rate volatility in the dry bulk sector is influenced by a mix of market-specific, macroeconomic, and behavioral factors. At its core, volatility arises due to the cyclical demand, inelasticity of supply, and the time lag between investment decisions and fleet deployment (Stopford, 2009; Kavussanos, 1996). On the supply side, the construction of a new vessel can take 2–3 years, creating a mismatch between capacity adjustments and current market demand (Clarksons Research, 2024). Additionally, vessel scrapping decisions and slow steaming contribute to the short-term rigidity of tonnage. This low elasticity shows high price movements when demand shifts. On the demand side, freight market behavior depends heavily on commodity flows, especially commodities such as iron ore, coal, grain, and minor bulk products connected to industrial production, infrastructure spending, and seasonal harvest cycles (UNCTAD, 2022).

Further amplifying volatility are external shocks including geopolitical instability, sanctions, and war-related rerouting (e.g., Red Sea disruption due to the Houthi crisis). These shocks impact voyage duration and trade flows, ultimately distorting freight pricing mechanisms. Additionally, investor sentiment, speculative behavior, and market expectations introduce psychological and behavioral components into rate movements, which are often reflected in forward freight agreements (FFAs). While some analysts and shipbrokers rely on these instruments as leading indicators, others highlight the risk of herding behavior and mispricing.

These dynamics collectively indicate that volatility in the dry bulk market is not merely reactive but is shaped by both structural lags and behavioral feedback loops. When market participants anticipate booms or downturns, they make investment or divestment decisions

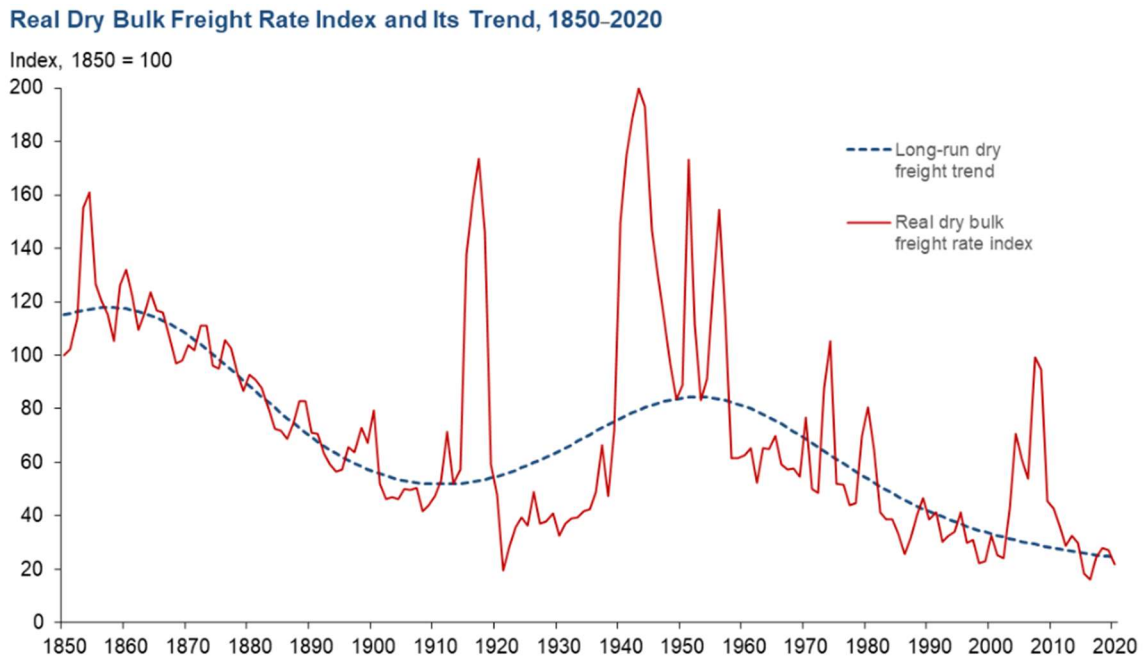
that can reinforce or distort market signals. This undermines the assumption of perfect foresight and creates uncertainty around optimal timing for vessel acquisitions or disposals.

Therefore, while these factors help explain historical volatility, they are often insufficient for reliable forward-looking decision-making, particularly in periods of geopolitical disruption or unexpected demand shocks. This reinforces the value of combining event-based qualitative analysis with traditional models to support better sale and purchase (S&P) decisions in volatile market environments.

2.2.2 Historical Volatility Patterns

The dry bulk sector, as it has already been mentioned, has historically experienced extreme patterns of freight rate volatility driven by its characteristics of cyclicality and exposure to global macroeconomic shocks. The book of Stopford (2009) highlights the fact that the dry cargo cycles are more clearly defined, and the peaks tend to be longer while the tanker cycles are more “spiky”. Freight rates are highly sensitive to even marginal changes in demand and supply, which creates sharp peaks and troughs in market performance across vessel types and charter durations (Stopford, 2009). Changes in technology have made new markets possible. In addition, the graph shows the shocks that made freight rates drop and rise, external forces that still influence the shipping industry and by far the freight market. The Korean war in started in early 1950, Suez Canal disruptions in 1956, the oil crisis in 1973, Asia crisis in 1997 and the China boom in 2003 are a few of the events from 1950 to 2008, when in 2008 there was the biggest peak.

Figure 4: Shipping cycles in the freight rates of dry-bulk shipping 1850–2020

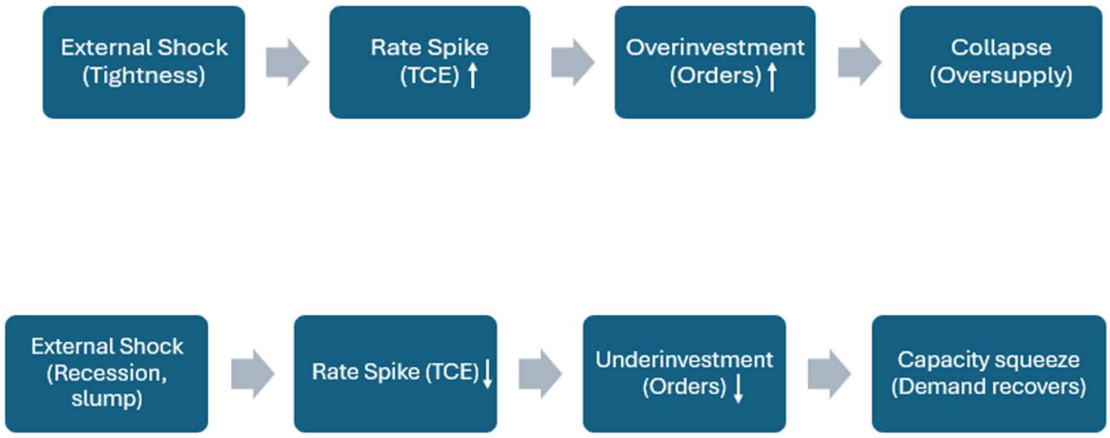


Source: Jacks, D., and M. Stuermer. 2021. "Dry Bulk Shipping and the Evolution of Maritime Transport Costs, 1850–2020."

The Figure 4 presents a long-term history of real dry-bulk freight rates (1850–2020). It shows substantial volatility across decades, reflecting wars, macro cycles, and supply-demand imbalances. The red line highlights short-run swings in the index, while the dashed blue line shows the long-run trend. The trend is extracted from the annual series using a Christiano-Fitzgerald band-pass filter configured to retain very low-frequency cycles (≈70 years) and smooth out short- and medium-term fluctuations, it is included for visual context rather than statistical inference (Christiano & Fitzgerald, 2003; Jacks & Stuermer, 2021).

A notable historical example of freight rate volatility is the 2003-2008 dry bulk supercycle during which the tramp shipping index rose dramatically, reaching its highest peak (Peak 23) in the dataset. According to the Norwegian Shipping News Tramp Index, freight rates surged due to the China-led commodity boom, with index levels rising more than fivefold compared to early 2000s levels. This upward moment is also a result of the global financial crisis where there was severe liquidity crunch from the collapse of global trade finance. This event exposes the industry's dependence in the financial credit system (Stopford, 2009). The above historical episodes such as the Korean war, Oil crisis and Suez Canal disruptions establish that the freight market volatility is often externally triggered.

To all of these examples from Stopford (2009) book there is a repeated behavior: when global trade or geopolitical stability being uncertain freight rates react disproportionately. Historical data also shows that Capesize, the largest class, experiences more extreme highs and lows, due to their dependence on fewer commodities (e.g., iron ore, coal) and routes, because of the constraints on several ports' infrastructure, which amplify volatility during shocks (Lei, 2009, Kavussanos, 1996). In summary, historically volatility follows a structure such as:



Ultimately, external shocks can push rates up or down. Positive shocks often trigger overinvestment and later correction, negative shocks lead to underinvestment and a later capacity squeeze when demand returns. These cycles are central and vital to understanding how freight market behaves over time and set the stage for analyzing how the post-2020 period compares with these established patterns.

2.2.3 Covid-19 and Recent Volatility Shifts

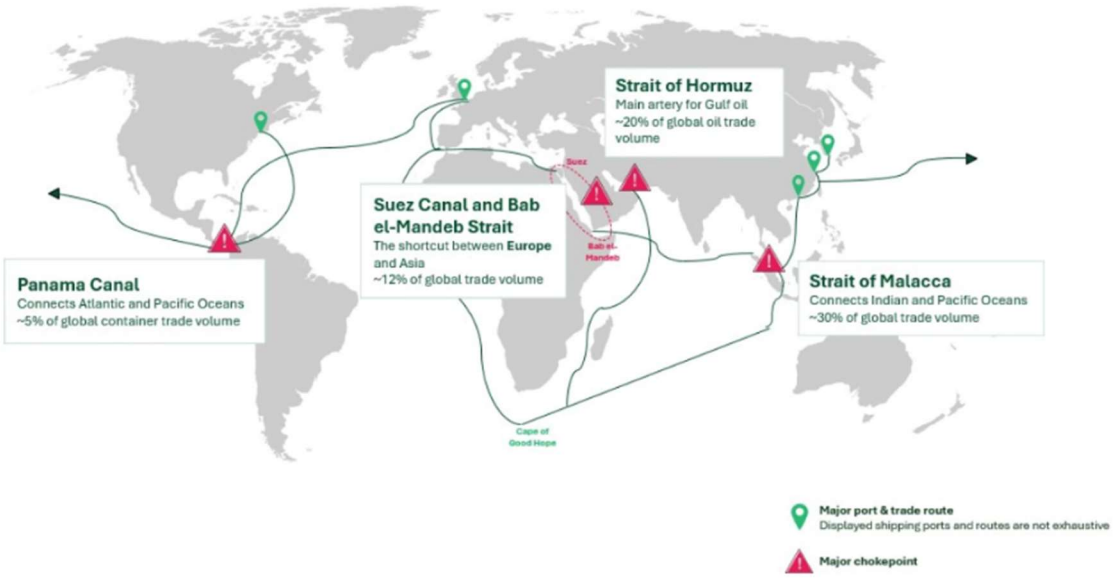
The Covid-19 shock really influenced the shipping sector and of course dry bulk shipping. First, there was a depressed dry bulk demand and then followed a demand rebound reflecting the sensitivity of the sector to demand side shocks. Since then, several unrelated

shocks have affected seaborne trade, most notably, Suez Canal blockage (2021), security risks on Red Sea that caused vessels to reroute via Cape of Good Hope increasing the operational uncertainty. These events have caused an imbalance at the demand and supply side and contributed to short-run volatility on shipping companies' earnings (UNCTAD, 2022, Clarksons Research, 2022).

From the commercial side of shipping this short-run volatility includes further fuel consumption, rerouting via Cape, congestion-related scheduling risk, and higher insurance premia on exposed routes. Together with the industry's low short-run supply these frictions widen bid-ask spreads and make chartering more reactive, reinforcing volatility without implying a permanent increase (Stopford, 2009; Alizadeh & Nomikos, 2011).

The following Figure 5 points the key maritime chokepoints from 2021-2025 the Suez Canal, Bab el-Mandeb, the Strait of Hormuz, and the Cape of Good Hope, regions that connect seaborne trade, exporters such as Brazil, Australia and Middle East with importers as China, Europe and India. Disruptions at these nodes can quickly change tonne-miles and move freight rates (UNCTAD, 2022; Clarksons Research, 2024). In addition, for dry bulk trade the most important are nodes are Suez–Bab el-Mandeb, the Strait of Malacca, the Turkish Straits, Gibraltar/Cape of Good Hope, and (for some trades) the Panama Canal. BCG estimates that: Suez–Bab el-Mandeb normally carries ~12% of global maritime trade and Cape detours add ~9–17 days per voyage, the Strait of Malacca handles ~30% of world trade and about two-thirds of China's trade (incl. ~80% of energy imports), while ~40% of the world's container fleet transits the Taiwan Strait. Furthermore, the Panama Canal accounts for ~5% of global container trade and ~46% of US East-Southeast Asia trade but has faced drought-related constraints, the Strait of Hormuz moves 20–30% of global oil indirect for dry bulk yet relevant via bunker costs and macro risk. For Sale and Purchase decisions what matters is the expected persistence of detours, vessels sail through Cape of Good Hope, not the shock itself. Mostly, prices tend to re-rate when higher earnings persist, not on one-off spikes. Treating these as independent episodes is appropriate for the 2021-2025 analysis (BCG, 2024).

Figure 5: Key Maritime Chokepoints Relevant to Dry Bulk Trade, 2021-2025

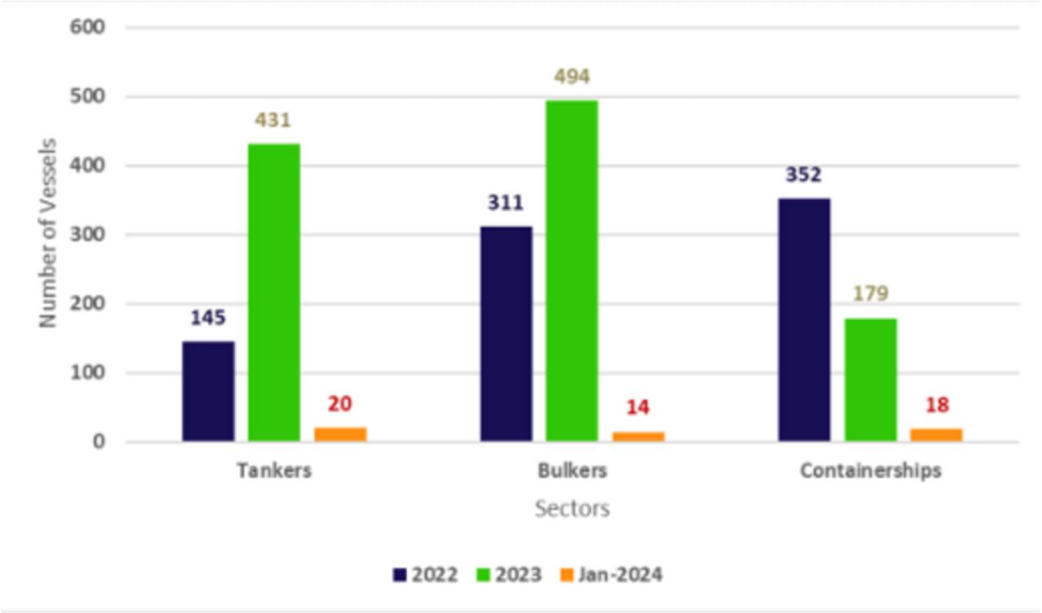


Source: Boston Consulting Group. (2024, February 12). These four chokepoints are threatening global trade.

Beyond freight rates, the S&P market in Q1 2024 offers compelling evidence of reactive investment behavior. Despite dry bulk carriers ranking first in newbuilding orders in 2022 and 2023, 2024 saw the lowest number of bulk carrier orders since 2002, indicating investor caution amid operational uncertainty (PMS, 2024). In stark contrast, secondhand bulk vessel transactions surged, with over 100 vessels sold in February a 267% increase annually. This shift suggests that market players prefer flexible assets in the resale market over long-term commitments like new buildings. Notably, Greek buyers acquired 33% of all Capesizes and 28% of Supramaxes traded, underscoring regional strategic focus on asset acquisition during volatile periods. This behavior aligns with theory suggesting that high freight rate volatility influences not only chartering but also timing and pricing of investment decisions. Furthermore, environmentally motivated orders such as Berge Bulk's Newcastlemaxes reflect the industry's response to evolving IMO decarbonization goals and green financing incentives, blending financial prudence with strategic fleet renewal. This sharp increase in second-hand bulk carrier transactions, despite low newbuilding activity, underscores that market participants are responding to short-term volatility with flexible

asset repositioning strategies rather than long-term investment, reinforcing the thesis that freight rate uncertainty heavily influences S&P decisions.

Figure 6: Newbuilding Sales



Source: Piraeus Maritime Studies (PMS), (2024)

2.3 Asset Valuation and Price Cycles

This chapter examines how secondhand vessel prices behave over time, how asset values are influenced by factors such as age and depreciation, and the empirical relationship between freight rates and vessel prices especially during periods of volatility. According to (The Signal Group, 2025) the sale and purchase of vessels has recorded an accelerated pace compared to the years of 2019 and 2020 for dry bulk ships. This increased volume of transactions for dry bulk carriers reflects the upward trend of freight rates in the Capesize segment with smaller ship sizes also attracting a high interest from investors.

2.3.1 Secondhand Vessel Pricing Behavior

Second-hand values largely capitalize expected earnings, their level and persistence, and are adjusted for vessel attributes such as age, DWT/segment, efficiency, regulatory readiness, such as EEXI/CII and scrubbers, delivery timing, and market liquidity (Stopford,

2009; Alizadeh & Nomikos, 2011). On the other hand, newbuilding prices, which are tied to the shipyard costs and delivery duration, secondhand carriers' prices are forward-looking and react or are influenced faster to shifts in the earnings outlook and sentiment (Stopford, 2009; Alizadeh & Nomikos, 2007).

Additionally, price dynamics are segment dependent, for instance, larger vessels such as Capesize exhibit higher elasticity because they serve concentrated, long-haul trades and deep-draft ports; smaller classes (Handysize/Supramax) tend to display more stable pricing due to greater trading flexibility (Kavussanos & Alizadeh-M., 2001; Kavussanos, 1996). Moreover, market practice and the behavior of the investors are what really matter. In reality, shipbrokers and owners benchmark values to the most recent comparable sale ("last done"). This approach makes prices slow to adjust (sticky) and, in volatile periods, they can temporarily deviate from fundamentals (Adland & Cullinane, 2006; Adland & Jia, 2017). As a key takeaway, secondhand vessel values mainly track expected earnings and react most when the earnings uplift looks credible and persistent (e.g., TC1y strength), not to one-off spot spikes. Sensitivity is segment-dependent for instance, Capesize swings > Handysize/Supramax due to trade concentration and draft limits.

2.3.2 Vessel Age Depreciation

Vessel values decline with both physical aging and economic obsolescence. Especially in the dry bulk sector, depreciation is non-linear compared to other shipping sectors. Asset values tend to fall faster in the first 10-15 years, then increasingly reflect scrap value and current sentiment; typical commercial lives are approximately 20-25 years, depending on the specific segment and trading pattern (Stopford, 2009). Recent environmental rules, decarbonization and zero net emissions in the shipping industry accelerate obsolescence for fuel-intensive tonnage. As a result, the economic life of a dry bulk vessel declines for non-compliant ships (Poulsen et al., 2018). Moreover, operational and technical features such as engine-fuel efficiency, gear, and build quality enter valuations directly, while firm period charters can partially insulate older vessels by stabilizing cash flows (Mayr, 2015, Stopford, 2009).

In literature, observed depreciation also reflects cyclical timing. More specifically, in downturns, mid-life and older ships adjust more as charterer preferences and efficiency

standards tighten, while in recoveries, persistent earnings improvements can re-rate values (Stopford, 2009). From a finance perspective, age shapes expected cash flows and risk in DCF models, and regimes such as tonnage tax can weaken the link between fiscal and economic depreciation (Glen, 2006, Veenstra & Franses, 1997). Also, the ongoing challenges from the IMO for decarbonization and technology transitions add more uncertainty to investors and shipowners, making scenario and investment planning more complicated, since there is no clear path of fuel transition (Notteboom & Cariou, 2021, Lam & Notteboom, 2014, Adland & Jia, 2017).

2.3.3 Link Between Freight Rates and Prices

Freight rates are undeniably one of the most important factors that influence secondhand vessel prices as they have a direct impact on their earnings of the asset when the vessel is operating. According to (Stopford, 2009) vessel prices are essentially "capitalized freight earnings," so rise and fall of the market has a direct impact on income. Recent literature highlights how microeconomic and contract-specific factors such as route, laycan timing, vessel age, and commodity type contribute to freight price formation and indirectly affect asset pricing behavior (Alizadeh & Talley, 2011).

Empirical studies of charter contracts show that freight rate contracts is influenced by other forces which are time-based, such as contract publication date, laycan start and end period, estimated vessel arrival and the cycle the market experiences at the moment on global commodity flows. Poblacion (2015) found that stochastic seasonality models better explain variations in freight rates than deterministic ones, especially for Time Charter Equivalent (TCE) and Worldscale (WS) rates across multiple routes. His findings showed that rates are higher in winter and spring as a result timing is a pricing variable.

Additionally, except for timing that has a strong influence on freight rates, other structural characteristics impact price transmission. Jonnala et al. (2002), analyzed over 12,000 grain shipping contracts and found that ship size, flag and voyage distance affect freight rates. Therefore, these parameters influence the price of the secondhand vessel market, especially when there is a high volatility season where investors deal with uncertainty and try to optimize the profits of their assets.

Furthermore, Adland et al. (2016) examined iron ore shipments from Brazil, identifying that vessel utilization can certainly change freight outcomes. Since the secondhand market are typically benchmarked against recent earnings, any changes in operational performance directly impact on the price assets in the market.

In a more recent example after the macroeconomic shock of the pandemic Covid-19 freight surge was not equally distributed. For instance, Capesize ,the large class of the dry bulk market, rates surged more dramatically due to the iron ore demand which cause the prices in the secondhand vessel market to explode or increase faster than other carriers such as Panamax or Handysize markets (Clarksons Research, 2022).

Ultimately, while there is a strong relationship between freight rates and secondhand vessel prices this relationship is complex. Timing, commodity type and vessel specifications all influence how freight income translates into asset value. That is the most important reason why it is needed to understand how the market works and which factors affect the freight rates in the dry bulk market especially after 2020 where macroeconomic shocks such as geopolitical tensions, trade wars and wars happen.

2.4 Sale and Purchase Decision-Making Under Uncertainty

The sale and purchase (S&P) of vessels is a strategic function in dry bulk shipping that extends beyond asset acquisition and disposal, it is a decision-making process that includes behavioral factors and market volatility. Qu (2014) argues that despite other stable investment environments, dry bulk shipping is highly cyclical and exposed to a large number to macroeconomic forces, including freight rates volatility, fuel price fluctuations and geopolitical disruptions. Recent studies have highlighted the need for a more nuanced view, incorporating descriptive behavioral theories such as Cumulative Prospect Theory (CPT) to reflect risk perception and loss aversion among shipowners (Güngör & Barlas, 2022).

These decisions, the acquisition of a vessel, are not usually made knowing all the information about the market, so there is no market clarity. Instead, shipowners rely on their judgmental abilities and try to forecast the market with the help of shipbrokers and market analysts and take risks especially when there is uncertainty in the market and

volatility such as the COVID-19 pandemic or major geopolitical disruptions. The following sections will explore, understanding the intersection between market timing, financial modeling, and behavioral dynamics is essential for effective decision-making under uncertainty in the post-COVID dry bulk sector.

2.4.1 Investment Strategies

The common guidance is the approach for every successful investor, “buy low, sell high”, although it is really hard to execute in shipping because of the lack of information available and constraints shift (finance, yard slots, regulation), and investment lags are long (Stopford, 2009). In reality there are three main approaches to investment strategies. First and foremost, counter-cyclical purchases and fleet renewal: buy tonnage in downturns when the values are depressed and dispose on older, insufficient carriers in upturns. Although this strategy could only be applied successfully when investors have a credible view on the persistence of earnings and access to funding. Second, a real-options lens: in this strategy, the investor treats the vessel as a flexible asset with timing (deferral), switching (trade/technology), and exit (sale/scrap) options, this preserves value under volatile earnings and evolving decarbonization rules (Güngör & Barlas, 2022). Finally, awareness of the “bullwhip effect”, based on the paper of (Qu, 2014), small disturbances in commodity flows can amplify through charter rates, orderbooks and asset values, complicating timing and encouraging scenario-based planning and limits on pro-cyclical ordering. Ultimately, an effective S&P strategy is the approach that balances near-term earning opportunities with regulatory and technology pathways.

2.4.2 Risk Assessment and Timing

Timing is state-contingent. Investors and shipowners, when they make decisions, are not only looking at the level of rates but they also ask whether the strength is likely to last. For instance, whether BDI/TC1y has held up for several weeks. Furthermore, it is also important to cross-check this with simple signals such as the orderbook-to-fleet ratio, scrap activity, and utilization/congestion. Regulatory challenges implemented by the IMO and the United Nations add market risk for decision making too (UNCTAD, 2024). In high-uncertainty regimes, bid–ask spreads widen and older, fuel-intensive ships trade at larger

discounts; when earnings look credible and persistent, spreads narrow and values re-rate (Stopford, 2009, UNCTAD, 2024).

2.4.3 Real-world S&P Decision Behavior

Theoretical investment behavior provides more clarity in this study. In another study of Akgul & Cetin (2021) found that small owners' decisions are influenced by behavioral biases such as overoptimizing during periods of crisis, demand booms, leading to reliance on past peak prices and affecting delays in sales of underperforming vessels. Industry data actually confirms those data. BIMCO (2024) analysis reports that the average age of a dry bulk fleet is near 12 years, indicating slow renewal despite rising freight rates. Their Q2 2023 and Q4 2024 Shipping Market Outlooks show that fleet growth continued while chartering conditions briefly improved but owners held older vessels, influenced by profit expectations and regulatory uncertainty.

This trend particularly started during the Covid-19 boom where there was highly uncertainty in the market demand and supply. Despite regulatory concerns around EEXI/CII, where most of the older vessels are practically underperforming and have a high number of C02 emissions, many owners bought vessels from the secondhand market at high prices due to increased demand in the market prioritizing short-term charter earnings and speculative upside (Clarksons Research, 2022). Such behavior aligns with cumulative prospect theory where owners overweight gains during bull markets and underreact during downturns (Güngör & Barlas, 2022).

There are differences between “small shipowners” with a small fleet and global shipping companies, they follow a different pattern. Public shipping companies used to follow formal investment models and scenario analysis instead, private owners rely more on relationships and gut feeling when they look at the market behavior. This heterogeneity reinforces why observed S&P behavior often diverges from textbook models.

2.5 Summary and Research Gap

Taken together, the literature clarifies how dry-bulk markets function and shows that second-hand prices broadly track earnings amid clustered volatility. What is less developed is practical guidance on how volatility conditions (not just rate levels) should inform S&P

timing and premia/discounts when decision-makers face real-world constraints and behavioral frictions. This thesis addresses that gap through a concise, qualitative, signal-based framework, with episode-specific illustrations reserved for later chapters. The aim is modest: to organize concepts and offer usable considerations, not to make causal claims.

3 Methodology

This chapter sets out and justifies the research design used to study freight-rate volatility and second-hand asset pricing in the dry-bulk market after 2020. The approach is qualitative and exploratory, supported by descriptive reading of numerical indicators rather than formal econometrics. Evidence comes from recurring, authoritative industry sources such as Clarksons Research, the Baltic Exchange, BIMCO, BRS, and UNCTAD over 2021-2025, which are coded for direction (rising/falling/flat), persistence (brief vs sustained), and stated drivers (demand/tonne-miles, fleet/supply, policy/compliance, shocks). A semi-structured interview with an anonymized S&P broker is used to test and interpret the desk findings (protocol and anonymized notes in Annex/Appendix A–B).

The chapter is organized as follows: the research approach and design, data sources, key variables and indicators (freight benchmarks, segment asset values, basic volatility cues) and analytical techniques. The aim is not to establish causal effects, but to explain how market behavior and sentiment under uncertainty map into observed pricing patterns during 2021–2025.

3.1 Research Approach and Design

This study adopts an exploratory, qualitative research design to examine how post-COVID fluctuations, volatility patterns, and asset price cycles influenced the dry bulk market and, therefore, the freight rates. While other studies (e.g., Memişoğlu & Başer, 2019; Kavussanos, 1996) emphasize quantitative modeling using ARCH-GARCH frameworks, this research focuses more on qualitative and descriptive analysis on capturing behavioral decision-making when there are disruptions in the market and when volatility episodes are observed.

The rationale of this methodological approach stems from the limitations of research after the post-COVID shock in the dry bulk market, as well as the lack of information for Sale and Purchase decisions. Furthermore, after the pandemic, several exogenous external forces influenced the shipping market and caused more uncertainty. For instance, the U.S.-China trade war after the reelection of President Trump and his aggressive trade policies, the Russia–Ukraine war, and regulatory changes, these several geopolitical disruptions are vital to the shipping market as they affect global trade. Yin et al. (2019) and Yang (2009), in their papers that examined investment strategies and shipping cycles, show that the

qualitative design allows the integration of market sentiment, strategic behavior, and narrative causality into the analytical framework.

While the literature on freight rate modeling frequently emphasizes cross-sectional time-series methods, such as Fixed Effects models (Adland et al., 2018), Random Effects, or even more complex frameworks like AR-GARCH (Xu et al., 2011) and Bayesian Multilevel Models (BML) (Shor et al., 2007), this study deliberately adopts an interpretive stance. The aim is not to develop predictive models or estimate causal coefficients but to generate an understanding of market dynamics through event-driven analysis and thematic interpretation.

Using mixed methods design, this study combines descriptive market indicators with qualitative, focused on macroeconomic and short-term shocks that influenced freight rate volatility and decision making. Rather than modeling volatility mathematically (Kavussanos, 1996, Memişoğlu & Başer, 2019), it traces how volatility emerged, why it spiked, and how market participants interpreted it over time.

3.2 Data Sources and Collection

To support the qualitative and quantitative approach in this study, this section outlines how we categorized data sources and methods used to gather relevant information. This research employed both quantitative data, including freight rates and asset price indices, and qualitative insights from market reports and trade press. The mixed approach strategy aims to provide a comprehensive overview of the dry bulk market from different perspectives, while presenting data and forecasts from analysts and shipbrokers.

The combination of high-frequency market data and qualitative industry commentary allows for a layered analysis. The following section explains how this information is interpreted through thematic and descriptive methods to extract insights relevant to freight market behavior. This design clarifies the freight market, the key market among the other three, the sale and purchase market, the new building market and the demolition market. (Stopford, 2009) and the evolution of asset-price cycles under uncertainty, without assuming market efficiency.

The next section analyzes the data sources, and the market reports studied (e.g., Clarksons, Baltic Dry Index, BRS Shipbrokers Research) to capture the dry-bulk market's multifaceted dynamics.

3.2.1 Quantitative Data Sources

The evidence base is document-driven rather than a compiled numerical time series. It draws on recurring market publications and briefs from Clarksons Research, the Baltic Exchange, BIMCO, BRS, and UNCTAD over 2021-2025 (Clarksons Research, 2025, Baltic Exchange, 2025, BIMCO, 2024, BRS Group, 2025, UNCTAD, 2024).

These sources were read and coded thematically to capture:

- direction of conditions for instance rising, falling or flat
- persistence of the shock such as brief spike vs. sustained change
- stated drivers demand/tonne-miles, fleet-supply, policy and compliance and shocks

Quantitative references within those reports (e.g., index levels, asset value tables) are used descriptively to support the narrative, not for econometric modelling. The resulting coded corpus provides a structured account of how market participants explained freight and asset dynamics throughout the period and informed the design of the key-informant interview. Findings from this desk review are subsequently triangulated with the anonymized broker interview (see Annex, Appendix A-B) to test whether reported patterns align with observed behavior in live S&P practice.

3.2.2 Qualitative Data: Key-informant Interview

To add practitioner insight, I conducted a semi-structured interview with an experienced dry-bulk shipbroker. The conversation took place in Athens in August 2025 and lasted about 60 minutes. The discussion focused on: (1) the main drivers of volatility in period 2021-2025 (2) how short-term freight-rate spikes inform guidance on secondhand vessel prices; and (3) practical timing rules brokers use under IMO/EEXI requirements. Informed consent was obtained, and no client names or commercially sensitive details were recorded. Interview notes were summarized and coded against the study's sub-research questions, and the insights were used to triangulate and enrich the patterns presented in Chapter 4. The interview protocol is provided in Annex A, and anonymized notes/excerpts in Annex B. Notes were coded against the study's sub-questions (durability/forward curve, bid anchors, segment asymmetry, compliance effects) and used to test the desk-research patterns reported in Chapter 4.

3.3 Key Variables and Indicators

This study examines the impact of freight rate volatility on secondhand vessel prices in the dry bulk market, particularly following the significant market fluctuations after the 2020 post-pandemic period. To explore this relationship, it is important to analyze three main categories of variables: freight rates, secondhand asset prices and volatility indicators. These are complemented by auxiliary variables such as fleet size, vessel age, and distance sailed, which provide contextual information for market dynamics. These core variables are supported by auxiliary measures such as fleet size, vessel age, and average distance sailed, which help explain structural changes in market behavior and add contextual depth to the analysis.

First and foremost, freight rates are primary signal of short-run supply–demand balance. In this study the Baltic Dry Index (BDI) is used and its Capesize and Panamax sub-indices. BDI is widely used in the shipping industry and by market analysts for research purposes because it tracks trade cycles, commodity flows, and vessel availability (Stopford, 2009).

Additionally, Clarksons' assessed asset values for Handysize-Capesize are read alongside S&P commentary to understand how participants price earnings expectations, age and specification, financing conditions, and regulatory readiness (e.g., EEXI/CII compliance and retrofit needs). Under strict environmental rules and high uncertainty, older or less efficient carriers that do not apply to environmental targets set from IMO tend to face accelerated depreciation and thinner buyer interest (UNCTAD, 2021, Clarksons Research, 2024).

Volatility indicators are described through event narratives in broker and industry reports. Events that have already been mentioned such as Red Sea Crisis, Suez Canal blockage and U.S.-China trade tensions abrupt shifts in chartering sentiment, widening route spreads, rerouting through Cape of Good Hope and stop-start cargo programs around geopolitical and macro shocks. These events explain why and how the rates fluctuate and how market investors react to those moves (BRS Group, 2025, Clarksons Research, 2024).

Given the links among freight rates, secondhand vessel values and volatility indicators, this study uses a qualitative approach, drawing on market publications to capture both

numerical swings and behavioral dynamics after 2020, showing how external shocks and UN/IMO regulations translate into market outcomes.

3.4 Analytical Techniques

While there are a lot of studies that employed econometric modelling to examine similar relationships (Koekebakker et al., 2007; Adland & Cullinane, 2006), the present approach prioritizes context-driven interpretation over purely statistical inference. This reflects the decision-making by market participants where shipowners, charterers and shipbrokers are involved and both quantitative metrics and qualitative intelligence shape strategic actions.

The analytical process of this research will follow three interconnected stages:

1. Desk-based descriptive reading. Reported movements in benchmark freight indices (BDI, BCI/BPI/BSI) and segment asset values from Clarksons are reviewed to characterise volatility, trends and segment differences (Capesize, Panamax/Kamsarmax, Supramax/Handysize), without constructing a separate econometric time series.
2. Event-centric mapping. Major post-2020 disruptions and policy shifts (e.g., COVID-19, Russia–Ukraine, Red Sea routing, IMO decarbonization, EU ETS/Fuel EU) are mapped to contemporaneous changes in freight and values using authoritative industry commentary (BIMCO, 2024, UNCTAD, 2024), Clarksons Research notes, and Baltic Exchange briefs. This stage interprets observed changes but does not attempt formal identification.
3. Expert triangulation. A semi-structured interview with an anonymized Sale & Purchase broker is used to test and interpret the desk patterns and especially add his personal experience regarding the fluctuations in the market and decision making for investors.

Numerical volatility signals (dispersion, spikes) are read together with the reported drivers (demand, supply, policy) to judge when freight moves are likely to pass through to second-hand values and when efficiency/compliance features command a premium. The resulting evidence is presented in Chapter 4, structured around the research questions.

4 Data and Descriptive Analysis

This chapter assembles qualitative evidence for 2021–2025 from industry publications and assessments. It maps how shocks and structural factors were reported to affect freight rates and secondhand values, setting up the answers developed in Chapter 5. No econometric or numerical estimation is undertaken, instead the thesis concludes answering the research question based also on interviews with shipbrokers involved in the field of Dry bulk and Sale and Purchase sector.

4.1 Evidence Synthesis Approach

This section explains how market reports turned into qualitative evidence for the 2021-2025 period. The core of the thesis is based on dated documents from Baltic Exchange, Clarksons Research, BIMCO, BRS, and UNCTAD. The study chose reports and evidence that included dry-bulk freight or secondhand values, and stated direction, persistence, or driver of change. On the other hand, it excludes reports if undated, duplicated, or purely opinion without market content.

A codebook, seeded by the research questions, guided analysis and was refined iteratively (Bowen, 2009; Braun & Clarke, 2006). Each item was coded along six dimensions:

- Rate signal: upwards, downwards, stable. Stable means moves are within a typical day-to-day band noted by the source (no clear trend).
- Persistence: how long the shock lasted for instance spike (≤2 weeks), short run (≈2–4 weeks), sustained (>4 weeks).
- Driver: such as demand and trade, cargo programs, commodity flows, macro activity. Furthermore, fleet and logistics vessel supply, congestion, weather, rerouting, port/canal frictions. In addition, regulatory challenges from IMO EEXI/CII, EU ETS, fuel rules-costs. Finally, finance credit availability, interest rates, and cost of capital.
- Behavioral activities: anticipatory chartering, capacity hoarding, risk-off S&P, compliance premia/discounts. Anticipatory chartering such as fixing ahead of need ,capacity hoarding as holding ships off-market/for own programs, risk-off S&P

such as buyers reluctant or lowering bids and finally compliance premia/discounts as price spreads based on EEXI/CII readiness.

4.2 Macroeconomic Episodes

Four episodes structure the evidence:

- Logistics and energy dislocations 2021: created port congestion and swings in energy market caused brief spikes in spot freight earnings. Secondhand prices only rose where this strength lasted, otherwise they stayed flat. Main reasons cited: long port queues, higher "friction" costs, and uneven cargo programs (BIMCO, 2021; UNCTAD, 2021).
- Russia and Ukraine war 2022: grain and coal flows rerouted, sanctions added and delays and sail distances increased Spot rates jumped quickly, but secondhand prices moved up only when cargo programs and time-charter averages stayed firm for several weeks; one-off spikes faded (UNCTAD, 2022; Clarksons Research, 2024).
- Policy and compliance with maritime regulations 2023-2025: New rules (EEXI/CII) and, in Europe, EU ETS costs changed what buyers want. Older and less efficient vessels which are not comply with regulations and are not preferred from investors instead "compliance-ready" vessels were preferred even when headline earnings were similar (IMO, 2023, European Commission, 2023, Clarksons Research, 2024).
- Red Sea Crisis and Suez Blockage 2023-2025: Security risks and premiums added for vessels that sail through this region. While carriers that sail around Cape of Good Hope experience higher freight rates and fuel consumptions Brokers described anticipatory behavior (fixing early, holding capacity). Effects on secondhand prices depended on how long the diversions and charter demand lasted (BRS Group, 2025; BIMCO, 2024; Baltic Exchange, 2023).

Building on the document-based synthesis in sub-chapter 4.3, 4.4 presents Figures and visual trends from market experts and private research companies for the same 2021–2025

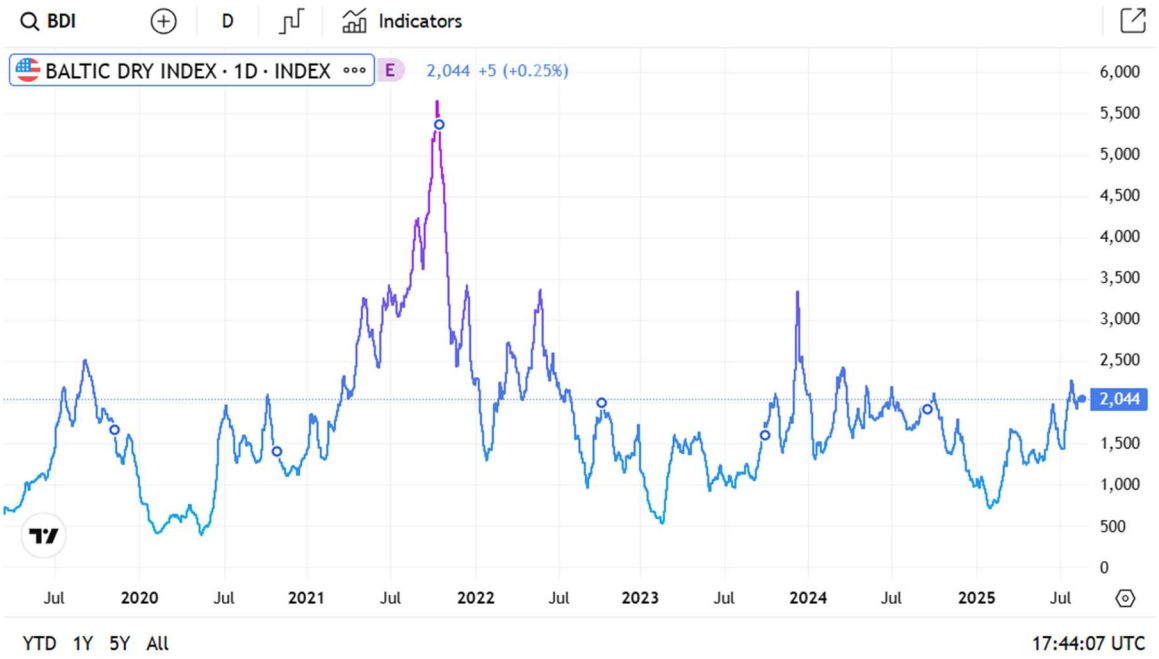
windows, highlighting timing, persistence, and segment contrasts that feed directly into the findings in Chapter 5.

4.3 Visual Trends and Observations

Sections 4.2-4.3 establish that dry bulk earnings and benchmark indices are volatile, asymmetric, and heavy-tailed, with clear event-driven regimes. Section 4.4 now visualizes how those earnings dynamics transmit to secondhand prices and risk metrics, addressing sub-questions on (i) rate–price co-movement by segment, (ii) disruption effects, and (iii) S&P timing under uncertainty.

This chapter contains visualizations of the main patterns documented in 4.2 and 4.3, based on sources such as Clarksons SIN, Baltic Exchange, UNCTAD, BIMCO and other market reports. Event windows COVID port congestion (2020-03–2021-12), Russia–Ukraine invasion (from 2022-02-24), China property slowdown (2022-06–2023-06), Red Sea disruption (from 2023-12-15), U.S – China trade tensions and IMO decarbonization challenges are shaded for comparability across exhibits. Notes beneath each figure state units, transformations, and sources. Below, Figure 7 plots the Baltic Dry Index with shaded episode windows (2021 logistics/energy, 2022-23, Russia-Ukraine, 2023-25 policy & compliance, 2023-25 Red Sea/Suez). It shows fast, event-driven spikes versus longer, lower-amplitude phases. This anchors the sub-research question number two by locating when disruptions appeared and how persistent they were (Baltic Exchange; BIMCO; UNCTAD).

Figure 7: BDI with disruption windows, 2020–2025



Source: TradingView. (2025). Baltic Dry Index (BDI)

The Baltic Dry Index charts the post-2020 cycle clearly: a steep run-up into the late-2021 peak during COVID-era congestion, a sharp retracement through 2022 as queues eased and China's property downturn reduced bulk demand, and a series of shorter spikes in 2023 - 2025. Acute events (e.g., the March 2021 Suez blockage, Red Sea tensions) generated brief surges, while macro headwinds compressed both levels and volatility for longer. Because the BDI is Capesize-weighted, amplitudes are larger than in mid-size segments; the index is used here as whole-market context (Clarksons Research, 2022, 2024; Suez Canal Authority, 2021; IMF, 2023; World Steel Association, 2023; UNCTAD, 2024).

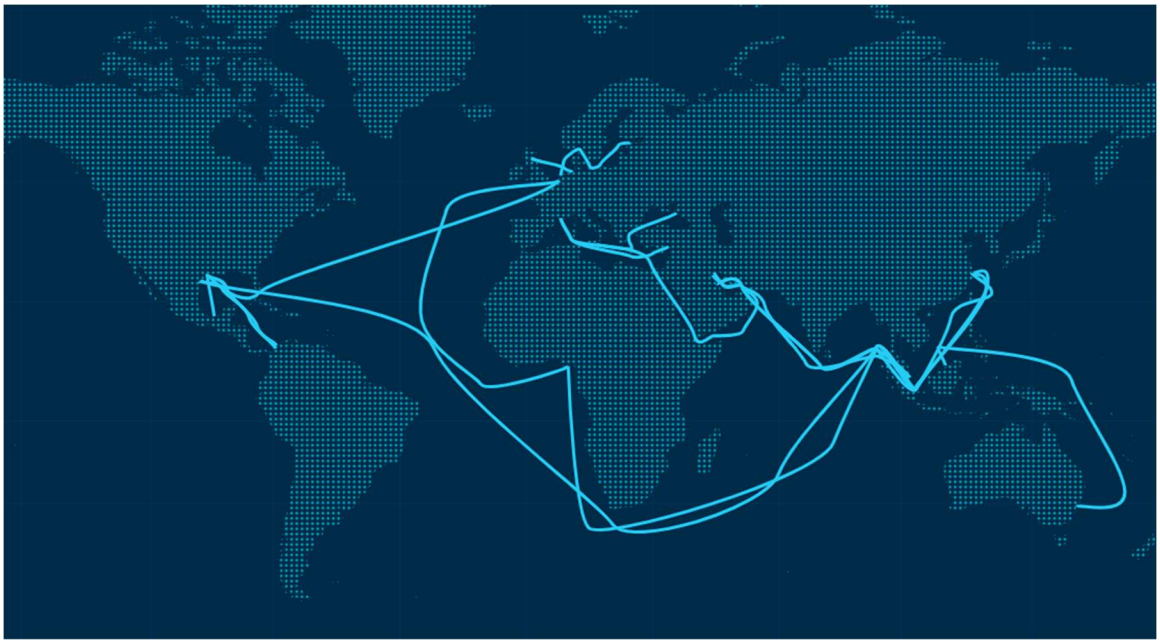
Figure 8: Baltic Panamax Index (BPI-82 4TC), 2020–2025, with disruption windows.

Source: Fearnleys AS. (2025). Dry bulk market charts Panamax indices, 2020–2025. Oslo: Fearnleys AS.

Notes: Monthly averages of daily assessments; units: index points. Shaded bands mark COVID port congestion (2020-03–2021-12), Suez blockage (2021-03), Russia–Ukraine invasion (from 2022-02-24), China property slowdown (2022-06–2023-06), and Red Sea disruption (from 2023-12-15), (Baltic Exchange (BPI-82 methodology)).

In Figure 8 the BPI index where the Panamax 4TC traces the same post-2020 arc as the broader market but with smaller swings, consistent with the segment's more diversified cargo mix (grains, coal, bauxite, fertilizers) and shorter average hauls than Capesize (Baltic Exchange, 2025; BIMCO, 2024). From late-2023 there are brief lifts helped by the Atlantic grain season, minor-bulk restocking, and some Red Sea-related rerouting but these bumps are modest and fade quickly, nowhere near the 2021 surge (Pacific Basin, 2024; Xinhua–Baltic, 2025). In effect, Panamax employment acts like a shock absorber: losses are milder than in Capesize, but the same diversification also caps the upside, so rallies tend not to stick unless broader demand strengthens and stays firm.

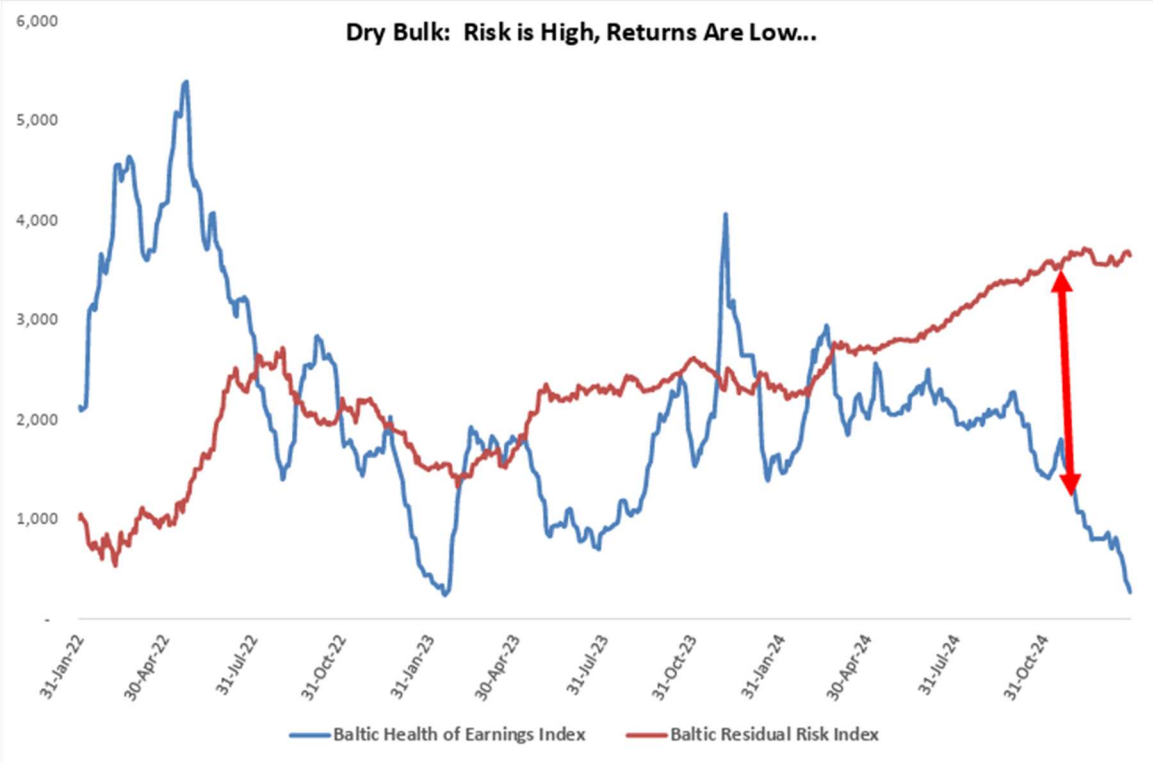
Figure 9: Red Sea disruption: illustrative diversion vs normal Suez route (late-2023)



Source: Baltic Exchange 2025 website

Additionally, Figure 9 is being used to highlight the fact that many dry bulk East–West carriers are rerouting through the Cape of Good Hope, rather than the Suez Canal, because of the Red Sea disruptions lengthening round voyages and raising tonne-mile demand. In other words, the same fleet supply executes fewer trips per month, creating a temporary tightness that supports spot earnings. As schedules adapt or risk eases, this tonne-mile premium fades, consistent with the brief, modest lifts seen in the BDI/BPI after late-2023.

Figure 10: Baltic Exchange Investor Indices: Health of Earnings vs Residual Risk, 2022–2025

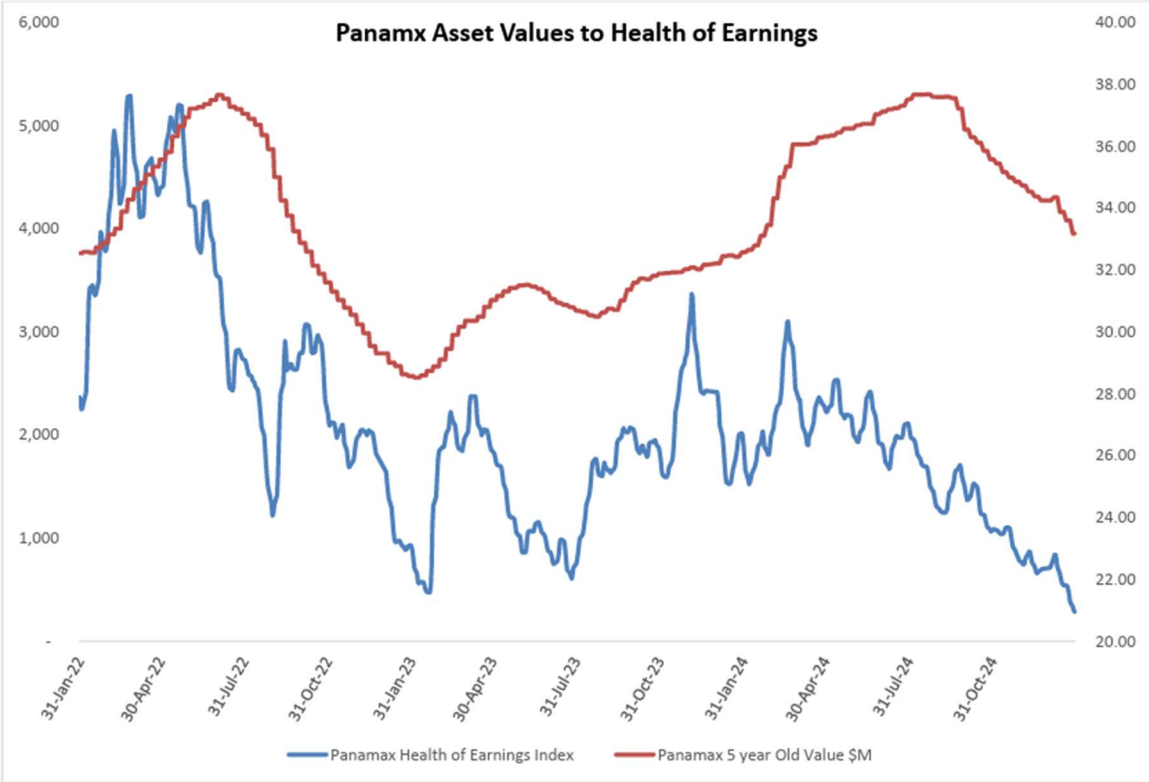


Source: Baltic Exchange. (2025, February 18). Baltic Dry Investor Indices Quarterly 4Q24. London, UK: The Baltic Exchange.

The Health of Earnings Index (HEI), blue line, measures how far spot time-charter income sits above (or below) daily running costs rising HEI indicates healthier operating margins. In contrast, The Residual Risk Index, red line, rises as assessed vessel values approach their implied scrap value, signaling greater downside risk to owners' equity. HEI has trended lower while Residual Risk has climbed, producing a "low returns / high risk" regime. Historically, that configuration is associated with fragile secondhand pricing, thinner S&P liquidity and wider bid–ask spreads, because cash flows no longer justify prior transaction marks, (Baltic Exchange, 2025, August).

In other words, When HEI falls while Residual Risk rises, paying premiums for second-hand ships is hard to justify prioritize cash, keep cover short, and avoid older units until margins improve. The next figure shows this lag for Panamax 5-year values in 2022–2025.

Figure 11: Panamax asset value (5-year-old, USDm, rhs) vs Health of Earnings Index (lhs), 2022-2025



Source: Source: Baltic Exchange Investor Indices, 2025, Clarksons assessed values 2025

Notes: HEI = ratio of spot earnings to daily running costs (Baltic Exchange Investor Indices methodology). Asset values are broker-assessed secondhand prices. Units: USD millions (rhs), index points (lhs). Sample: Jan-2022–Aug-2025. Sources: Baltic Exchange Investor Indices; Clarksons Research vessel valuations.

Figure 11 shows Panamax 5-year asset values (USD m, right axis) against the Health of Earnings Index (HEI) (left axis). Moreover, HEI compares spot earnings with daily running costs. Through late 2024 heading to start of 2025 HEI trended down even as asset values remained comparatively elevated, indicating a decoupling/lag between earnings and prices and the presence of valuation premia not fully justified by contemporaneous cash flows, (Baltic Exchange, 2024), (Baltic Exchange, 2025, August). Finally, financing and liquidity conditions shape the path of prices: leverage amplifies cycles, and when S&P activity is thin in soft markets, the few trades that print can produce lumpy, stepwise adjustments rather than a smooth drift towards earnings.

Several near-term forces could lift HEI before any corresponding response in asset values. On the supply side, orderbook-to-fleet ratios and projected net fleet growth remain moderate by historical standards, limiting structural pressure on earnings, (Clarksons Research, 2025). On the demand side, the seasonal South American grain export program typically supports Atlantic rates in the second half, while the ramp-up of Simandou in Guinea once fully operational would lengthen iron-ore tonne-miles, supporting sentiment in larger segments. In parallel, FFA curves have recovered from post–Lunar New Year lows, signaling improving short-run freight expectations, (DNV, 2024, July 15). Historically, such factors lift HEI first; secondhand prices tend to follow only if the improvement proves persistent, (Baltic Exchange, 2024).

When it comes to Sale and Purchase decision making by shipowners and investors, in phases where HEI is low or weak but values are still high purchase risk is elevated and timing discipline matters (prefer younger units, shorter cover, or wait for better entry points), (Clarksons Research, 2025). In contrast, when HEI tends to be higher or stronger, then valuation becomes more defensible. When the HEI improves and FFA prices strengthen across maturities, paying a premium for second-hand tonnage is easier to justify, fleet upgrades or a modest increase in exposure can be sensible. On the other hand, during prolonged low-HEI periods, investors face greater cash-burn risk and the goal is to avoid issuing equity below NAV and consider selling older, less efficient vessels until earnings recover, (Kavussanos, M. G., & Visvikis, I. D, 2011).

Figure 12: Capesize (≈180k dwt) vs Panamax (≈75k dwt) 1-year time-charter rates, Oct-2023–Aug-2025

Source: Fearnleys AS, Weekly Market Report / Dry Bulk (2025).

Finally in Figure 12, Capesize (blue) moves in bigger, quicker waves and falls harder, while Panamax (orange) behaves like a lower-beta, steadier segment. The difference is structural: Capes rely on long-haul iron-ore and coal trades (Brazil/WA–China), so earnings swing with tonne-miles and sentiment, Panamaxes carry a broader cargo mix on shorter routes (grains, coal, bauxite, fertilizers), which naturally smooths the cycle. The late-2021 surge and 2022 pullback are visibly sharper in Capes, and the post-2023 bumps are modest and brief in both lines Panamax gets seasonal help from Atlantic grains, with only a small lift from Red Sea diversions.

For S&P, this points to different risk profiles: Capesize is a pro-cyclical exposure that can re-rate fast but reverse just as quickly, Panamax tends to deliver more stable cash flow and smaller overshoots, though price re-rating is slower. Taken with the HEI and price panels, the overlay confirms SRQ1: the rate-price transmission holds across sizes but differs in amplitude and speed, informing choices on entry timing, cover length, and fleet mix.

Overall, the evidence shows that since 2020 freight shocks reach secondhand prices with a lag. Spot rates jump and fade quickly, the 1-year T/C resets more slowly, and asset prices only re-rate when the Health of Earnings stays stronger for a while. Segment effects matter: Capesize is the high-beta cycle (bigger, faster swings), while Panamax is steadier, so the pass-through differs in both size and speed. Sudden disruptions (COVID, Suez, Red Sea) create brief lifts by lengthening voyages, whereas macro drags like China’s property

downturn keep rates and volatility subdued for longer. For S&P choices, use HEI/Residual Risk, spot vs 1-year T/C, and a simple valuation ratio together: add selectively when HEI trends up and the forward curve firms, avoid paying premia when HEI is weak and risk is high favor younger, efficient ships, shorter cover, and tight liquidity control.

5 Results & Implications

This chapter first summarizes an expert interview with a dry-bulk S&P shipbroker and then answers the main and sub-research questions directly and briefly. The full questionnaire is included in Appendix A.

5.1 Expert Interview

The purpose of this interview is to add a practitioner view on how post-2020 freight-rate volatility translates into S&P pricing and timing in dry bulk. This section tests also the desk-based patterns from Chapter 4 against the broker interview in Annex B.

Participant profile: Shipbroker with 7 years of experience in the Dry bulk market and with Sale and Purchase experience, most active in Kamsarmax/Ultramax, with Panamax and selective Capesize transactions.

Integrated narratives from findings

1) **Persistence over spikes**

   Desk results: Second-hand values re-rate only when 1-year TC earnings stay firm and the FFA term structure is stable/contango, brief spot rates jump rarely move prices.

   Interview (Annex B, Q1): Secondhand values don't jump just because spot rates jump for a week, instead buyers wait to see if stronger earnings persist for a long period and whether the forward curve (FFA prices for next month) looks stable or supportive. The respondent said that in practice a short-term spike is treated as noise, on the other hand a multi-week improvement that also influences the forward curve starts to re-anchor price ideas. This is why values often move with a lag after the freight market turns.

2) **How bids are anchored**

   Desk results: During the research it was obtained that the 1-year Time charter and the FFA curve are the metrics that market analysts should look for but there was not a clear pattern being followed. Also, market reports highlighted that vessel efficiency and environmental rules are vital for decision-making. Although, during the interview the pattern becomes more clear.

Interview (Annex B, Q2): During the period of 2021-2025, in live negotiations buyers tend to look for four simple references rather than running complex models. First and foremost, the 1-year time-charter (TC) level, second the FFA curve (contango vs. backwardation signals how confident the market is about the next quarters). Then the scrap floor or scrap value and finally due to regulatory challenges efficiency/compliance exposure (CII/EU ETS/FuelEU costs). For instance, if the Time Charter (TC) is strong and the forward curve is supportive then the buyers will pay up, in contrast if the curve is weak, they will resist. It is important to highlight that during the research there was not a clear statement mentioning that shipbrokers were specifically, first, looking for these four elements during the period of 2021-2025. Therefore, this was an important addition for the study to better understand decision-making and market behavior.

3) **Segments differences and lead-lag**

   Desk results: Capesize values moved faster and larger while different segments of dry bulk carriers tend to move slower with stickier asks. This is based on the size of the vessel and the commodity that each carrier trades.

   Interview (Annex B, Q3): the speed and size of a carrier depend on liquidity and how similar vessels are to each other. For instance, Capesize carriers' values usually react faster and more once the earnings really turn (typical lag ~1–3 months), while on the other hand Panamax/Kamsarmax take longer (~2–4 months) and Ultramax/Handy longer still (~3–6 months). This is a result of differences in sizes and speed and also because of certain specifications each vessel segment has so buyers/sellers need time to agree on comparable levels.

4) **What actually trades and where the premium shows up**

   Desk results: Market liquidity clusters in 5-10-year ships. Eco/CII-positive, EU-ETS and Fuel EU Maritime ready units' price at a premium, strongest on EU-exposed routes, Japanese and South Korean shipyards often add an extra uplift (c. 10–15%) versus lower-tier builds such as China. Older vessels are referenced to the scrap floor and show a larger percentage swings.

Interview (Annex B, Q4): the market analysts respond that a 5-to-10-year vessel is the most liquid. New ships that are EU compliant with better fuel, efficiency metrics) and good CII typically come with a premium, especially to EU area routes where ETS and FuelEU costs bite. While older vessels are priced more for scrapping and swing more upwards and downwards. For instance, when it comes to scrapping Japanese and Korean scrap yards, with strong specs and quality control, it appears a price premium frequently quoted around ~10–15% because buyers expect lower technical risk, easier chartering/financing, and stronger resale liquidity".

5) **Practical timing (how they actually decide)**

   Desk results: The desk review offered limited, high-level guidance on timing. Sources repeatedly advise watching the 1-year TC and the FFA term structure (avoid reacting to brief spot spikes) but provide no operational thresholds or cash-flow rules. The practical decision comes from the broker interview (see Annex B).

   Interview (Annex B, Q9): during the interview with the market expert, he analyzed a simple rule that is being followed, often, when the earnings are durable meaning that they are not reacting to one-week spikes, the FFA curve is stable/contango, (future prices ≥ near-term), the market is saying today's strength looks sustainable while if it's backwards (future prices < near-term), the market expects rates to fade, so you should be more cautious. Finally, if the cash flow makes sense, TC yield (%) = (1-yr TC × 365) ÷ price, higher is better, it is acceptable, and months-to-payback aren't stretched. Instead, if the FFA curve falls, then the broker becomes selective, leans on the scrap floor, and watches recent cleared deals.

In the end of the interview, there was a question said, "Why spikes don't always change asset prices". The market analyst responded with an example from 2024, during the second quarter of 2024 the Capesize market softened quickly from about $29k/day to $9.5k/day, but sellers held to earlier "last done" levels and there were few prompt, modern ships on the market. Although after a few weeks' prices started to rise again led by mid-aged units taking roughly 20-25% adjustments. The result was a delayed catch-up correction. This explains the stickiness/lag mechanism described above.

Finally, during the last minutes of the interview there was a question regarding a final key insight or recommendation regarding the overview of the dry bulk market. The shipbroker gave some information that has been interpreted in the study. The analyst stated that during this cycle to treat volatility itself as a gate before buying assets. When forward indicators are soft and noisy broad buying is hard to justify. In this case decision making is hard and it depends on the investor profile. Moreover, in those phases there are two options the first one is to buy a new compliant vessel and efficient under the market environmental regulations (benefit from EU ETS/CII and scarce modern supply) or a very old vessel near scraping years where downside is limited. He mentioned that is preferred to avoid mid-aged carriers which are more exposed to market fluctuations, yield compression and future CII/retrofit costs. Additionally, as geopolitics becoming more serious especially with Red Sea detours, U.S.-China trade frictions, he stated to wait for persistent strength and a supportive curve before decision-making.

The limitations of this thesis and this interview are that these opinions and insights come from a market expert individually and this is only one expert view rather than universal.

The interview highlights four themes persistence over spikes, simple bid anchors, segment lead–lags, and practical timing heuristics that shape S&P decisions. Using these, the next section answers the research questions directly and briefly.

5.2 Answers to the Research Questions

Main research question: How has freight rate volatility since 2020 influenced secondhand vessel price cycles in the dry bulk market, and what are the implications for sale and purchase (S&P) decision-making?

Answer: during the period of 2021-2025, dry bulk asset prices selectively and with lag, short-term spot spikes rarely move values while also earnings, combined with a supportive FFA term structure, discussed during the interview, are the conditions that under which values reset. Chapter 4 shows in Figures 10 to 12 that the Health of Earnings (HEI) is trending lower while on the other hand Residual Risk rose through late-2024/early-2025. Historically, a low return - high-risk associated with fragile secondhand pricing, thinner S&P liquidity and wider bid- ask spreads. Generally, spot rates jump around day-to-day,

but buyers and financiers look at cash flows and cash signals before changing what they will pay for a vessel. Finally, during the interview with the shipbroker, he confirmed that live bids are based on four “indicators”: 1-yr TC, FFA curve shape, scrap floor, and efficiency/compliance exposure, mostly, rather than heavy models.

Sub-research question 1: How has the relationship between time-charter rates and secondhand vessel prices evolved across major dry bulk segments (e.g., Capesize, Panamax) in the post-2020 period?

Answer: the links remain, although speed and reactions to fluctuations are different based on the segment. Chapter 4 highlights that Capesize experiences a higher “asset beta” (faster, larger pass-through) while Panamax and Karsarmax re-pricing slower. Differences in commodity flows, routes length and speed are vital and the key factor resulting in these differences. The interview places a typical value-lag ranges at ~1–3 months (Capes), 2–4 months (Panamax/Kamsarmax) and 3–6 months (Ultramax/Handy).

Sub-research question 2: What impact have key post-2020 market disruptions such as the Suez Canal blockage, and Red Sea tensions had on freight rate volatility and secondhand asset price behavior?

Answer: shocks move freight rates quickly for instance during port congestion, delays due to rerouting through the Cape of Good Hope instead asset values only re-rate when effects persist for a certain period of time and appear in FFA curve metrics. Moreover, Chapter 4 discussion of event windows and the 4Q-2024 Cape “catch-up” example aligns perfectly with the shipbrokers view that sellers “hold” to recent “last-done” prices until earnings are clearly settled and once, they are stable then values reset. Mid-aged vessels are the ones that move, usually, the most as new carriers keep their premium due to their efficiency and compliance with the environmental regulations and very old vessels keep their value for scraping. So, the carriers between 7 to 15 age gap that makes most of the price adjust.

Sub-research question 3: What lessons can be drawn from recent volatility patterns to support better timing decisions in the dry bulk sale and purchase (S&P) market?

Answer: based on the interview with the market analyst, to support better decision making in each case the following rule should be followed: the 1-year time-charter (TC) level,

second the FFA curve (contango vs. backwardation signals how confident the market is about the next quarters). Then the scrap floor or scrap value and finally due to regulatory challenges efficiency/compliance exposure (CII/EU ETS/FuelEU costs). For instance, when the curve moving backwards be selective, it is preferred to choose or stay with old vessels or bids to the scrap floor or stick to new vessels younger, efficiency/compliance-ready tonnage that carries lower EU-ETS, Fuel EU risk and better resale.

Sustainability and fuel transition (commercial perspective)

Several market reports highlight the fact the industry should decarbonize, but decarbonization is not just a policy, it influences freight rates and also secondhand vessel values. Moreover, EU-ETS and FuelEU and fuel-choice uncertainty make voyage costs more variable, so the net TC earnings that matter for asset pricing depend significantly on vessel's fuel efficiency and compliance profile. With the detour via Cape of Good Hope bunker costs and fuel consumption rise, compliance-ready bulkers keep more of the upside (and lose less on the downside), so their cash flows are less volatile, and they command a valuation premium. Mid-aged vessels with weaker CII face bigger earnings swings. Ultimately regulatory environmental policies and fuel uncertainty, because there is no specific guidance of which alternative fuel is going to dominate yet widen value spreads. So finally, decision making should include sustainability measures and analysis of environmental regulations to mitigate risk.

6. Conclusions and Recommendations

This thesis examined how freight rate volatility in the period of 2021-2025 is transmitted to secondhand vessel values and what this means for Sale and Purchase decision making using the qualitative publications for credible shipbroking companies and organizations and the market experts' interview, it draws the following conclusions:

In the dry bulk market prices do not chase every spike, they usually move after earnings are durable checking the 1-year time charter rate and the FFA curve metrics, compliance and efficiency of the vessels based on the maritime regulations and the scrap value. Additionally, sellers have usually the last-done prices and values can look sticky, although they wait for earnings to clearly stabilize and settle at a new level, prices catch up with the mid-aged vessels tend to adjust the most. Furthermore, there is a differentiation between different dry bulk carriers, segments. Capesize values reflect earnings faster and more; Panamax and Kamsarmax move slower and show stickier asking prices. And while shocks such as the Red Sea crisis can result fluctuations and uncertainty in the market, asset values only shift if the effect lasts and shows up in the forward curve (FFA).

In addition, another interesting observation is that environmental regulations and targets to zero net emissions by 2050 changes earnings risk and value. The continuous uncertainty in the market, finding the dominant alternative fuel, makes voyage costs and thus net TC more variable. While vessels that are not ready to comply with face significant challenges in the short future. Environmental regulations come with a premium for the new carriers because of the upgrades in engine and fuel efficiency. Although the key factor for investors and decision makers is to find or build their upgraded fleet based on alternative fuels only while being in the same page with IMO environmental regulations.

For Sale and Purchase decision making based on the interview with the market specialist it is preferred to wait for the "three green lights": earnings look durable (the 1-year TC has held up for several weeks), the FFA curve is stable or contango rather than backwards and the cash flows math works. If any of the above three are not matching then it is better for decision makers to be selective anchor bids to the scrap floor and recent cleared deals, and prefer younger, compliance-ready ships over mid-age tonnage. Furthermore, it is vital to keep a close look on the IMO regulations regarding the environmental target goals

otherwise it will have as a result a loss of investment. Always pricing the rules as well as the rates by applying a compliance filter (EU-ETS/FuelEU exposure, eco/CII performance,) these filters can stabilize earnings, support resale and mitigate risks. Finally, in uncertain markets it is preferred to invest in new compliant vessels and old for scrap ships rather than overpaying for secondhand mid-aged ships.

Areas for further research

Building on this thesis, I believe that there are three topics that would add the most decision value for further investigation in the future. First and foremost, compliance economics in asset pricing: develop valuation models that embed EU-ETS, FuelEU liabilities, CII trajectories and test how these factors shift rates, add premium and how they reshape the market. Secondly, causal effects on shocks using event or case studies to identify how combined shocks such as geopolitical instability, trade tensions and green transition costs translate into tonne-mile persistence, net TC volatility, and ultimately asset repricing. Last but not least, risk management and performance, evaluating whether adaptive pricing or risk-sharing between shippers and carriers can decrease uncertainty in the shipping market while improving earnings and returns. All of them can transition from just describing how prices and earnings move together to building practical tools and a framework for "better" or with less uncertainty Sale and Purchase decision making.

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Annexes

Annex A. Interview Protocol

Purpose. Semi-structured interview used in Chapter 5 to understand how freight signals and compliance factors map into second-hand valuations and live S&P bidding.

Participant descriptor (anonymized). Athens-based S&P shipbroker (dry bulk), mid-senior level.

Ethics & consent. The interview was voluntary, the participant gave verbal consent for notetaking and an anonymized quotation. No personal identifiers are reported in this thesis.

Opening script.
"Thank you for your time. This interview is for academic purposes. With your consent, I will take notes. You can skip any question and stop at any time."

Core prompts.

1. How do you judge when a change in freight rates should move second-hand values?
2. In live deals, which references matter most 1-year TC, FFA curve, scrap floor, efficiency/compliance? How do you weigh them?
3. Do pass-through speed and size differ by segment (Capes vs Panamax/Kamsarmax vs geared)?
4. How have EU ETS/FuelEU and fuel-choice uncertainty changed bids/asks, timing, and premia?
5. Can you recall a recent episode (e.g., late-2024) where values lagged spot and then "caught up"? What droves the adjustment?

Closing prompts.

- "Is there anything important for S&P timing we didn't cover?"
- "May I follow up for clarification when writing up the results?"

Mode, duration. Semi-structured, online meeting and forward of the answers I received in the end, the duration was approximately an hour.

Annex B. Interview Transcript

Participant. Athens-based sale & purchase (S&P) shipbroker, dry bulk. **Consent and anonymity.** Verbal consent obtained, name and firm withheld. **RESPONDENT** answers in plain text, brief omission short and small changes with no change of meaning.

INTERVIEWER: When should a move in freight rates change second-hand values? **RESPONDENT:** We wait for persistence. If the 1-year time-charter (TC) is firm for a while and the FFA curve backs it up, values move. One-week pops are noise.

INTERVIEWER: In live deals, what do you actually check before bidding? **RESPONDENT:** Four quick anchors: (1) the 1-yr TC level, (2) curve shape (contango = safer, backwardation = caution), (3) the scrap floor for older ships, and (4) efficiency/compliance exposure (CII, EU ETS/FuelEU, and likely retrofit needs). We don't over-model, these checks enforce discipline.

INTERVIEWER: Do pass-through speed and size differ by segment? **RESPONDENT:** Yes. Capesize re-price faster and more. Panamax/Kamsarmax/Ultramax adjust slower and asks are stickier, especially where specs vary.

INTERVIEWER: Which ages/specs actually trade, and where are the premia? **RESPONDENT: 5**-10-year ships are most liquid. Eco designs and good yard pedigree (JP/KR) keep a premium. Older units lean on the scrap floor and swing more up and down.

INTERVIEWER: How is decarbonization affecting bids and asks? **RESPONDENT:** We now think in net TC after carbon. EU-exposed trades price in EU ETS costs. Compliance-ready ships (better CII, DF option, or WAPS) get tighter yields and higher bids, exposed mid-age ships get haircuts.

INTERVIEWER: What's your timing rule of thumb? **RESPONDENT:** Enter when earnings look durable, the curve is stable/contango, and simple cash-flow checks pass (acceptable TC-yield/payback). In backwardation or thin

yields, be selective, lean on scrap, and prefer younger, compliance-ready tonnage. Some desks avoid <10% yields in weak curves and look for ≥12–15% once the curve stabilizes.

INTERVIEWER: Can you give a recent example of a delayed catch-up?
RESPONDENT: In 4Q-2024 the Capesize market softened quickly, but asking prices lagged sellers held to "last done" and prompt quality was scarce. After a few weeks of weaker earnings and a softer curve, mid-age ships corrected the most. That's the stickiness/lag in practice.

INTERVIEWER: How do shocks (e.g., Red Sea, sanctions) feed into pricing?
RESPONDENT: They move spot fast, but we only shift values if the effect persists and shows up in the forward. Otherwise, we mostly see a wider bid–ask and slower deals.

INTERVIEWER: Any closing advice for buyers?
RESPONDENT: Stick to the rule the bid logic (TC, curve, comps). Use FFAs if you must move before durability is proven. In uncertainty, a barbell works: very young (optionality/compliance) or very old near-scrap (downside protected). Don't overpay for mid-age in a weak curve.

Notes on ethics and data availability: shipbroker's identity and contact details are not shared but only with the supervisor. Minor changes have been made to ensure clarity and understanding during the process of the study. Although, these light changes do not influence the relevance of the answers.