
Crude Oil Tankers

SHIPPING PRIMER: PART ONE



Prepared for :

BCG Undergraduate Investment Fund

Written by: Abhinav Arumilli
Edited by: Chelsea Crow, Smriti Korampally



Shipping is one of the oldest and most niche industries in the world. Largely responsible for the globalization of the 21st century, maritime trade continues to play an integral role in the global economy. Many modern geopolitical issues are underpinned by shipping related disputes, as nations race to secure shipping lanes and ports. Shipping is considered a traditional industry, with relationships at the core of transactions and efforts to modernize being consistently rejected. This complex structure makes the industry one of the most difficult to grasp and leaves entry points relatively obscure. This series of primers aims to tackle these issues, by outlining the basics and key terminology for the four main segments of shipping. We hope to shed some light on one of the least known and most vital industries.

Happy Sailing.

The Basics

As the name implies, Crude Tankers are vessels that carry crude oil around the world. The flow of trade tends to go from major producers (U.S., Middle East, Russia, etc.) to the refineries of the major consumers of oil (China, India, Europe). The crude oil is then used in these refineries to create refined products such as gasoline, diesel fuel, and jet fuel. The continued flow of these oil tankers is needed to support many of the biggest economies in the world, and any stoppage could prove devastating to the world economy (as seen with the U.S. under the trade embargo of 1973).

Demand

Demand is predicated on the volume of oil produced and transported, rather than price. Unlike most other commodities, demand destruction is rare. When rates are high, location arbitrage spreads for Crude are also generally high enough to support the higher tanker rates. Demand for Crude Tankers can be split into two categories: long-term oil supply contracts and spot supply contracts (trading of oil).

Long-term contracts typically consist of a producer of oil going to a refinery (which needs consistent inputs of crude) and inking a multi-year contract to supply crude. This type of deal will not see demand destruction, as the oil needs to be transported regardless of outside circumstances. The second category, spot supply contracts, are producers selling and/or transporting non-contracted oil volumes. Companies seek opportunities where production and transportation costs are lower than the sale price at the destination point.

When it comes to freight, the main opportunity is buying at a certain location (point A), putting it on a ship, and then selling it at point B. When rates are high, the spread between point A and B generally also widens. Wider spreads mean there is more money to be made on this location arbitrage, allowing for higher tanker rates to be paid while the trader maintains profits.

Another key element of Crude Tanker demand is **ton-mile demand**. The concept here is simple: there's a certain number of vessels on the water that can transport crude oil, which translates to a certain amount of days available for maritime voyages. A more efficient route means more oil transported in fewer days, which in turn leaves more days available for spot contracts. This concept has been brought up in reference to the effect of Russia on the market, as longer, less efficient routes (Russia → Asia) replaced more efficient routes (Russia → Europe). For a practical example of this, it takes 5 days to transport Oil one way between Russia and Europe, and now to transport that same amount of oil to Asia will take closer to 45 days.

Supply

Supply is the more complex part of the equation, although it is easier to measure. Long-term supply is measured by the number of crude tankers currently on the water *minus* the number of tankers being **scrapped** (disassembled and sold for parts) *plus the* construction of new tankers. The **orderbook** is a list of all orders for tankers to be newly constructed, which generally takes about 3 years from order to delivery.

This offers valuable insights for those taking a longer-term approach to the market, and the main metric tracked by equity investors. While demand can be unpredictable, supply tends to be more trackable and isn't subject to wild swings. Events such as the Russian War which reorganized trade, or the Shale boom which increased volumes, can dramatically change the demand landscape. The **Energy Efficiency Existing Ship Index (EEXI)** is the main regulatory instrument. The main goal is to reduce the carbon impact of shipping by enforcing an emissions standard for each vessel. This disproportionately impacts older vessels that were not built eco-friendly and forces them to slow down, creating fewer available days. As a result, shipowners may decide to scrap the vessel for parts (primarily steel).

To sum it up, the main summary number to look at on the demand side is ton-mile demand. Oil production, export/import demand, storage inventories, and trade flows also provide valuable insight. On the supply side, the main summary number to look at is the orderbook. Other items to look at are steel/scrap prices, current scrapping, space left at shipyards (predicting if more orders can come in), regulations, and the average age of the fleet. It should be noted that there are more items that can be helpful on either side of the equation; however, the most critical pieces have been covered.

Voyage Contracts

With the basic macro-industry items covered, let's look at the entire process, from the negotiation of the tanker contract to the completion of the contract.

To run through an example let's assume the following: The Charterer needs to move oil from the US all the way to Rotterdam; The Shipowner is the company that owns the ship; the Broker is the middleman; and the Client Company receives oil from the Charterer in Rotterdam.

Charterers have two options to market their **cargo** (in this case, oil): they can either go through a **broker** or directly to the shipowner. Generally, companies will choose to go through a broker; However, if you have a good relationship with a shipowner, sometimes the **charterer** (the person responsible for this deal at Charterer or Charterer itself), will decide to go direct. They usually have a **laycan**, or date range, where they want the vessel to load their cargo. When the company starts marketing its cargo depends on the laycan, the size of the vessel, and whether or not they are trying to time the market. In a **firming market** where rates are increasing, companies will reach for a vessel as early as possible, and vice versa in a weakening market (as late as possible).

There is a second set of considerations for a company: whether to go public with the cargo (everyone knows, everyone bids) or go privately to one or a group of shipowners. The positive of a public approach is that a true market price is achieved since everyone knows of the cargo. The downside is that the market price may be undesirable, and a company may want to see if someone will bite for cheaper. The process of sorting through and negotiating all of the offers can be time-consuming. The advantage of a private approach is that companies can target specific **tonnage** (another term for ship) or specific counterparties.

Another positive is potentially getting a rate lower than the true market rate by convincing the shipowner that the last publicly done rate (known as **last-done**) was the true rate because market rates are declining. Most communication throughout the offer and negotiation process is done between ICE and Whatsapp.

So now let's assume you get through the negotiation process of offers and counters, and the Shipowner and Charterer are able to agree on a price for freight. The price can either be done as a **lump sum (LS)** or a **world-scale (WS)** contract. Lump sum is the stated total price, like what would be seen at a store. LS 1.2M for example means the Charterer will pay 1.2 million to transport their cargo from the US to Rotterdam. World scale, on the other hand, is an easy way for market participants to talk about rates. WS acts as a multiplier to the **flat rate** - a published rate on voyage operational costs. To illustrate this concept: 100 WS = 1x, 200 WS = 2x, 50WS = .5x. For example, let's assume the flat rate for US-Rotterdam is around 19 and the current market rate is 110 WS.

The total price for the voyage would be:

$$19 \times 1.1 \times \text{DWT}$$

Deadweight tonnage (DWT), measures the size of a vessel (Vessel size and classification will be addressed more extensively later on). Other key items on the price side are **demurrage** (fees per day if the voyage takes longer than expected) and **overage** (costs for loading more cargo than agreed upon).

Differentials, or added costs if discharging in different ports, are also sometimes added and this gives more optionality to the charterer in which port he wants to discharge.

Next, Shipowner and Charterer are put on **subjects** (also known as “subs”), which basically means an agreement that is not yet official. Subs are usually a period of 24-48 hours where all parties check their bases and decide whether to proceed with the deal. A lot of paperwork is requested from the Shipowner, including certifications and the last few cargoes, to make sure everything is all right from a compliance perspective. The Charterer will then send that documentation to the receiving party (Client Company) and get their approval as well. Once all the documentation is in order, and Charterer, Client Company, and Shipowner are all still on board, then the subs are lifted and the **fixture** (deal) is signed and becomes official.

From there, the process gets handed to the operation teams for all the parties. The respective teams will attempt to work together to keep everything organized and on schedule, as well as solve any issues on the voyage if they come up. This is a pretty simple breakdown, and there are always multiple different issues which is why most of this goes through brokers who have the capacity to make it easy on all parties involved.

Example Notation of a Fixture:

COOLSHIP 270 NHC USG/ROTTERDAM 21/APR WS 110 OIL COMPANY

To translate:

Vessel Name, Size (DWT), Type of load, Voyage, Laycan, Rate, Charterer

There are 3 other main types of contracts:

1. **Contract of Affreightment (COA)** - Long-term agreement between a shipowner and charterer to do multiple voyages over a period of time
2. **Time Charter** - Agreement between a shipowner and charterer to give one vessel over a period of time
3. **Lightering/STS** - Agreement between a shipowner and charterer to provide a vessel for multiple days to bring crude from the port to a larger ship, because the ship cannot fit in the port

Vessel Classes, Vessel Tracking & Positions

Vessel Classes, as mentioned above, are divided by size through DWT (these are relatively rough ranges)

<50,000 DWT - **Handymaxes**

>50,000, <70,000 - **Panamaxes**

>70,000, <130,000 - **Aframaxes (Afra)**

>130,000, <200,000 - **Suezmaxes (Suez)**

>250,000, <350,000 - **Very Large Crude Carriers (VLCC or VL)**

The big 3 are Afra's, Suez, and VL's, and you can see how they differ in carrying capacity below:

Afra ~ 750,000 bbls

Suez ~ 1,000,000 bbls

VLs ~ 2,000,000 bbls

For larger vessels, efficiency increases with the length of the voyage. For example, on a longer voyage like the United States to China, VLs will offer the best \$/bbl. Conversely, smaller size vessels are generally used for shorter distances. When dealing with WS (as seen in the above section), vessel size is taken into consideration when deciding rates.

In the previous example, the rate calculation was:

$$19 \times 1.1 \times \text{DWT}$$

Now let's fill in that mystery DWT:

Ranges usually follow the DWT, there are exceptions in unique deals with tighter ranges, but generally they follow these buckets (all in 1000's): 70-100 for Afra, 130-145 for Suez, and 260-270 (occasionally 280) for VLs.

To run through the whole calculation, let's say we were going with a Suez at 135. The full calculation would be:

$$19 \times 1.1 \times 135,000 = 2,821,500$$

Tracking vessels is mainly done through **Automatic Identification System (AIS)**, which is basically GPS for ships. The system shows the vessel's location as well as its weight. The main goals of tracking are to determine how many ships are in the area, and to differentiate between **laden** and **ballasting/Fresh off Cargo (FOC)** vessels. A laden vessel has cargo on board and is therefore unavailable; In contrast, ballasting or Fresh off Cargo vessels have no cargo on board and could be available.

A lower weight indicates ballasting units and a higher weight indicates laden.

There are also **position lists** sent out by shipowners to both brokers and charterers containing basic identifying information on a vessel and detailing what port vessels are **open** (available) and at which date, as well as any other specific comments a shipowner may have. Combining position lists with vessel tracking, charterers and brokers try to piece together an idea of how many units of each type of asset class are available in each region. This estimate is compared against open cargoes to predict the direction of the local markets. As certain canals and ports have certain restrictions, it is critical to keep in mind how many of each unit are suitable for those specific restrictions. For example, a broker may check which units can load at a specific port, and make a decision based on the strength of the supply. If the position list is small, a charterer may go directly to the shipowner to see if a deal can be made before the shipowner realizes he's one of the few suitable ships in that area. If the list is large, a charterer may wait for tonnage to pile up before taking advantage of panicking owners.

Major Players

Major Charterers

BP, Shell, Exxon, Vitol, Trafigura, Petrochina, Unipecc, Chevron, IOC, BPCCL

Major Shipowners

Teekay, Minerva, Avin, Tsakos, Delta, Nordic American Tankers, DHT, Frontline, EPS, Navig8

Major Routes & Ports

The Baltic Exchange posts the most active routes, which are listed below in the following notation:

Baltic Notation, Voyage, Size (Vessel Class)

Routes with active **Forward Freight Agreements (FFA)** - tanker futures used to either hedge risk or take a speculative position - are highlighted.

TD1 - Middle East to US Gulf x 280,000 (VL)

TD2 - Middle East to Singapore x 270,000 (VL)

TD3 - Middle East to China x 270,000 (VL)

TD6 - Black Sea to Mediterranean x 135,000 (Suez)

TD7 - North Sea to Continent x 80,000 (Afra)

TD8 - Kuwait to Singapore x 80,000 (Afra)

TD9 - Caribbean to US Gulf x 70,000 (Afra)

TD14 - SE Asia to EC AUS x 80,000 (Afra)

TD15 - West Africa to China x 260,000 (VL)

TD17 - Baltic to UK-Cont x 100,000 (Afra/Suez)

TD18 - Baltic to UK-Cont x 30,000 (Handymax)

TD19 - Cross Mediterranean x 80,000 (Afra)

TD20 - West Africa to UK-Cont x 130,000 (Suez)

TD21 - Caribbean to US Gulf x 50,000 (Panamax)

TD22 - US Gulf to China x 270,000 (VL)

TD23 - Middle East to Mediterranean x 140,000 (Suez)

TD24 - Russia to China x 100,000 (Afra/Suez)

TD25 - US Gulf to Rotterdam x 70,000 (Afra)

TD26 - EC Mexico to US Gulf x 70,000 (Afra)

Major Ports (and notations with popular ports) include:

US Gulf - **USG**, one of the busiest areas in the world, lot of STS activity and both short routes (Caribs/Canada/US West Coast) as well as longer routes (UK-Cont, China)

West Africa - **WAFR (Lome)**, a surprisingly busy area, mostly larger sizes that head to UK-Cont and China

Cape of Good Hope - **COGH (Cape Town)**, diversion area for units heading usually from the Middle East/India/Singapore to the West or the other way around

Singapore - **SPORE**, the busiest port in the world and you will always see a lot of tonnage there for bunkers

Galle - **COLOM**, Diversion/Bunker spot for vessels heading from AG to the East or Singapore to the West

West Coast India - **WCI**, where most AG loads to India end up going to (discharge area)

N. China - **NCHINA**, busiest discharge area in the world

Europe - **UK-CONT (Rotterdam)**, another busy discharge area, describes UK ports and Europe mainland

Middle East - **AG (Fujairah)**, large exporting region, mostly heading out east

A few more important ports include **ECC** (East Coast Canada, Canaport), **SEAUS** (Australia, Geelong), **USAC** (US East Coast, Bayway), **RECIF** (Brazil), **GIBR** (Gibraltar, entrance into the Med.), **SUEZ** (Suez Canal), **CMED** (Greece, Italy, etc.)

A sample world voyage may look like this...(remember ballast = move without any cargo on board)

1) Load at US Gulf then discharge in UK-Cont

2) Ballast down to West Africa load and then head to the Med. through Gibraltar discharging in the Med.

3) Ballast down the Suez Canal to Arabian Gulf to load once again. Have a two-port discharge at West Coast India, fuel up at Galle, and then the second leg of the discharge at China

4) Ballast down to Singapore for bunkers. The final leg of the journey heads through Cape of Good Hope west back home to the US Gulf.

Tracking News, Data, and Other Services

Keep an eye on general news sources such as Bloomberg, New York Times, and The Wall Street Journal. Nowadays, tanker news is much easier to come by on these outlets. If it is financially feasible, up-to-date and historical rate information is available on Baltic Exchange, and it is well worth it.

Platts is also a great source of commodity-specific information including shipping, and Tradewinds is top tier for shipping-specific news. Broker reports are also a great way to get a snapshot of the industry and some shops post them publicly.

Other things to learn would include the individual port restrictions at all major ports, including if the vessel can berth there or even emissions, of both the vessels and the cargo. There is a lot of complexity here once you dive into the details.

If interested in the industry, the best way to break in is through networking. Because of how small the industry is and how critical relationships are to the business, networking is a great litmus test for those in hiring positions to test a candidate's ability to make connections.

Glossary

Automatic Identification System (AIS) - shows information about the vessel including weight, location, etc.

Ballast/fresh off cargo - a vessel moving without cargo on it

Broker - a middleman between shipowner and charterer, to help with negotiations, documents, etc.

Cargo - the oil being shipped

Charterer - the one who needs the ship

Contract of Affreightment (COA) - an agreement between a shipowner and charterer to do multiple voyages

Deadweight Tonnage (DWT) - measurement of a size of a ship, used to classify different vessel classes

Demurrage - late fees paid by the charterer to the shipowner for using his ship long than expected

Differentials - cost between one port and another, used for optionality for charterer

Energy Efficiency Existing Ship Index (EEXI) - emission regulations

Firming - rates going up

Fixture - a completed deal

Flat-rate - the rate of a voyage determined by all operational costs (voyage time, port costs, fuel costs, etc.)

Forward Freight Agreements (FFA) - a futures market for the freight market, used for either hedging or spec.

Laden - a vessel moving with cargo on it

Last-done - last deal that was done on that specific voyage

Laycan - dates to load the ship with the oil

Lightering/sts - agreement between a shipowner and charterer for a vessel to bring crude from port to a ship

Lump-sum - total dollar value of freight contract

Open - date when vessels will be available for another voyage

Orderbook - number of ships ordered at shipyards, to be delivered at future date

Overage - rate paid by the charterer for additional bbls to be loaded into the vessel

Position lists - a list of vessels that are marked as available by shipowners

Scrapping - selling older ships for steel value

Subjects (subs) - a time period where most details are hammered out but not finalized

Time charter - agreement between a shipowner and charterer to give one vessel over a period of time

Ton-mile demand - measurement of demand, focusing on barrels of oil and on miles transported

Tonnage - another term for ship

World-scale - published index, that makes talking about rates easier