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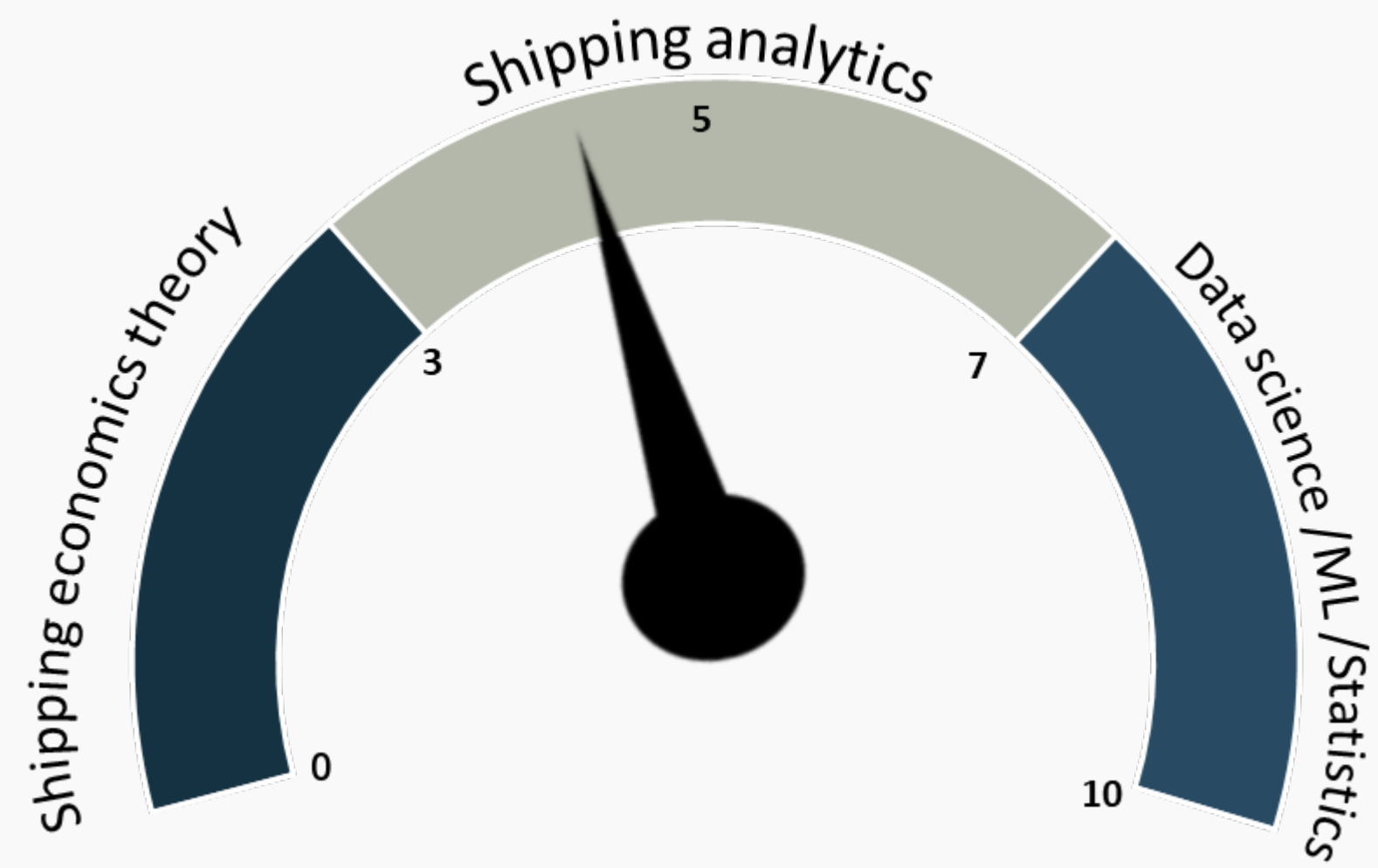


Freight derivatives and risk management

Gabriel Fuentes

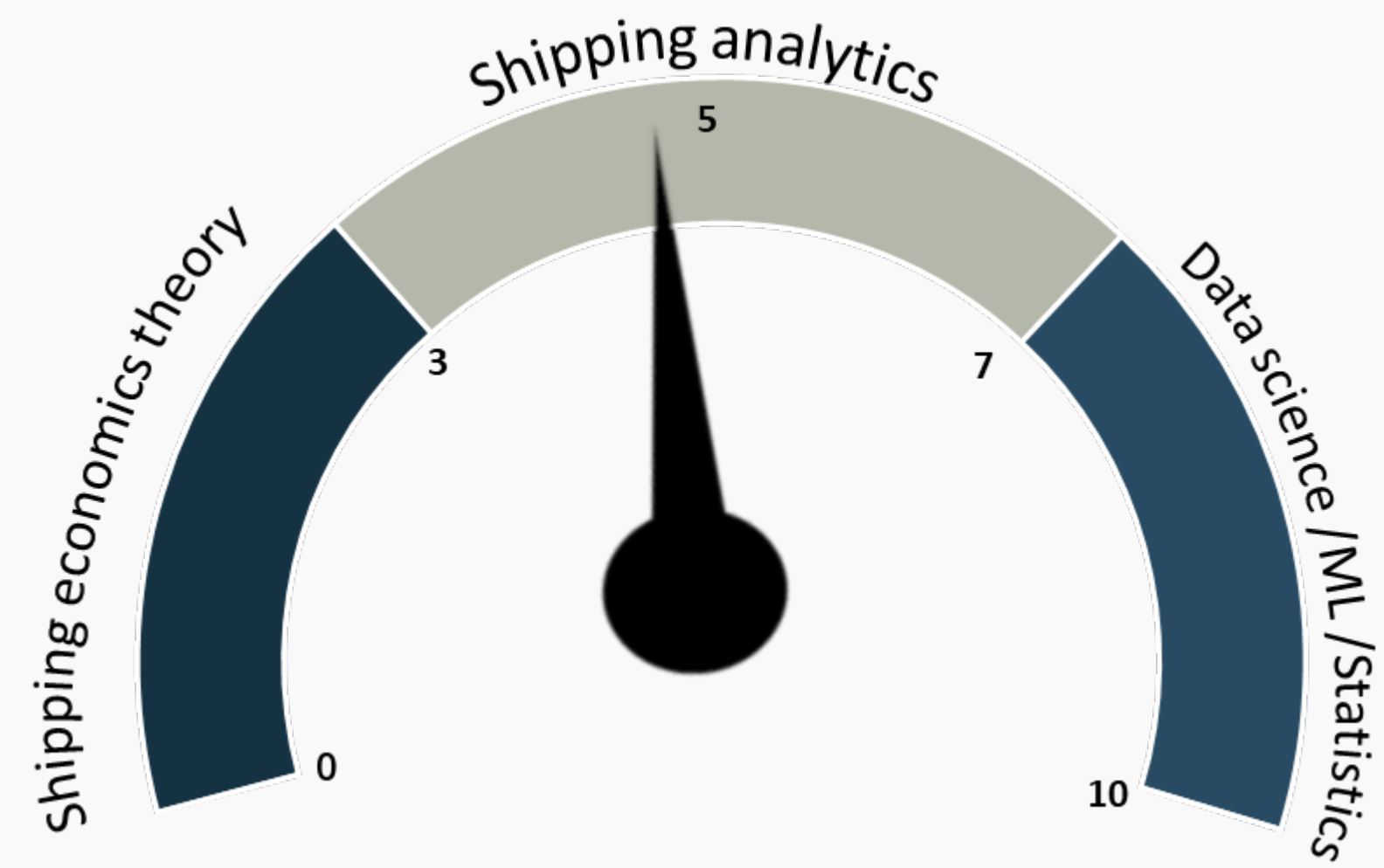
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So far



4.63

Expected



4.90

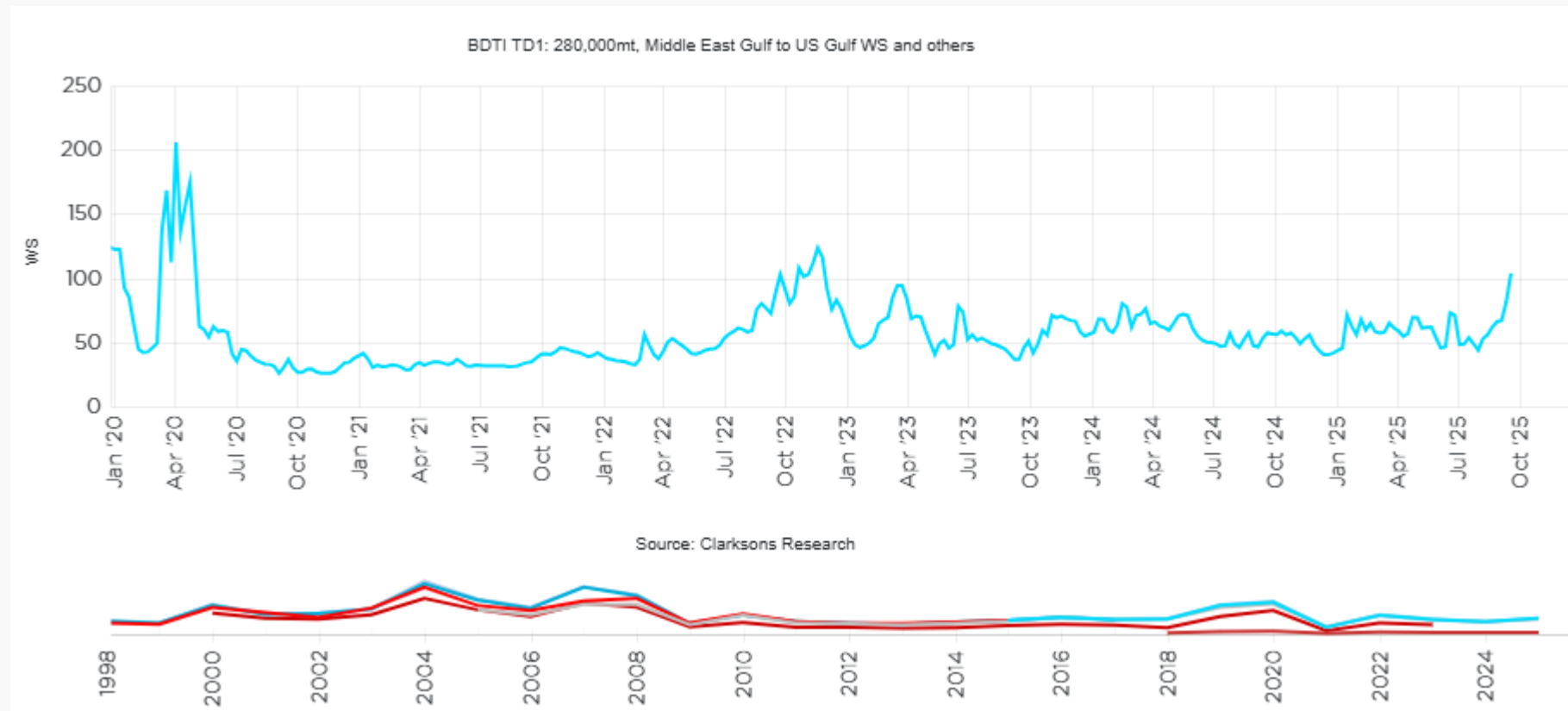
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Suggestions

| | |
|---|--|
| Every week or every other week, look at different segments and compare how they reflect in the stock market | Replace the in the news for in the news with stock market information. |
| Upload all lectures | Lectures (slides) are all available so far. Some recordings (majority) are uploaded. Not all sessions are recorded and none of the workshops/case studies/exercises are recorded. |
| More advanced coding videos | I will make an extra session (recorded) with the advance analytics parts of some of our previous sessions. For the benefit of our diverse batch, and given that is not a requirement, I have reduced the technical elements compared to other years. |
| Analytics more in terms of the underlying mechanics. | Idem to previous action. |
| Longer breaks | Lecture dependent. Will aim for 10 min. max. |
| More exercises/tips for out of class | Will share some extra information. So far, Panayides book Chapter 8 and 10 are excellent source of exercises. |
| Would like to learn economics (tech perspective) | The course aims to connect relevant economic knowledge with practical applications. Since economics is a broad field, I would recommend complementing it with more theoretical courses. The general principles of Mar. Economics can be found in Stopford (2008). From the reading list, several papers starts from an in-depth discussion of economics concepts applicable to shipping (e.g. Adland et al, 2020; Fuentes and Adland, 2023; Poulsen and Sampson, 2019) |
| More case studies | One today following L2, L7 (2 cases) and short exercises in other sessions. Note: case/exercise sessions are not recorded. |





Frontline FRO (NYSE)



Tanker giant Frontline: 'We're in for a longer one' in current upcycle

Oil majors and national oil companies seek more three-year VLCC charters

30 May 2024 NEWS

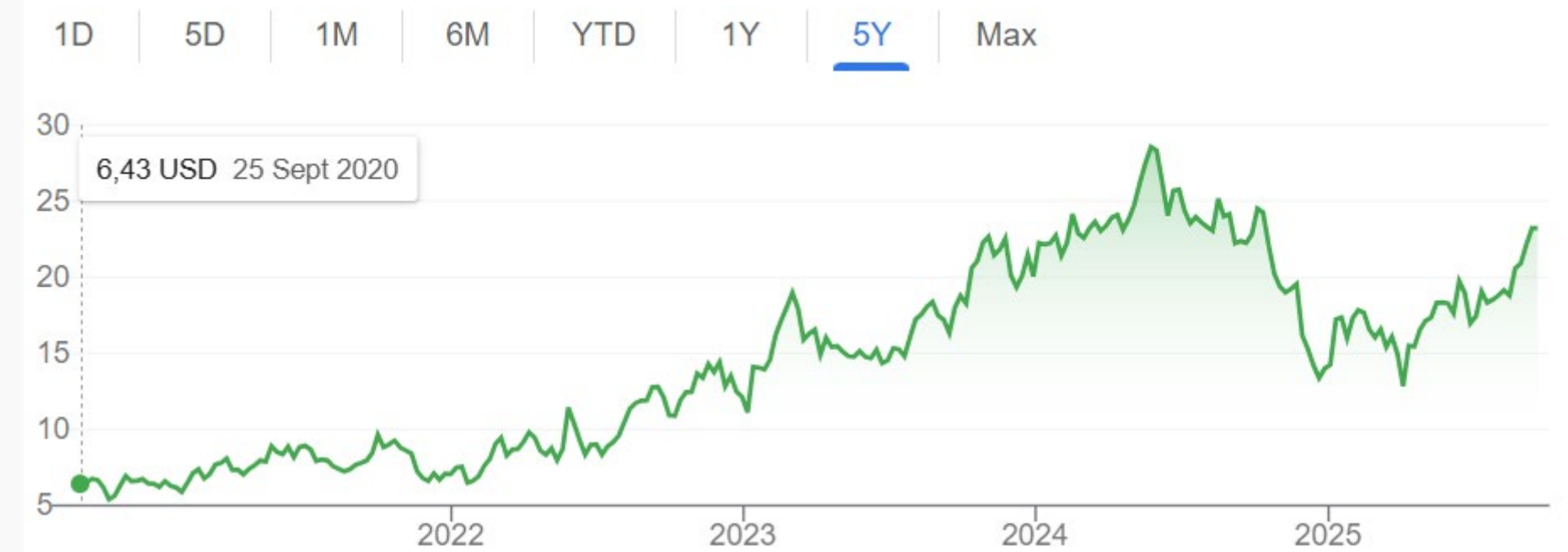


by Greg Miller

@GMjournalist

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Frontline's purchase of 24 VLCCs from Euronav is paying off as the transformative fleet growth coincides with a period of highly profitable rates and structural constraints on industry capacity expansion



Frontline owns and operates a large and modern fleet



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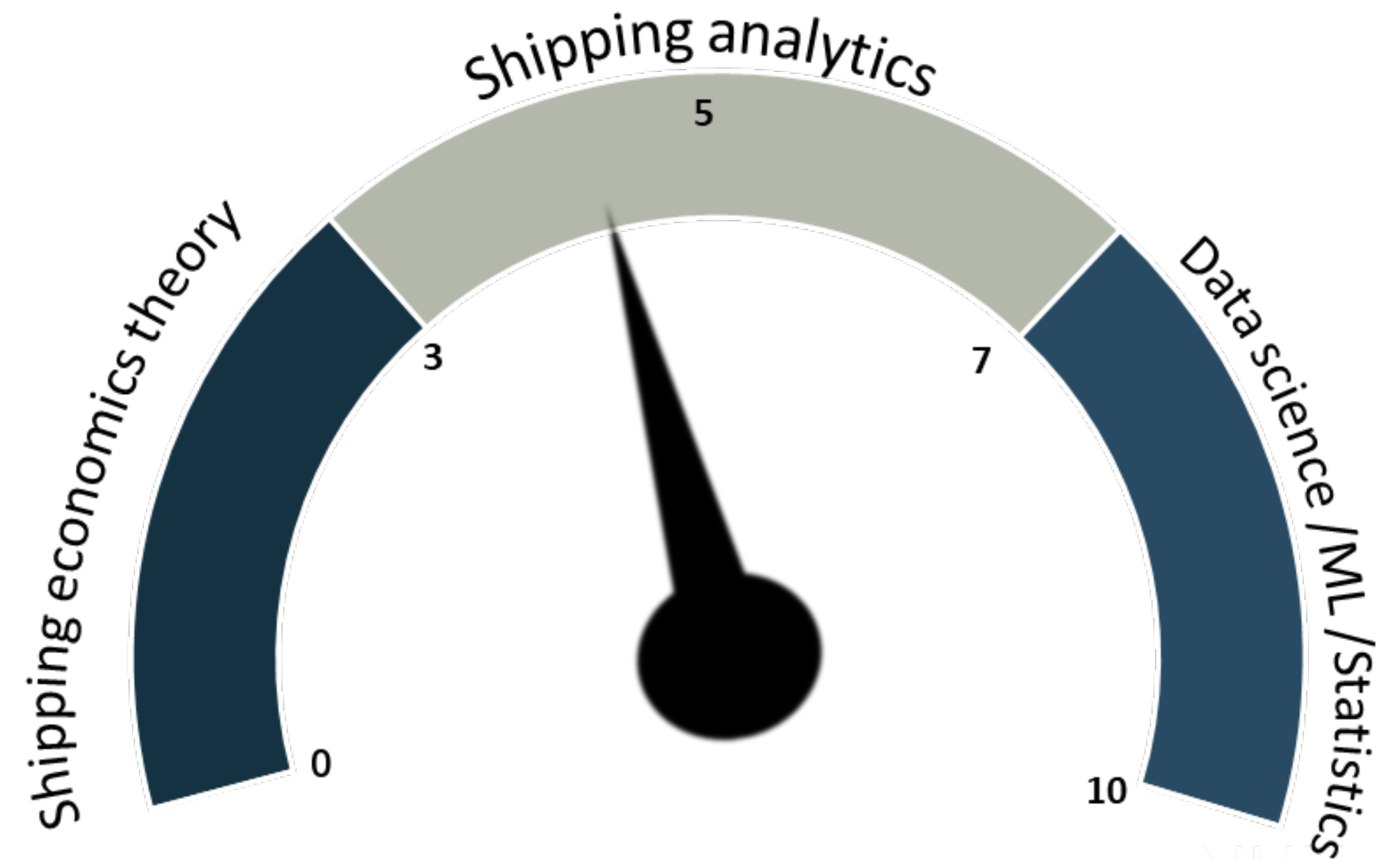
This lecture

Before break (45 min)

- Intro – (5 min)
- Risk factors in shipping
- Risk management in shipping – with no financial contracts
- Freight derivatives

After break (45 min)

- Freight derivatives
- Group work – (30 min)



Learning outcomes

This lecture will help with the following learning outcomes:

Knowledge

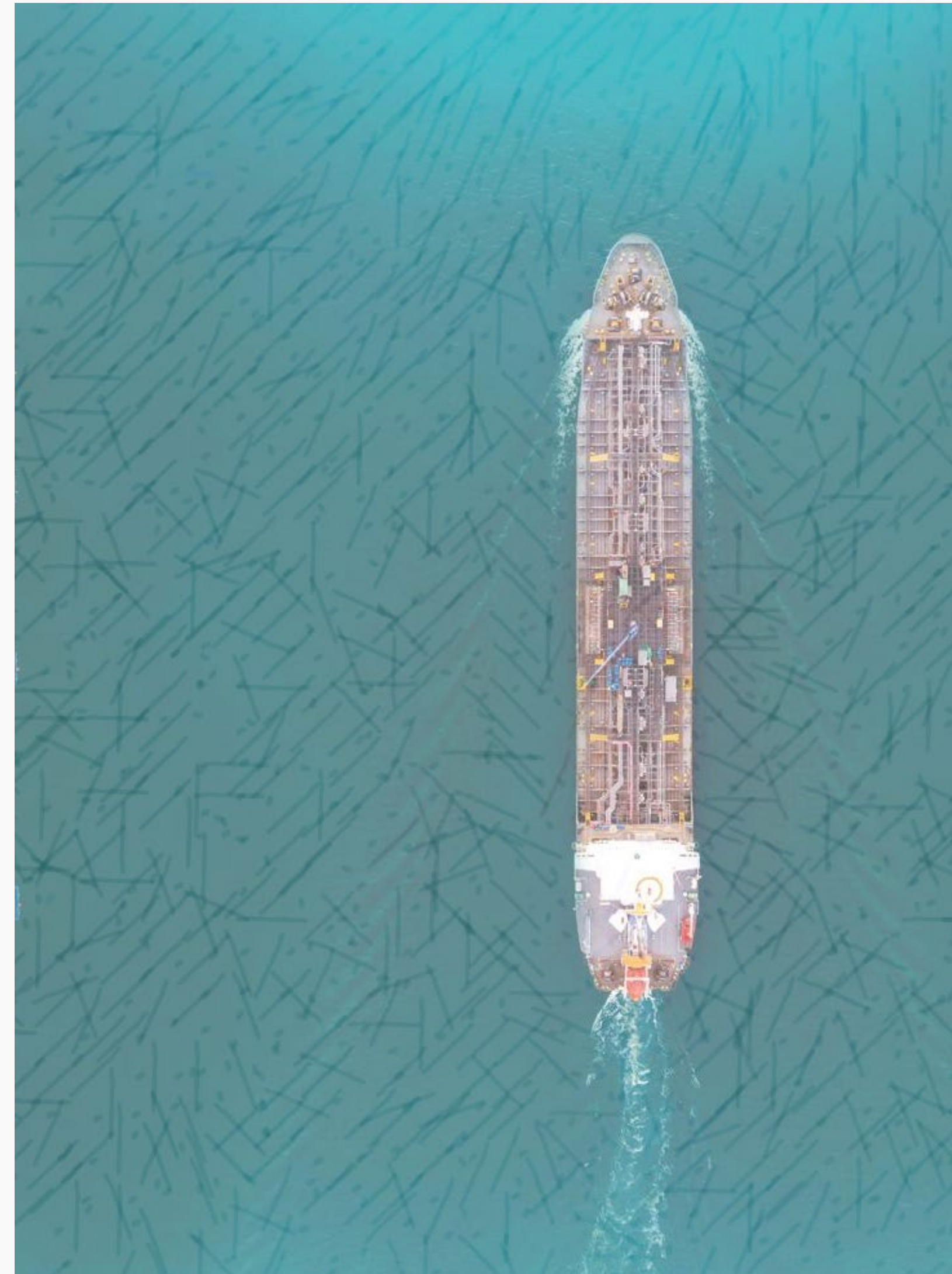
- understands the economic mechanisms driving the international shipping markets
- understands how to apply advanced economic models and concepts in international shipping industry

Skills

- can communicate with industry practitioners using correct terminology
- can apply economic theory to varied strategic issues and practical problems facing shipping companies
- considers the economic, political, and ethical issues relevant to the shipping industries

Competency

- **exchanges opinions and experiences with others with a background in the field**



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Case of the day

You work for a Suezmaxes' operator (NHH Shipping Co) with worldwide operations.

You are given the task to reduce the freight revenue volatility for 2026

- 1) Mention what instruments/operational hedging strategies do you have to do this and highlight the pros and cons.
- 2) What type of option are you buying (put or call)?
- 3) If you want to hedge via an FFA option for a route Bonny Nigeria to Philadelphia what is the FFA payoff (per day) if in six months the route is paying \$16,500.
- 4) Estimate the break-even payoff (necessary to cover the premium) when the option is purchased for a slot of 30 days.

Today's spot rate is \$20,000 per day. The strike price is \$18,000 per day and expires in six months. The premium for the option is \$200,000

Operational risk relates to the trading of these ships:

- Unemployment
- Port congestion, strikes
- Charterer default
- Illiquidity risk
- Technological obsolescence / stranded asset.

Market (price) risk relate to the fluctuation in prices and costs the company is exposed to:

- Freight rates
- Bunker prices
- Currency risks
- Scrap values
- Secondhand values
- Share price (if applicable)



Uncertain cashflow

Source: Roar Adland

Physical risks are exogenous events unrelated to the choices made by the company:

- Weather
- Collision
- Loss of ship
- Damage to third party
- Loss of hire due to breakdown
- Pollution liability

Mostly open-ended risk, not insurable but covered on mutual protection schemes such as Protection and Indemnity (P&I) or Hull and Machinery

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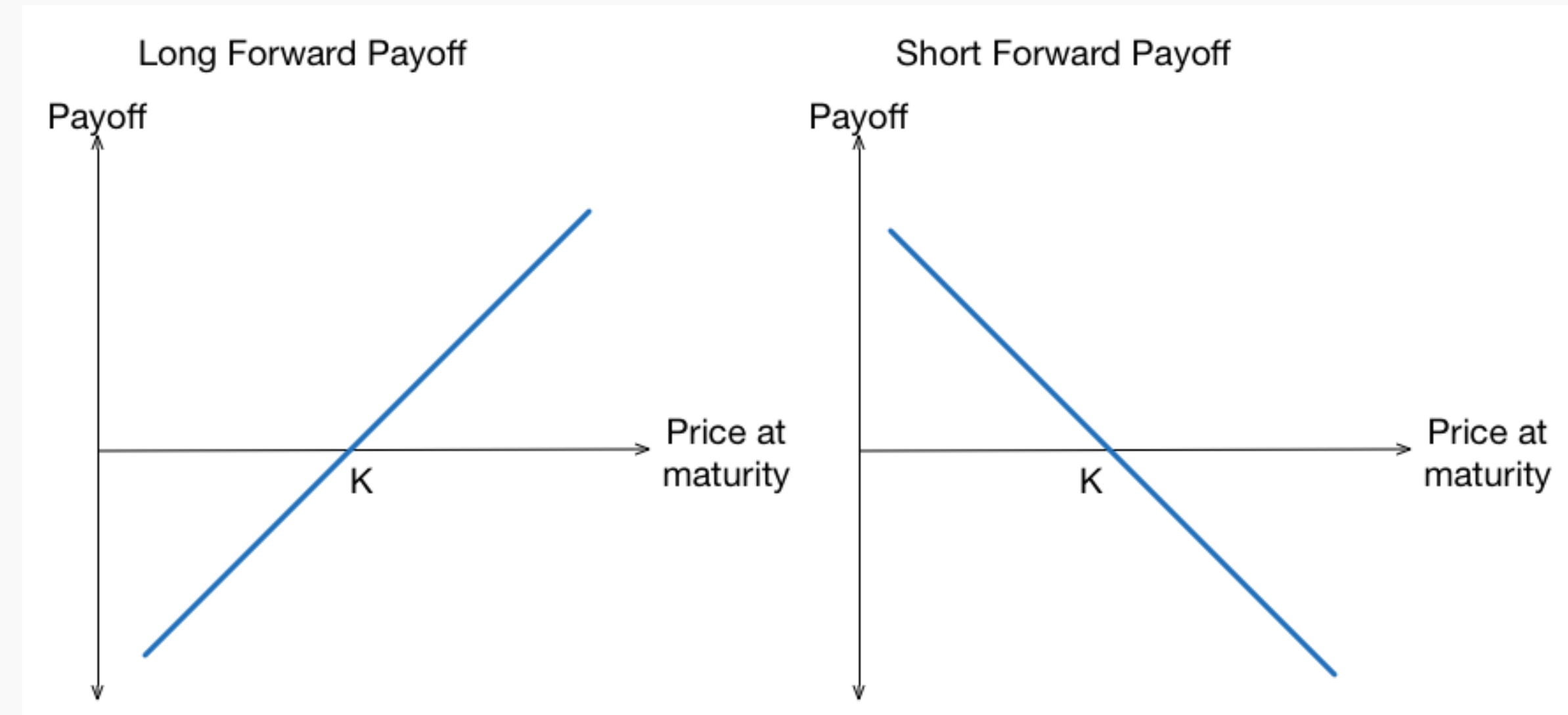
Finance definition of risk management

- Risk management: To alter the characteristics of the risks facing a company
- Usually thought of as reducing or eliminating future fluctuations in income and/or costs (hedging) with financial instruments
- May also wish to increase exposure to risk to profit from it (speculation)



Long vs Short positions

- A “long position” increases in value when the price of the underlying goes up
 - Buy crude oil at \$100 -> if price rises to \$1200, you profit \$20 per barrel
- A “short position” increases in value when the price goes down
 - Sell iron ore short at \$100 -> if price falls to \$90, profit \$10 per tonne
- For forwards and futures, the buyer is said to be “long”, and the seller is “short”
-but the buyer of a put option is *long the put (owns the option)*. More on that later.



Risk management in shipping – with no financial contracts

- **Also, about managing your financial risk exposure**
 - Debt vs equity used in buying ships
 - How much cash is set aside to cover derivatives exposure
 - Modern expensive fleet versus old cheap fleet
- **...and operational risk exposure**
 - Spot market operation versus long-term timecharters
 - Quality of counterparts (default and renegotiation risk)
 - The use of FFAs to increase/reduce risk
 - Spot rates for bigger ships are more volatile than small ships
 - Freight rates for certain ship types are more volatile than others
 - Diversification of sector exposure

Risk management in shipping – with no financial contracts

Volatile freight revenue can be managed by changing from spot to **timecharter operation**

- Provides stable revenue, no unemployment risk
- But introduces default risk
- May not be available
 - Availability dictated by charterers (e.g. oil companies)
 - Your vessel may not be an attractive candidate for a T/C due to its age, quality, or physical characteristics
- Owner may prefer to operate in the spot market
 - Potential for higher vessel utilization through better voyage planning
 - Maintain flexibility of operation and ship sales
 - Better information from shipbrokers

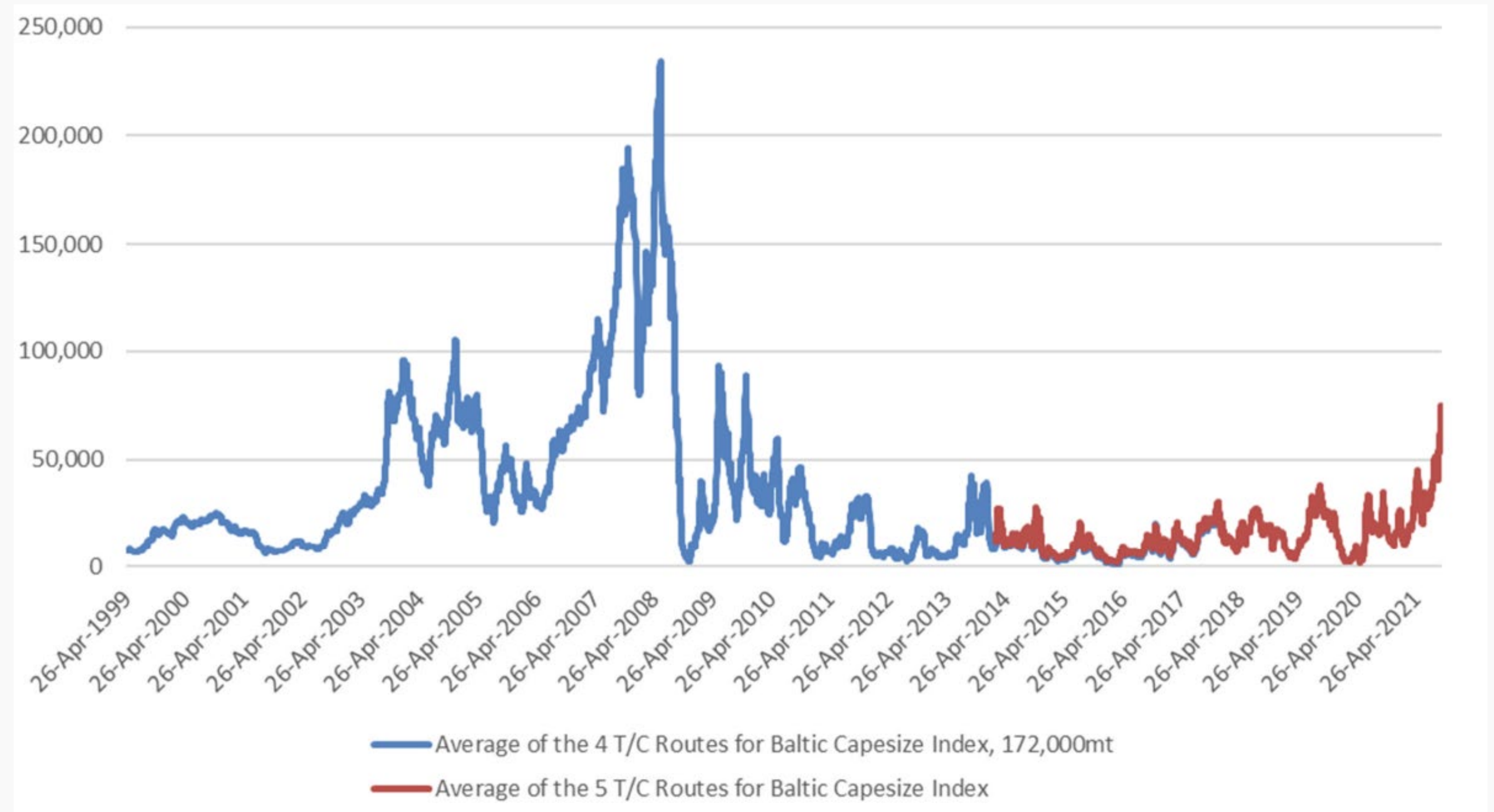
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Freight derivatives for freight risk management

- Forward Freight Agreements (FFA)
- Freight futures
- Freight options

*Derivatives as they derive from an underlying price, index or commodity



Source: Roar Adland

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Forward Freight Agreement (FFA)

- Over the counter instruments (Seller to Buyer)
- Arranged via brokers or banks
- Settle a freight in a future date for a specified quantity of cargo or type of vessel, for one (usually) or combination of the major trade routes of dry bulk, wet bulk or containers
- Dry bulk FFA are derivatives on a particular route of the Baltic Exchange dry bulk indices. Measured in USD/ton for voyage (not very liquid) and USD/day for time charter derivative contracts
- Tanker FFA are based on Baltic Exchange Tanker indices. Measured in **World Scale** or TCE
- You can also trade baskets of monthly contracts settled individually
 - Quarterly contracts are baskets of three individual months
 - Calendar year contracts are baskets of 12 individual months

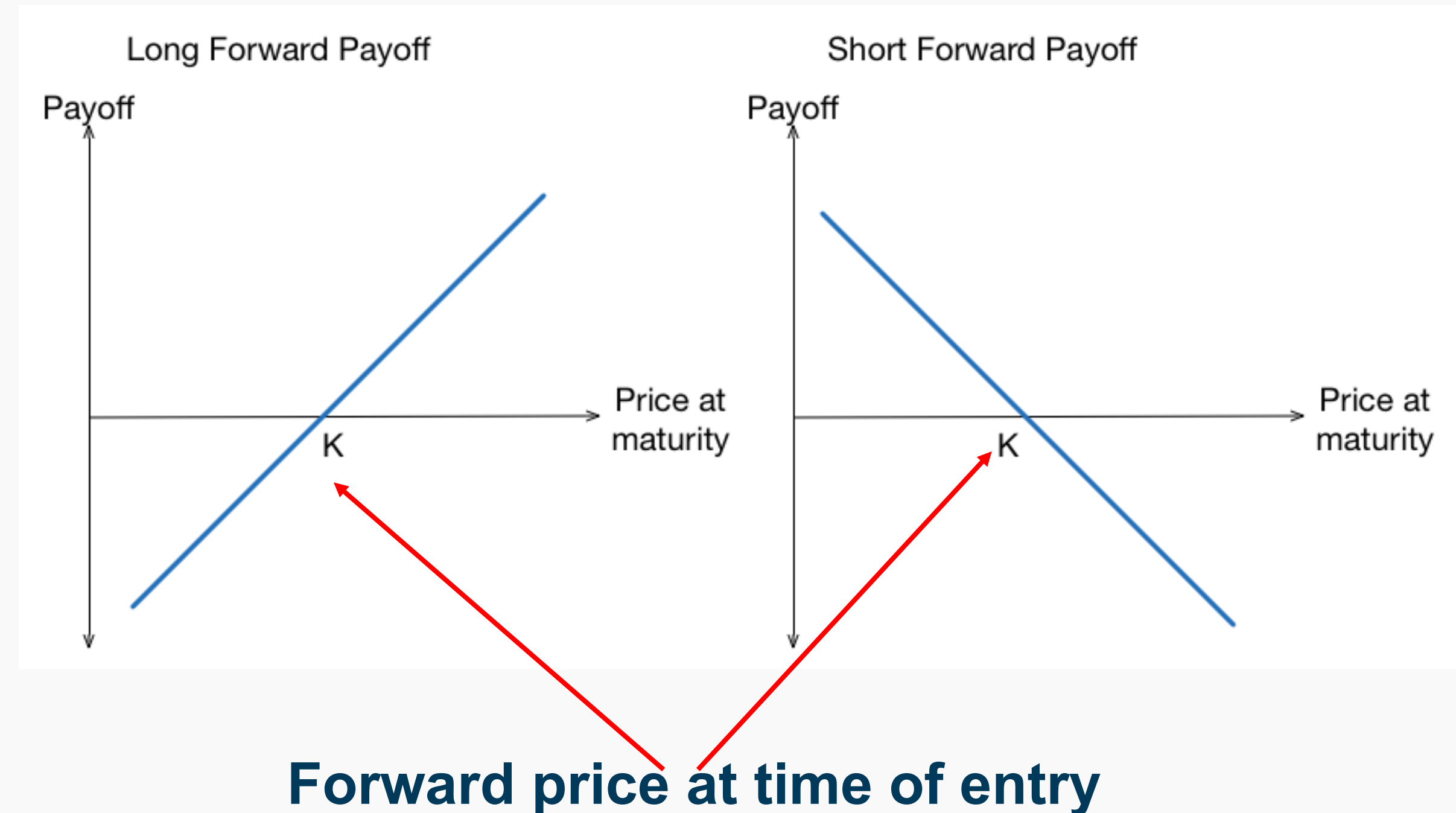
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** Worldscale: is used to calculate freight rates for oil tankers and product carriers. The principle is that it uses a standard setup for easy calculation such that a shipowner would have the same net return irrespective of voyage performed by the Worldscale standard vessel (75k tonnes) at WS100.

Hedging with FFA's

- Shipowners have natural “long” positions in the freight market (physical market) and would hedge with a short FFA position (paper market)
- Charterers have natural “short” positions in the freight market (physical market) and would hedge with a long FFA position (paper market)



Hedging with FFA's: Benefits and Challenges

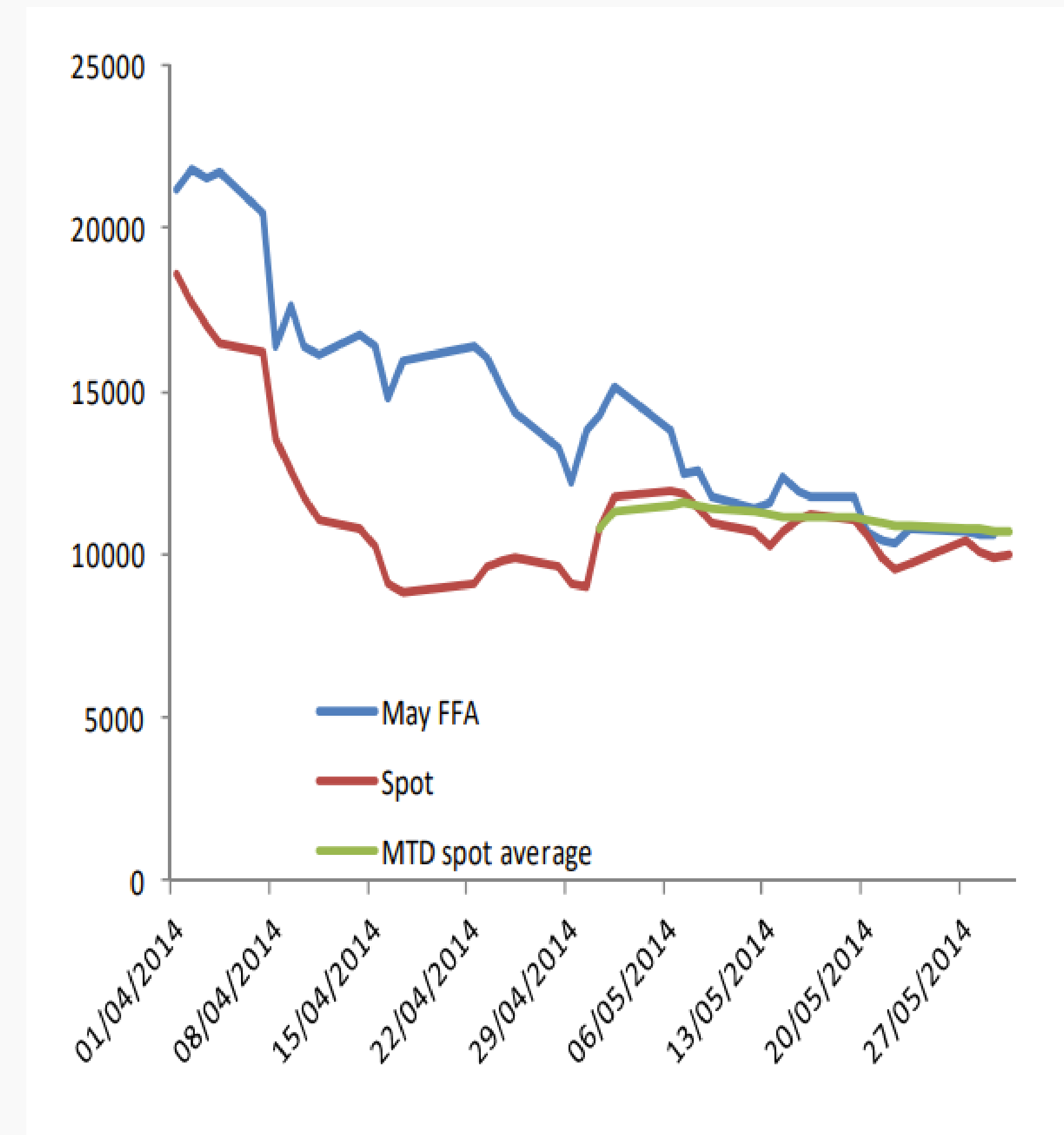
- Benefits compared to a physical T/C:
 - Clearing eliminates default/renegotiation risk
 - Quick execution in relative anonymity
 - More counterparts to trade with, no limits on ship age
 - Hedges can be unwound at any time
 - Continue to trade the physical ship in the spot market for better access to market information
- Challenges:
 - Can be illiquid for a large hedging program
 - Mismatch in the timing of fixtures in the physical market and settling against a continuous daily index in the FFA market
 - Mismatch between the technical specifications of your ship and those of the standard Baltic ship
 - Basis risk: Added risk from using imperfect hedging instruments

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FFA use example

- You as a shipowner have a **bearish** sentiment about the market and you would like to hedge in case of that happening.
- Sell (go short) one May Capesize FFA contract at \$21,200/day on April 1, 2014
- A full contract equals 31 days
- May average spot rate settles at \$10,681/day. Your intuition was right.
- If contract is held until settlement the difference $(\$21,200 - \$10,681) \times 31 = \$326,000$ will have been transferred to your account
- Note: You can trade out of the position before you enter the settlement month



Source: Roar Adland

** Bearish sentiment: belief that the prices will go down

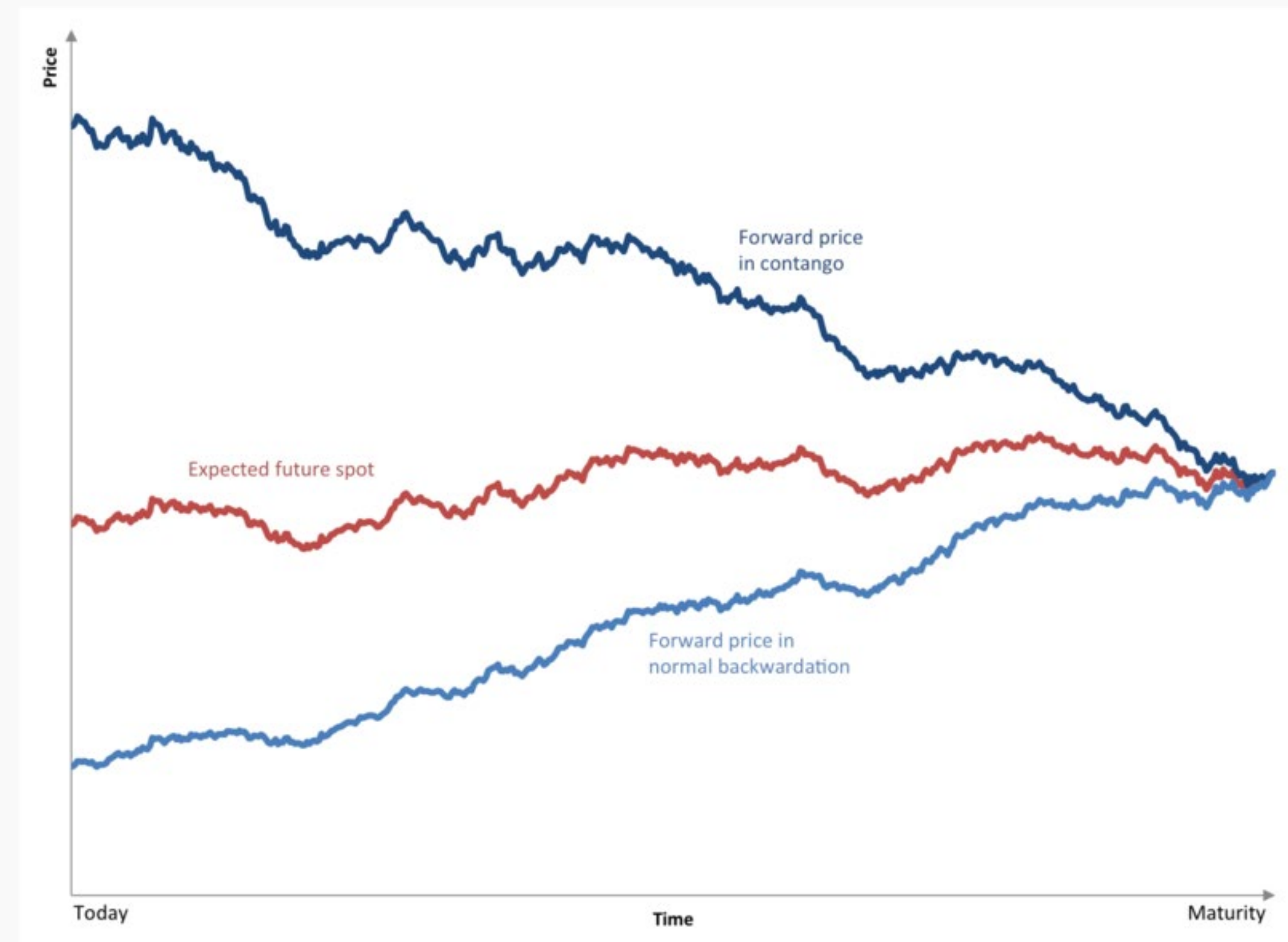
** Bullish sentiment : belief that the prices will go up

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Points of Note

- The price for each one-month FFA will always converge to the spot average at the end of the month
- Positions can be closed out (reverse trade) before settlement
- The initial margin (deposit) to do this trade is probably less than 20% of the nominal contract value (FFA price * volume)
- Return on employed capital -
 $\$326,000 / (0.2 * \$21200 * 31) = 248\%$ in one month
- Easy to leverage up the already huge volatility.



The case of floating storage

- In a contango market (oil market), as there is an expectation for the crude oil price to increase, a strategy would be to store oil on board vessels
- Traders may buy oil, charter a vessel and **physically** store the oil to sell it at the time when the oil price increases or selling futures contract of that oil.
- Applicable if the storage cost (time chartering+vessel expenses) of the vessel is lower than the price differential between the spot and future prices
- What does it do to the freight rates?



Source: Hunter Group as retrieved from rivieramm.com

- *Contango
Future prices are higher than current spot price
- ** Backwardation
Futures prices are lower than current spot price

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Freight futures

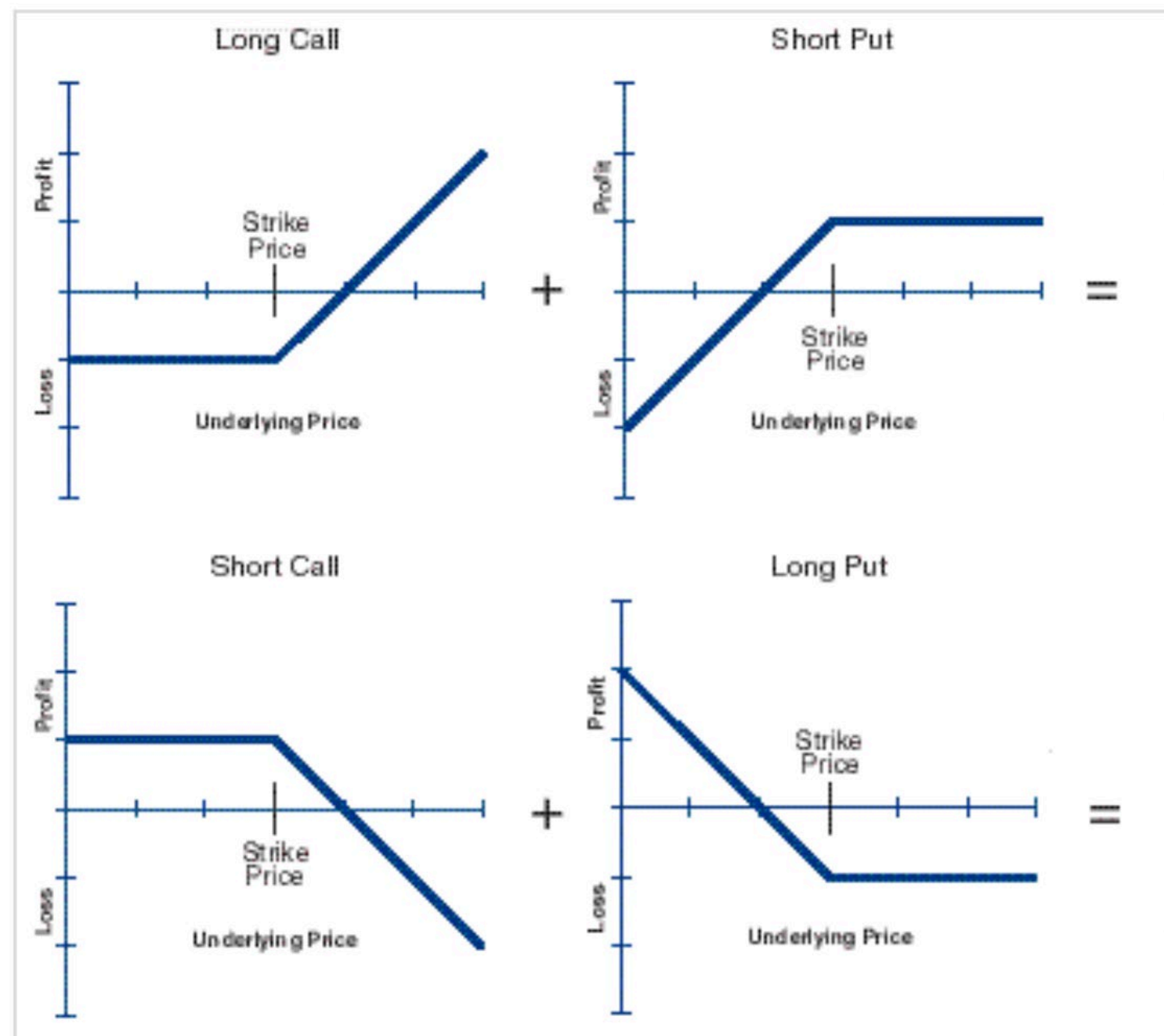
- Such as FFA's it is an agreement to buy/sell a freight rate for a specific cargo size and vessel route in a future date.
- Traded through derivative exchange platforms (e.g. London Clearing House, ICE, European Energy Exchange, et) or third-party derivatives broker (e.g., Clarksons, Simpson, Spence & Young, etc.)
- Cash settled every trading day (Mark-to-Market) by the clearing house and at expiration same cash settlement occurs such as in an FFA
- An initial margin is requested to debit the settlements.
- Underlying assets also Baltic Exchange indices and Platts tanker routes

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Freight options

- Offered by the same derivatives broker that trade FFA's or exchange platforms
- **Put** (Floor) and **Call** (Cap)
- A holder have the “option” but not the obligation of exercising the option, otherwise the option expire.
- Shipowners would take a long position (buy) on a put option such as to cover freight drops
- Charterers would take a long position (buy) on a call option such as to “cap” the freight to pay



Source: Money StackExchange



Other hedging opportunities

- Bunker swaps – OTC contracts to fix a price for bunkers for a nominated amount on a specific grade
- Oil futures (liquidity based)
- Commodity (Grain, fertilizers, etc.) futures
- Vanilla swap (interest rates)
- Weather derivatives? Precipitation swaps, rainfall options, temperature options
HDD and CDD



How to make money with derivatives (without buying vessels)

1. Speculate on FFAs

- Go long/short and bet on direction
- Long Capesize/short Panamax and bet on inter-size spreads
- Bet on the shape of the forward curve (long/short different maturities)

2. Take in ships on timecharter (go long physical freight)

- Re-let in the spot market and make money on the difference
- Re-let (if you can) on a higher timecharter rate
- Smarter operation – move ships between regions to optimise earnings
- Find a COA at a higher rate

3. Take on cargoes to be shipped in a COA (short physical freight)

- Find ships to transport at a lower cost (spot or timecharter)

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Forward curve of freight and FFA relation with the spot market (from reading for today)

Success or failure of a derivative contract could be summarized in two main economic functions:

1) Price discovery tools

- 1 and 2 months forward price make unbiased estimators of the spot market on all experimented BPI (P1, P2, P1A, P2A). Then mix results. Gu et al, 2021 tested better performance on 1 month Panamax than Capesizes forward prices
- FFA volatility spillover to spot prices in P1 and P2A. Lead (FFA) – lag (spot) relationship.

2) Hedging effectiveness

- Not clear. Based on regional economic dynamics. It is proposed for P1 and P2 that optimal hedge ratio could be done via first differences regressions

BPI P1: US Gulf/Antwerp-Rotterdam-Amsterdam

BPI P1A: T/C Transatlantic round to Skaw-Gibraltar range

BPI P2: US Gulf Japan

BPI P2A: T/C Skaw Passero – Gibraltar/Taiwan-Japan

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gabrielfuentes.org

References

Gu, Y., Chen, Z., Lien, D., & Luo, M. (2020). Quantile hedge ratio for forward freight market. *Transportation Research Part E: Logistics and Transportation Review*, 138, 101931.