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L8-Financing of shipping
assets and vessel valuation
analytics: sale & purchase

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Today events

TradeWinds

Containers

Yang Ming hedges fuel bets, adding ammonia features to LNG dual-fuel newbuildings

Taiwanese liner company unveils details of Hanwha order for seven big container ships



Yang Ming chairman Chuck Tsai and Hanwha Ocean CEO Charles Kim (both in centre), sign a newbuilding contract for seven 15,880-teu vessels. (Photo: Yang Ming Marine Transport)



Baltic Exchange

- Founded in 1744 from a coffee house where merchants and shipowners met to trade
- Motto: “Our word Our bond” Shared by the Institute of Chartered Shipbrokers
- Almost 5,000 members
- They define themselves as: “The worlds leading source of independent maritime market data”
- Produced some of the most important maritime indices, the Baltic Indices.
 - Baltic Dry Index
 - Baltic Tankers Index
 - Baltic Container Index
 - Baltic Clean Tanker Index
 - Baltic Dirty Tanker Index



Baltic Exchange

- Indices generation process:
 - Data on recent and current transactions from various market participants (a panel of shipbrokers)
 - Information is weighted depending on the market and route of the transaction. Baltic Dry Index (BDI) includes Capesize, Panamax and Supramax.
 - A specific formula is assigned to every index (average of assessments, and outliers removal)
 - Information is published daily
- They also generate Freight Forward Agreements (FFA) forward curves used as basis for FFA positions (from a pool of FFA brokers)



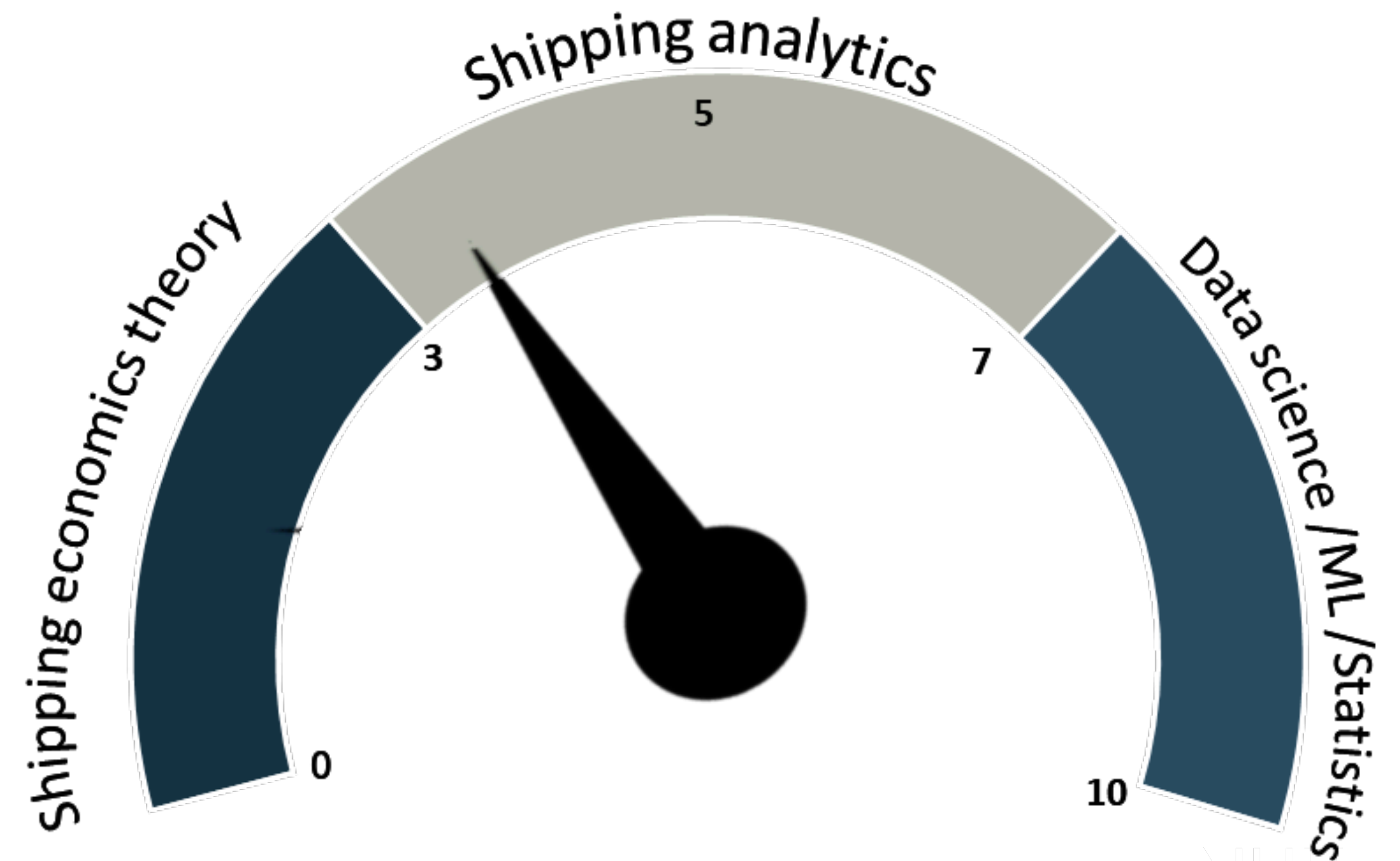
This lecture

Before break (45 min)

- Intro – (5 min)
- Today events (5 min)
- Vessel financing

After break (45 min)

- What are the different valuation methods for ships?
- What factors affect the value of a vessel?
- How can transactions data be used for vessel valuation?



Learning outcomes

This lecture will help with the following learning outcomes:

Knowledge

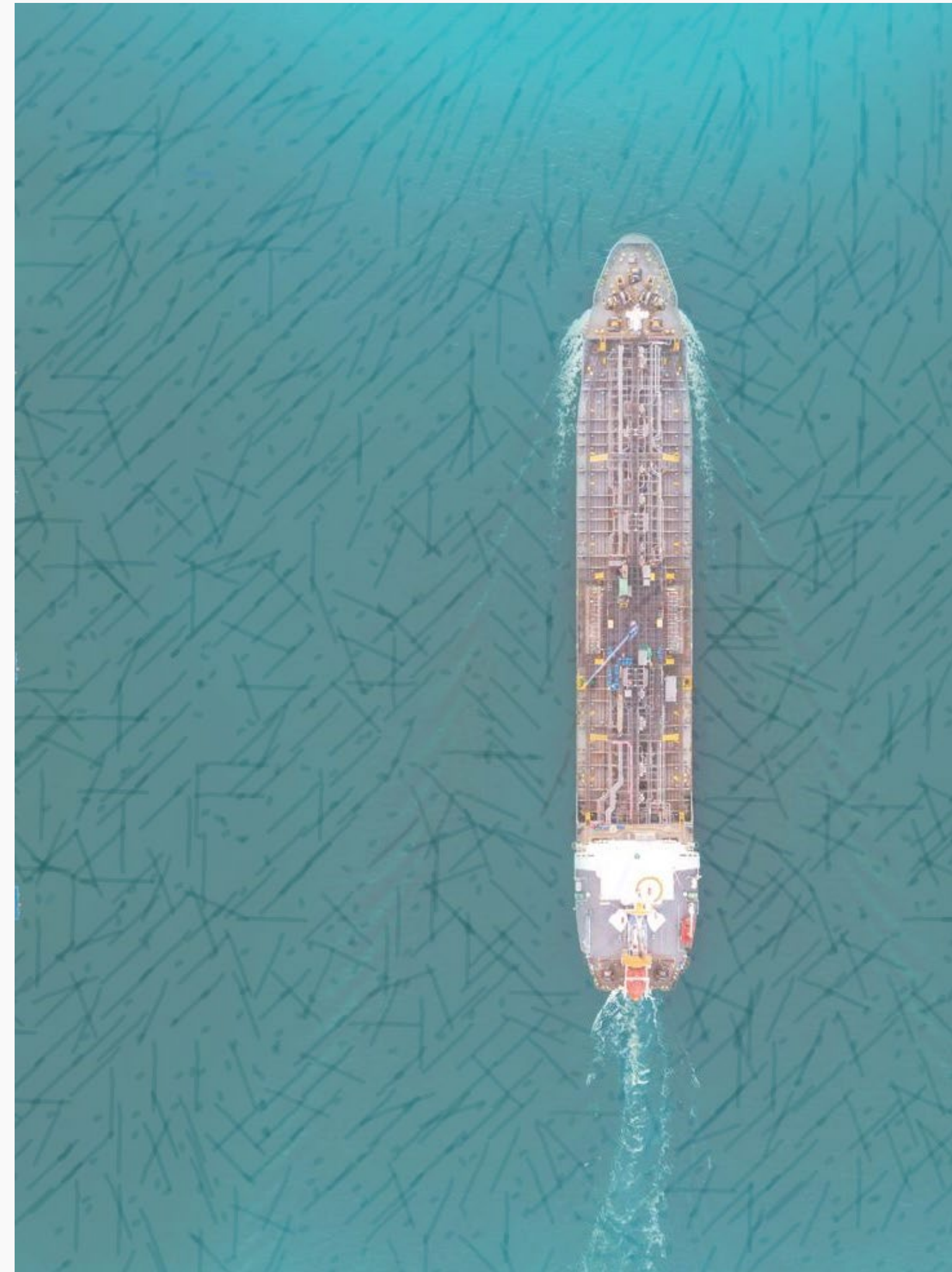
- understands the economic mechanisms driving the international shipping markets
- understands how to apply advanced economic models and concepts in international shipping industry

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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Capital Structure

The mix of debt and equity to fund assets and/or operations

Investor perspective



Source: corporatefinanceinstitute.com

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Capital Structure

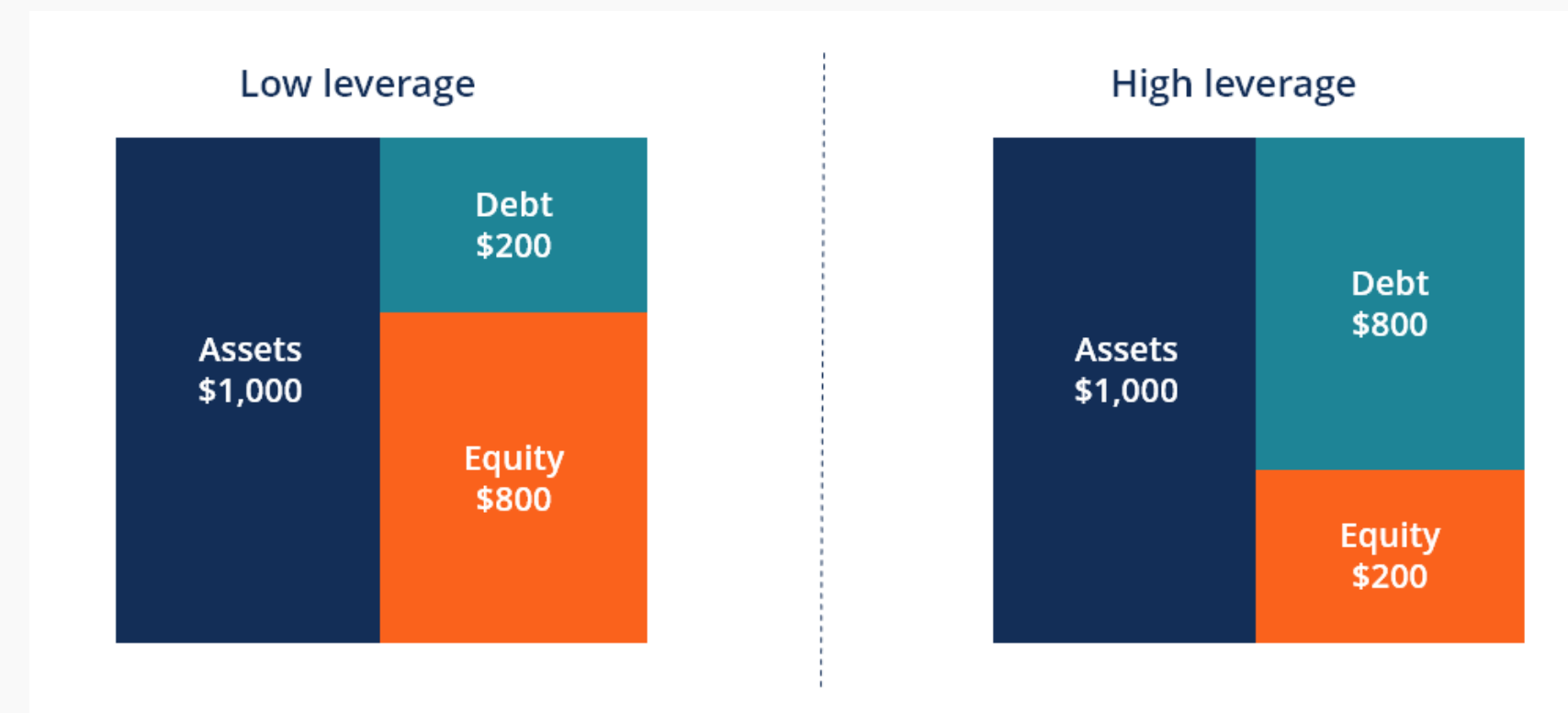
Company perspective

Equity ratio = Shareholders' equity / total asset

- A measure of the proportion of the total assets that are financed from owner's equity

D/E ratio = Debt / Equity

- Measures a company's leverage level
- Risk levels industry by industry
 - Flex LNG D/E – 2.23; Maersk D/E – 0.31 ;Frontline D/E – 1.44; Golar LNG D/E – 0.38



Source: corporatefinanceinstitute.com

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Sources of ship finance

Commercial bank loans

- Senior secured debt – debt w/ collateral
- Senior debt – without collateral

Subordinated debt - shipping corporate bonds

- High yield bonds (<BB+ S&P OR <Ba1 Moody)
- Vanilla bonds

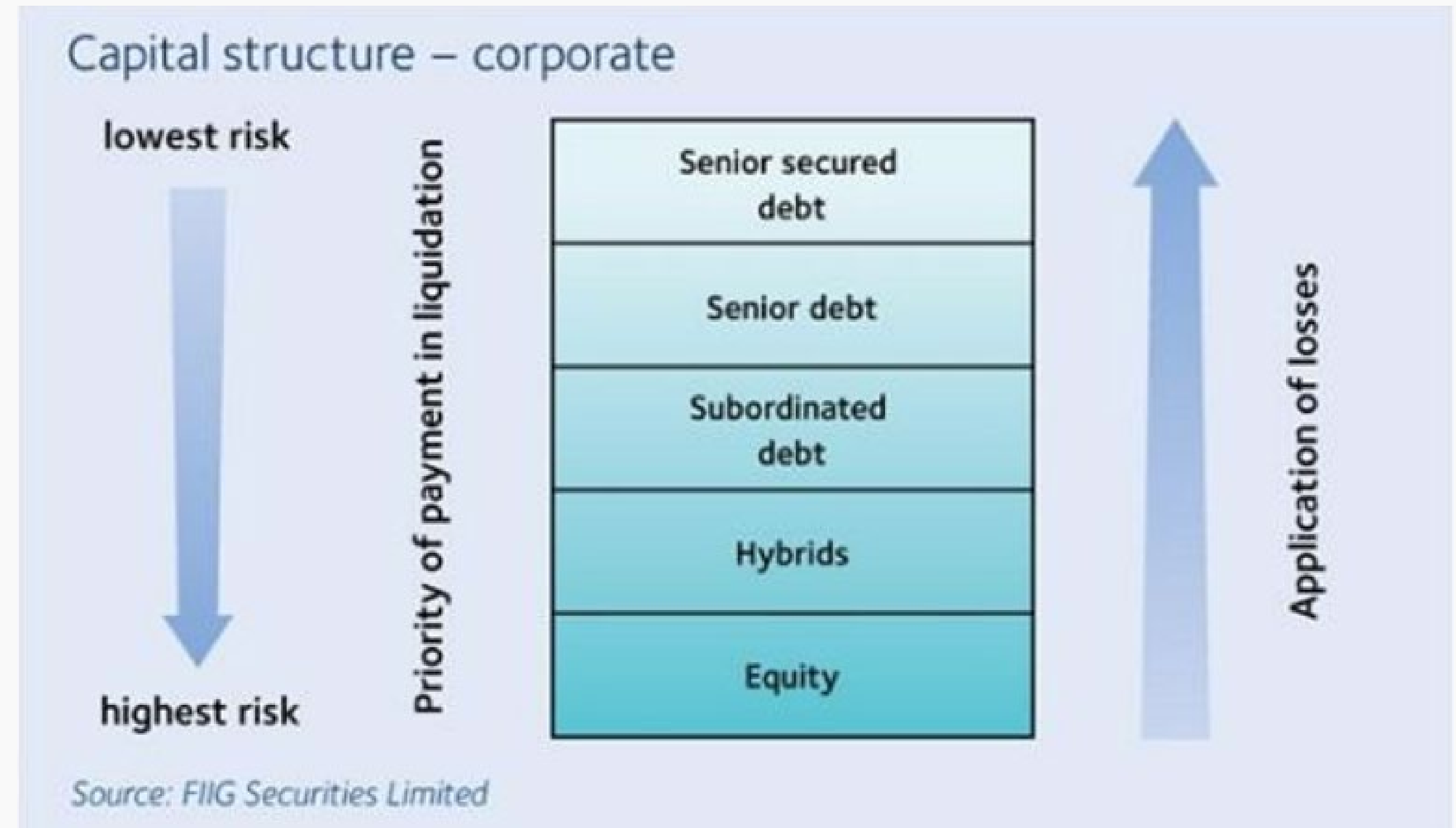
Hybrids

- Convertible bonds
- Preferred shares
- Mezzanine finance

Equity

- Private equity
- Public equity

Other debt instruments: Export Credits, Yard Financing



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Private Equity

- A Private Equity Investor or Fund investing directly into a non-listed private shipping company.
- Mostly new deliveries and young vessels. New build with long delivery are a challenge.
- Where is the money coming from:
 - Norwegian Kommandittselskap (KS) structures (General Partners and Limited Partners)
 - Private Banking
 - Specialized Shipping Funds
 - Non-Shipping Private Equity Funds
 - Hedge Funds
- Could represent some loss of control
- Appetite for low priced assets. Might signal the end of the bottom of a cycle

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Public equity

- This is the sale of equity securities made available publicly by already listed shipping companies or companies about to be listed on stock exchanges.
- Why “go public”, launching an Initial Public Offering (IPO)?:
 - Vessel Acquisition & Expansion
 - Diversification of Funds / Capital sources
 - Repayment of Debt
 - Cash-out
 - Net Asset Value (NAV) Multiple (sell at a premium to market price of vessel)
- Promotes transparency and increase a Co. reputation
- Loss of control is a challenge
- Market price now linked to stock market sentiment

$$\text{NAV} = (\text{assets} - \text{liabilities})$$

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Bonds

- Loan from an investor to a private company or government
- The interests to the loan are paid via fixed payments called **coupons**
- Bonds **face value** must be paid in full at maturity (term of agreement)
 - Face value: money worth of the bond at maturity
 - Coupon interest rate: amount of interest paid by the bond issuer to the bondholder. Usually per year.

Preferred stocks

Hybrid between bonds and shares.

They receive a contracted fix dividend. Contrary to bonds they might not have a maturity date.

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Loans

Principal – total amount of debt issued

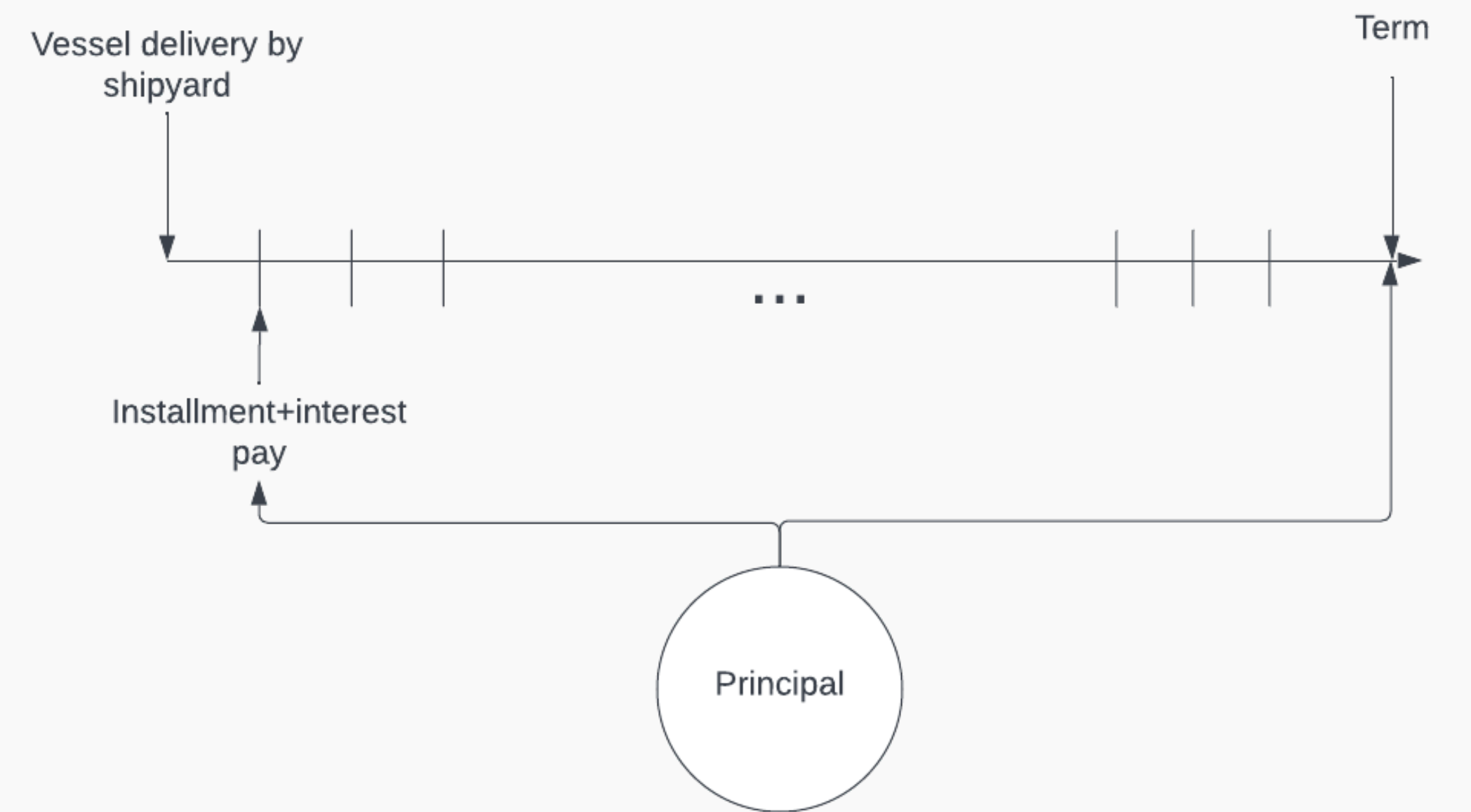
- ~80% for newbuildings (post delivery) and 50% for secondhand vessels

Interest rate – amount charged by the lender for lending the money

- Before LIBOR+ spread+ fees (Discontinued)
- Replaced by SOFR + spread +fees

Term – The repayment period

Installments – number of payments dividing the principal



***LIBOR- London Interbank Offer Rate

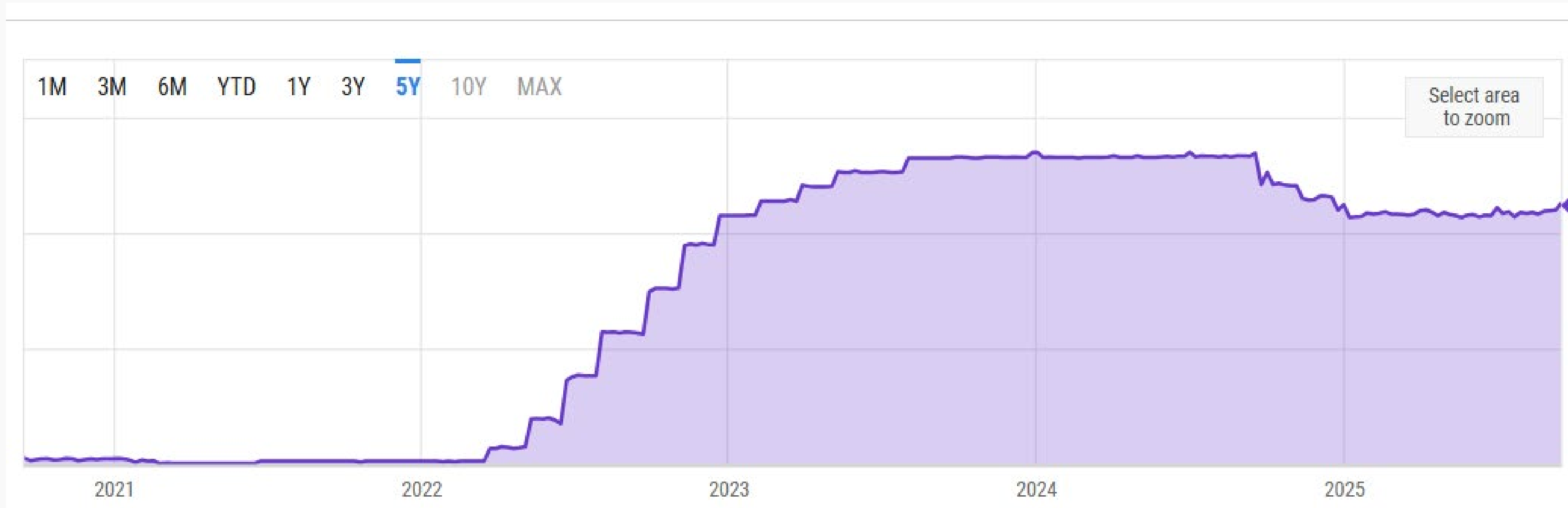
*** SOFR- Secured Overnight Financing Rate

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Loans

SOFR



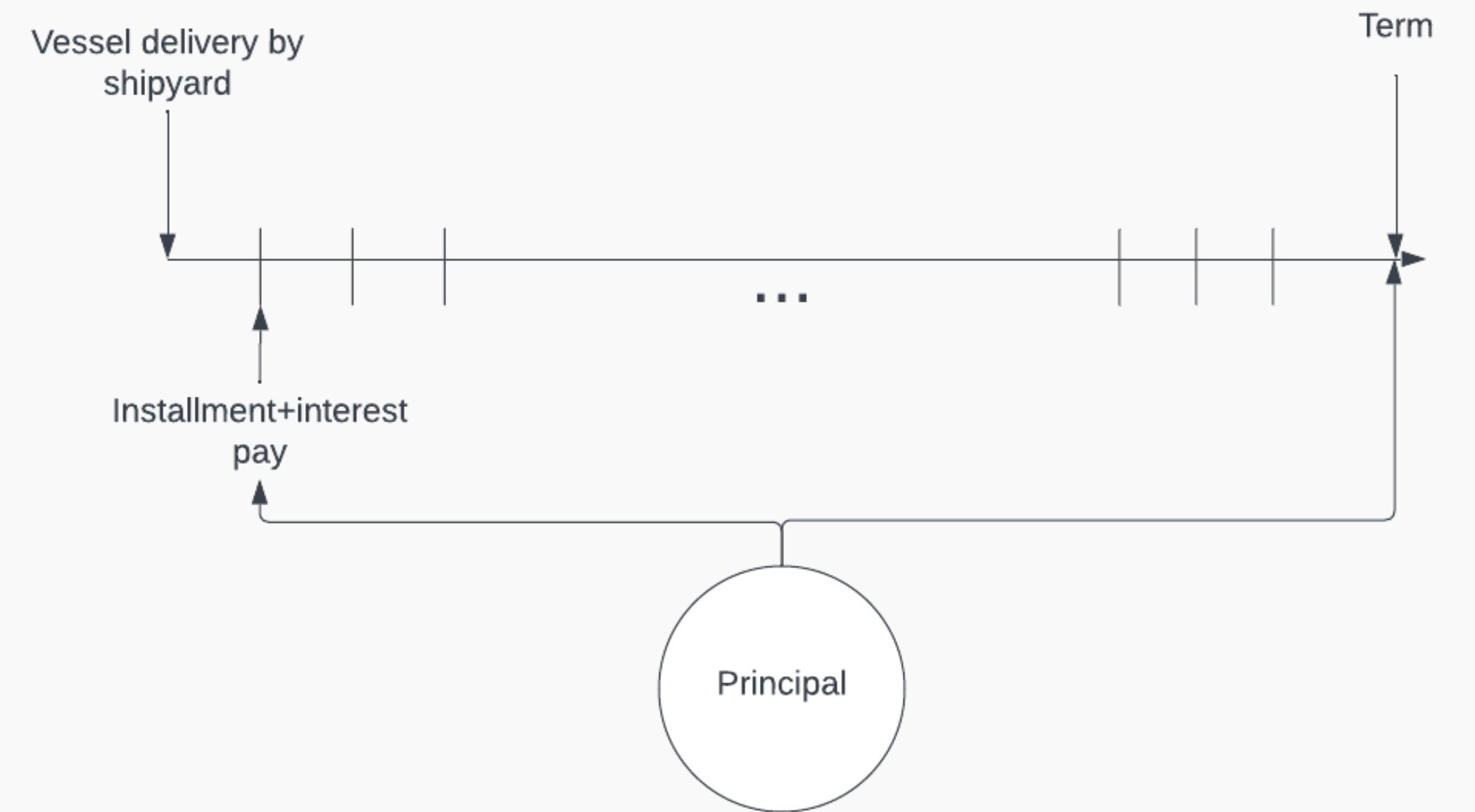
Loans

Signing contract – 5-10% vessel price covered by owner

Keel laying/cutting steel- 10-20% (loan drawn)

Launching – 10% (loan drawn)

Delivery – Largest instalment is delivered (large of the loan drawn)



BREAK

Loans- Example

- Suppose that a shipowner has received an 80% bank loan of \$40,000,000.
- They have to repay the loan **after delivery** every 6 months over 10 years
- Interest: SOFR+spread+fee; $1.0\%+1.5\%+1.0\%= 3.5\%$ per annum
- Number of installments = $(12\text{months}\times 10\text{years})/6=20$ installments
- Installment amount = Total sum to be repaid / Number of installments
($\$40,000,000 / 20 = \$2,000,000$)
- Outstanding loan = Total sum to be paid – Installment amount (for every period)
- Interest payment = Outstanding loan over the last 6 months x rate

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Loans- Example

Time repayment	Installment amount	Outstanding Loan	Interest payment	Total
1	2,000,000	38,000,000	700,000	2,700,000
2	2,000,000	36,000,000	665,000	2,665,000
3	2,000,000	34,000,000	630,000	2,630,000
4	2,000,000	32,000,000	595,000	2,595,000
5	2,000,000	30,000,000	560,000	2,560,000
6	2,000,000	28,000,000	525,000	2,525,000
7	2,000,000	26,000,000	490,000	2,490,000
8	2,000,000	24,000,000	455,000	2,455,000
9	2,000,000	22,000,000	420,000	2,420,000
10	2,000,000	20,000,000	385,000	2,385,000
11	2,000,000	18,000,000	350,000	2,350,000
12	2,000,000	16,000,000	315,000	2,315,000
13	2,000,000	14,000,000	280,000	2,280,000
14	2,000,000	12,000,000	245,000	2,245,000
15	2,000,000	10,000,000	210,000	2,210,000
16	2,000,000	8,000,000	175,000	2,175,000
17	2,000,000	6,000,000	140,000	2,140,000
18	2,000,000	4,000,000	105,000	2,105,000
19	2,000,000	2,000,000	70,000	2,070,000
20	2,000,000	0	35,000	2,035,000
				47,350,000

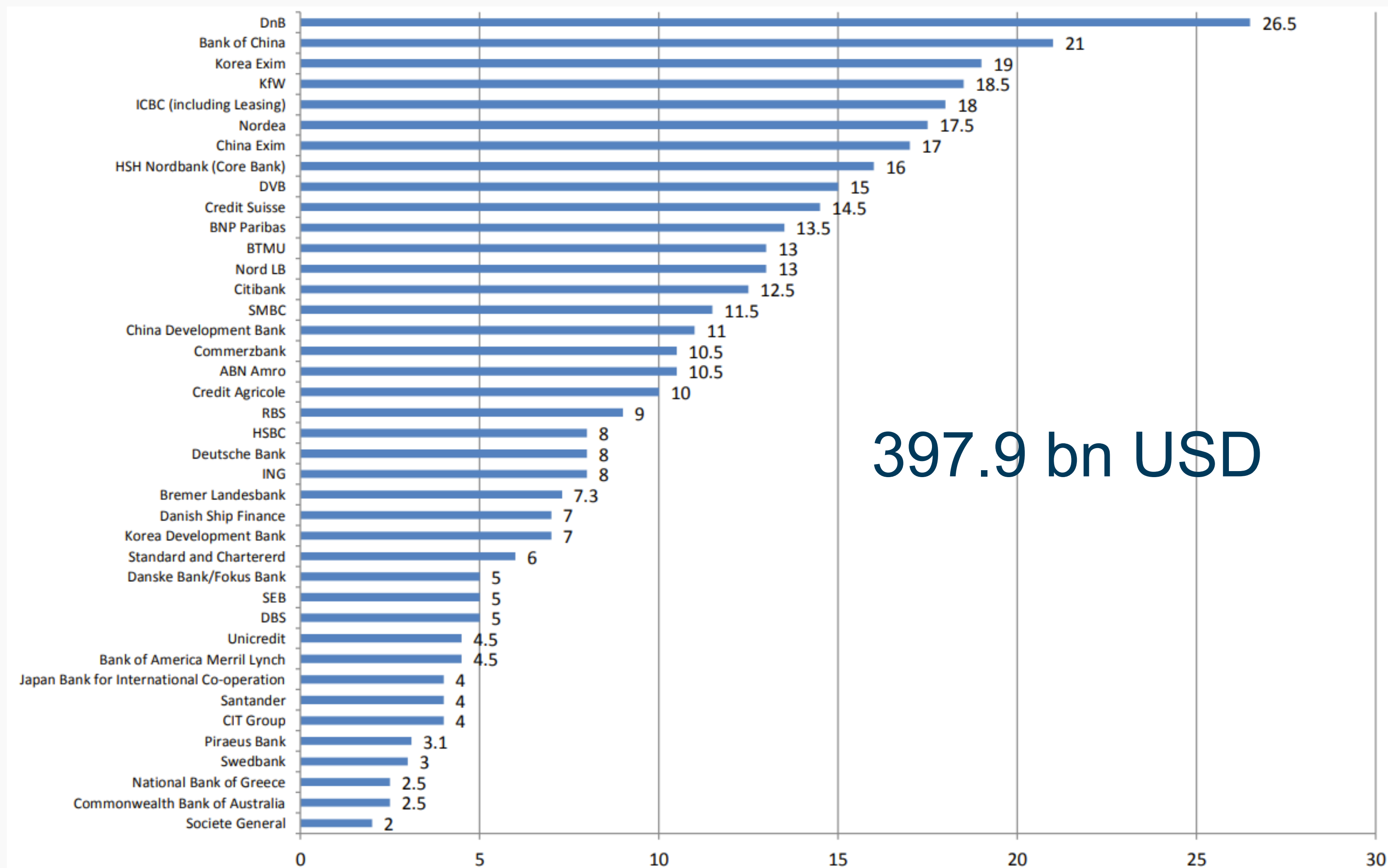
Source: Sloggett (1998)

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Commercial loans

2015

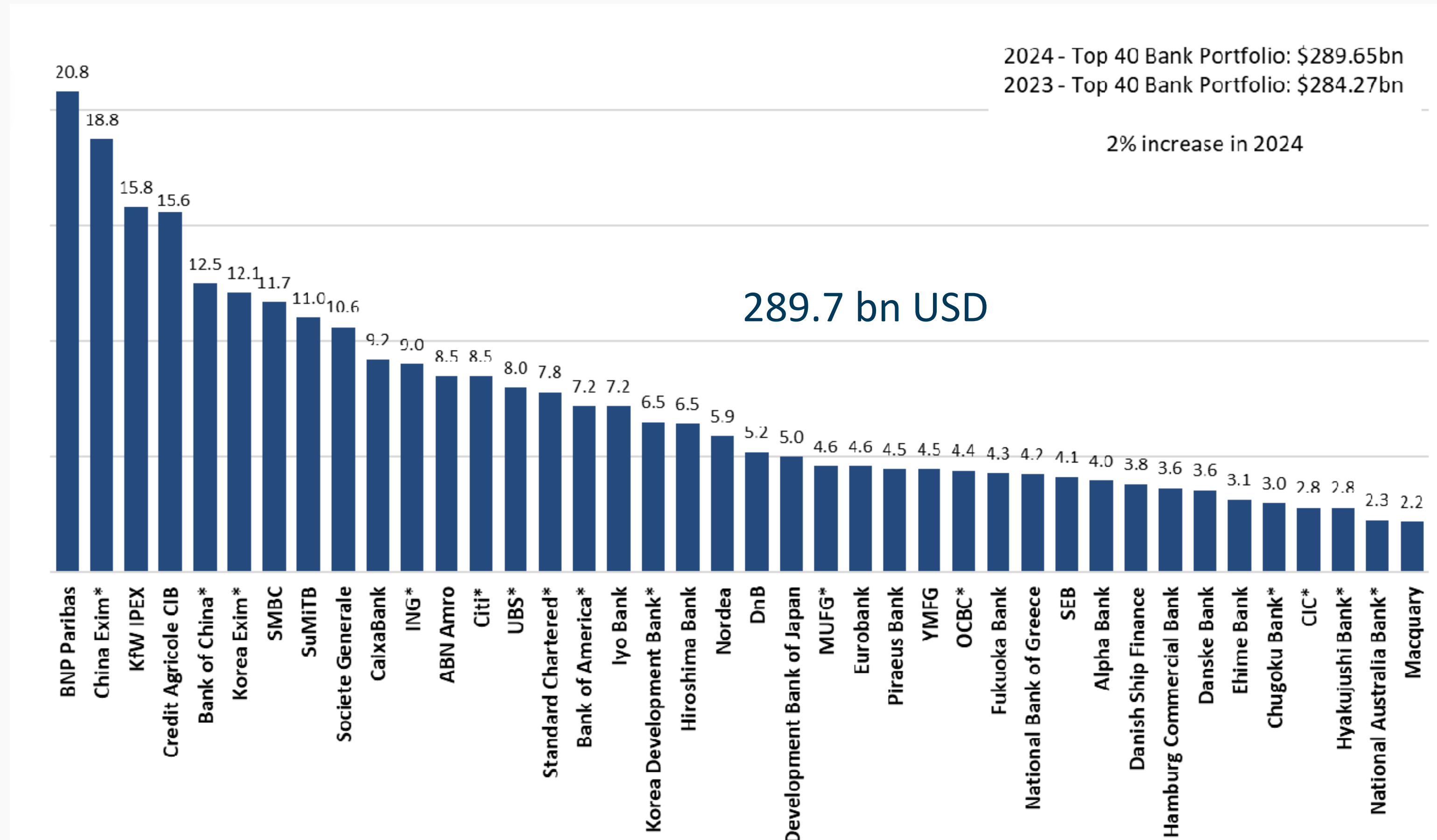


397.9 bn USD



Commercial loans

2024



Source: Petrofin Research

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Covenants

- As agreed on the loan contract, a set of conditions a debtholder must keep. Otherwise, a new payment of debt principal or additional collateral must be presented.
- Ensures that the financed asset would not lose its value, important in case of a potential sale if the debtholder defaults.
- One common way to monitor whether in breach of the covenant is by means of the Value Maintenance Clause (VMC) of the vessel / Loan to Value.
 - $VMC = [\text{Loan outstanding} / \text{Value of vessel (Fair Market Value)}] \times 100$
 - The minimum VMC is established by the bank
 - For a fair market value, the vessel must be valuated



VMC example

Beginning of year 1

Vessel FMV= 105 M USD

Value of debt (loan)= 80 M USD

VMC= $(80/105) \times 100 = 76.2\%$

During year 1

Capital repayment= 3.25 M USD semiannual: (2x3.25)

End of year 1

Value of debt= 73.5 M USD

What if the VMC covenant is 83% and the new FMV is 91 M USD at the end of year 1?

Other instruments:

- Maximum leverage ratio: net debt/vessel value
- Interest cover ratio: (TCE income-OPEX)/interest expense
- NIBD/EBITDA ratio: (Net interest-bearing debt)/ EBITDA
- Liquidity

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Poseidon Principles

- Green initiative for shipping loans among financial institutions
- The Poseidon Principles provide a global framework for integrating climate considerations into lending decisions to promote international shipping decarbonization.
- 36 banks as signatories (~200 bn USD in shipping finance)

They are based on four principles:

1. Assessment of climate alignment (Portfolio of loans checked under Annual Efficiency Ratio of ships)
2. Accountability (Digital exchange between financial inst. And classification societies/recognized organizations)
3. Enforcement (Covenant requiring shipowners to provide specific data to financiers)
4. Transparency (Publicly acknowledge –yearly- that they are members of the Poseidon Principle and report the climate alignment of their shipping portfolio)

** Information shared among signatories but not public.



Why do we need ship valuations?

- **Shipping banks**

- Independent appraisal for loan application. What Minimum Value Covenant (MVC) should be put in the term sheet?
- Once the loan is agreed, the MVC is tested again at drawdown. That is the time when the funds are released by the bank.
- Independent Appraisal during the loan review (once or twice a year).
- The average of two valuations is used to test the MVC.

- **Creditors**

- Bills are unpaid and the ship “arrested” in port. How much can the ship sell for at auction?

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Why do we need ship valuations?

- **Insurers**

- In the event of a total loss, the underwriter pays out on an “agreed value” basis, irrespective of the current market value of the ship.
- The insured value needs to be calibrated with market values. If a vessel is insured too high the moral hazard increases.
 - Moral hazard: risk of a party not entered a contract in good faith (usually insurance)

- **Investment banks**

- Fleet valuation for IPO or bond sale prospectuses

- **Listed shipping companies**

- Need fleet valuation for accounting purposes in annual reports and for NAV

- **Legal disputes**

- May be related to the valuation provided for financing, IPOs

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Ways of valuating a vessel?

- **The market approach**

- What was the transaction price for comparable recent sales (last done) between a “willing buyer and willing seller”?
- Suitable for standardized vessels with a liquid sale and purchase (S&P) markets (e.g. tankers, bulkers)
- Drawbacks: Liquidity can be low, high bid/offer spread, availability of financing
- Less helpful for niche markets (e.g. LNG carriers, Chemical tankers): Low liquidity even during normal markets, small global fleet, small number of potential buyers and sellers, higher barriers to entry, long-term relationships

- **Replacement cost approach**

- How much would it cost to build an identical vessel
- Suitable for highly specialized/customized vessels on long-term contracts with few alternative uses

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Ways of valuating a vessel?

- **Income approach**

- Value = NPV of all expected earnings in remaining lifetime + residual value (usually scrap value)
- Relies heavily on assumptions and predictions
 - What will future freight rates be?
 - Chartering strategy (spot vs long-term charters)
 - Projected operating expenses
 - Cost of financing (WACC - weighted average cost of capital)
 - Remaining commercial life of the vessel (technological and regulatory obsolescence)
 - Residual value (resale or scrap)
- Value and price is not necessarily the same....

Adland and Köhn (2019): Background

- Ocean transportation of chemicals and petrochemical gases is undertaken in a market characterized by
 - Highly specialized, technologically complex vessels
 - A wide range of technical asset specifications
 - Small global fleet and concentrated ownership = low liquidity in the second-hand market
- Heterogeneous nature and low number of sales means vessel valuation is challenging
- But no less important for owners and financiers of such vessels



Adland and Köhn (2019): Results

- Relationship between asset value and
 - Vessel age, replacement cost, earnings and size is highly non-linear and significant
 - Non-double hull tonnage attracted a discount
 - Versatility and efficiency (cargodiv, pumpdiv, speed) significant
 - North of Europe building attracts a premium
- edf – estimated degrees of freedom = degree of nonlinearity
 - 1.0 = linear function

	Model E		Country of build	
	edf	Sig	pe	Sig
NB	5.902	***	Belgium	0.342 *
EARN	3.514	***	China	0.134
SIZE	4.114	***	Croatia	0.045
AGE	5.871	***	Denmark	0.448 ***
NOTANKS	---		Finland	0.282 *
CARGODIV	7.412	***	France	-0.130
PUMPDIV	1.001	**	Germany	0.402 ***
SPEED	7.785	***	Italy	0.227 *
	pe	Sig	Netherlands	0.232 *
D/Bottom	-0.113	*	Norway	0.307 ***
D/Sides	-0.413	***	Poland	-0.114
S/Skin	-0.200	**	South Korea	-0.054
IMO2	0.166	***	Spain	0.172 *
IMO3	0.218	*	Sweden	0.149 *
Intercept	1.938	***	Turkey	0.232 *
.			Ukraine	-0.381 ***
No. obs	736		UK	0.056
Adj. R ²	88.0%		Other	0.039



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References

- Adland, R., & Köhn, S. (2019). Semiparametric valuation of heterogeneous assets. In *Asset Intelligence through Integration and Interoperability and Contemporary Vibration Engineering Technologies* (pp. 23-30). Springer, Cham.