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Shipping Economics and Analytics-Freight market basics. Supply and demand . L3

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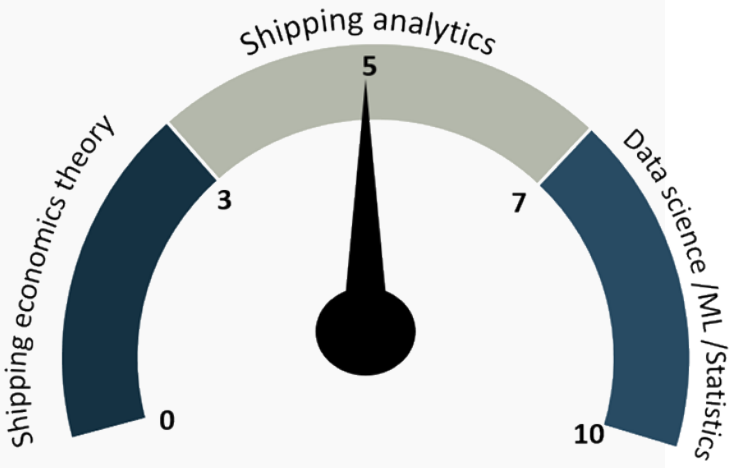
This lecture

Before break (45 min)

- Short intro of supply and demand; elasticities and perfect competition (15 min)
- Microeconomics of freight rate (30 min)

After break (45 min).

- Microeconomics of freight rate (10 – 15 min)
- Hands on session (35 min)
  - Freight rate mechanism with shipping data



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Learning outcomes

This lecture will help with the following learning outcomes:

Knowledge

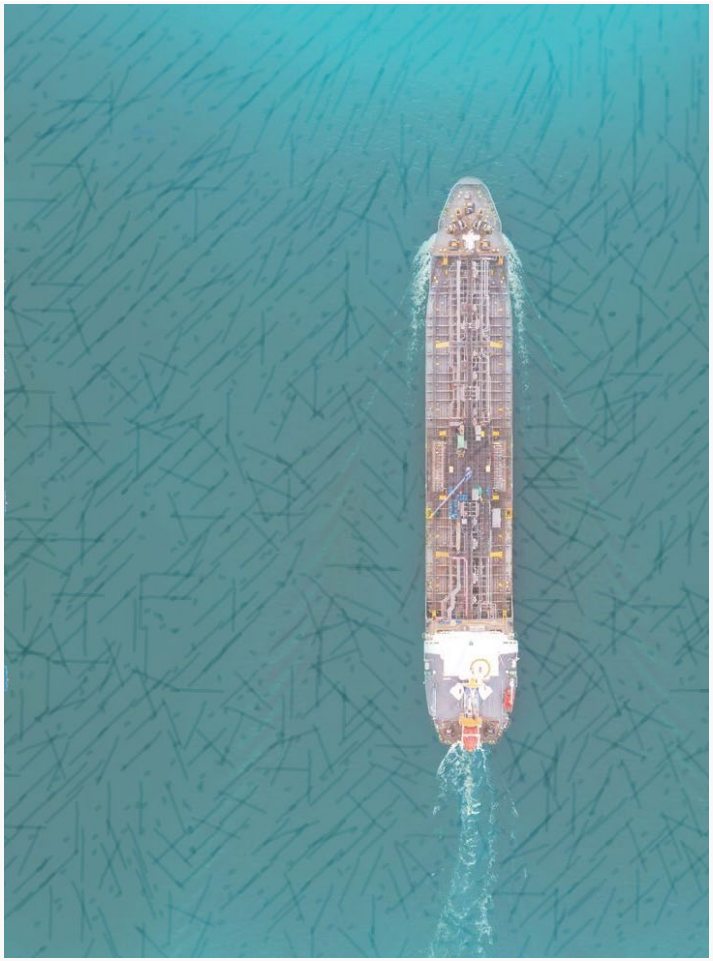
- understands the economic mechanisms driving the international shipping markets
- understand the main results in recent research within shipping economics and analytics

Skills

- finds, synthesizes, and presents information on the international shipping
- can communicate with industry practitioners using correct terminology

Competency

- translates statistics into managerial insight
- exchanges opinions and experiences with others with a background in the field



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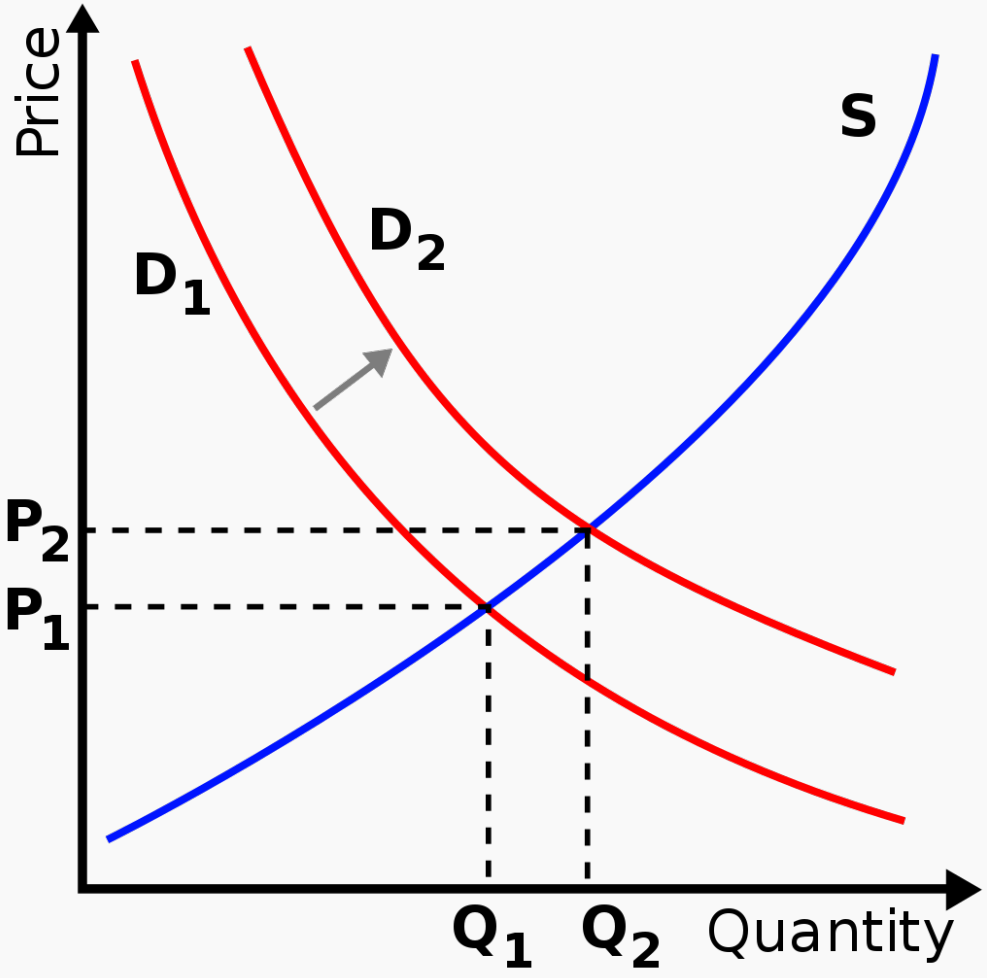

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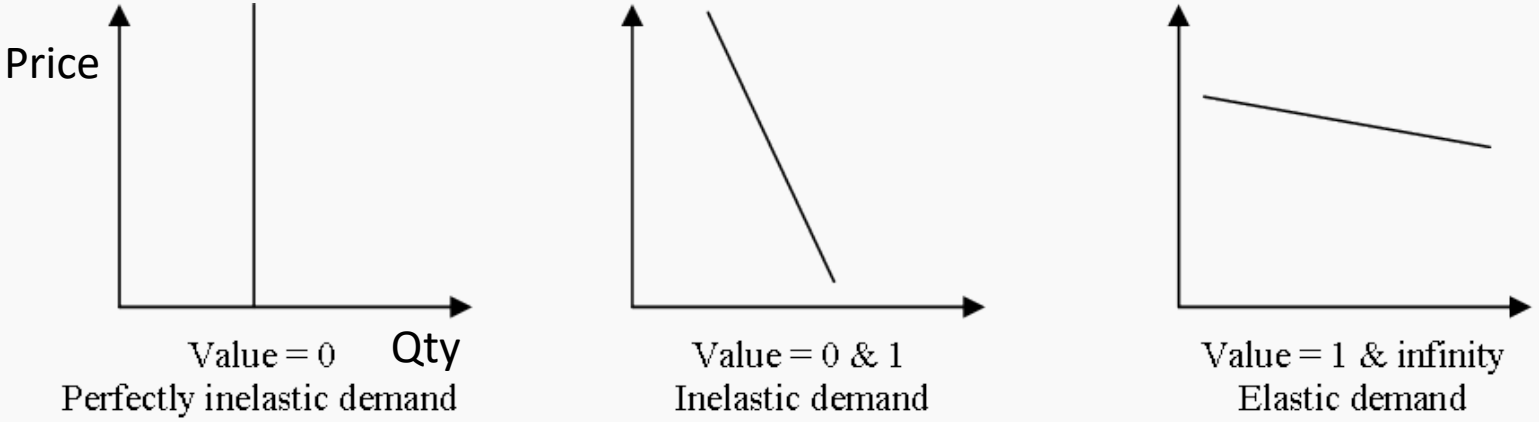
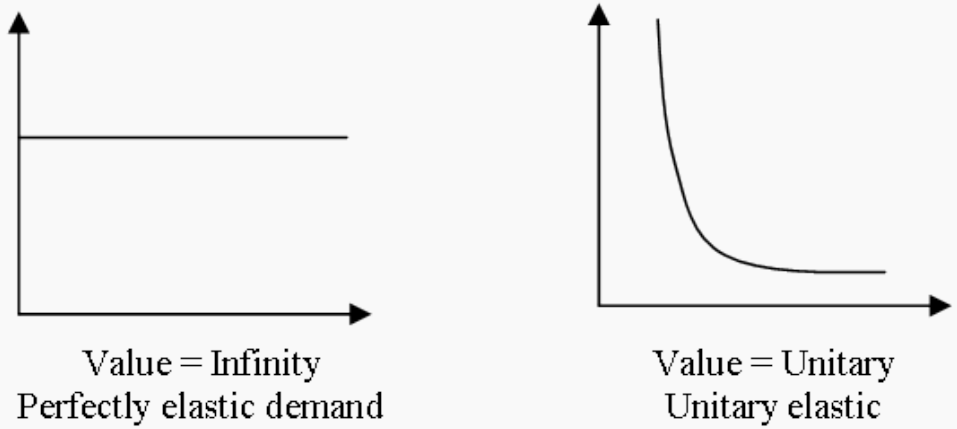
Demand elasticity: %change in quantity/%change in price

Discrete calculation

$\%\Delta Q = (Q_{new} - Q_{old})/((Q_{new} + Q_{old})/2)$, and

$\%\Delta P = (P_{new} - P_{old})/((P_{new} + P_{old})/2)$





Is all about substitution. Inelastic: no substitutes. Elastic: Substitutes available.

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Perfect competition

- Theoretical market structure. A dream for economists.
- Price driven just by supply and demand (invisible hand)
- Characteristics
  - All firms sell an identical product
  - All firms are price takers (cannot influence the price of the products). Monopoly (price makers)
  - Market share has no influence on prices
  - Buyers have complete or perfect information
  - Low barriers of entry

Arguments for perfect competition in (some tramp markets) shipping

- All firms sell an identical product – **Bulk commodity**
- All firms are price takers (cannot influence the price of the products) – **Various competing small companies**
- Market share has no influence on prices – **A company cannot drive the prices. Is that so?**
- Buyers have complete or perfect information – **Brokering services**
- Low barriers of entry – **Relatively easy as the liquidity of assets allows relative fast movements**

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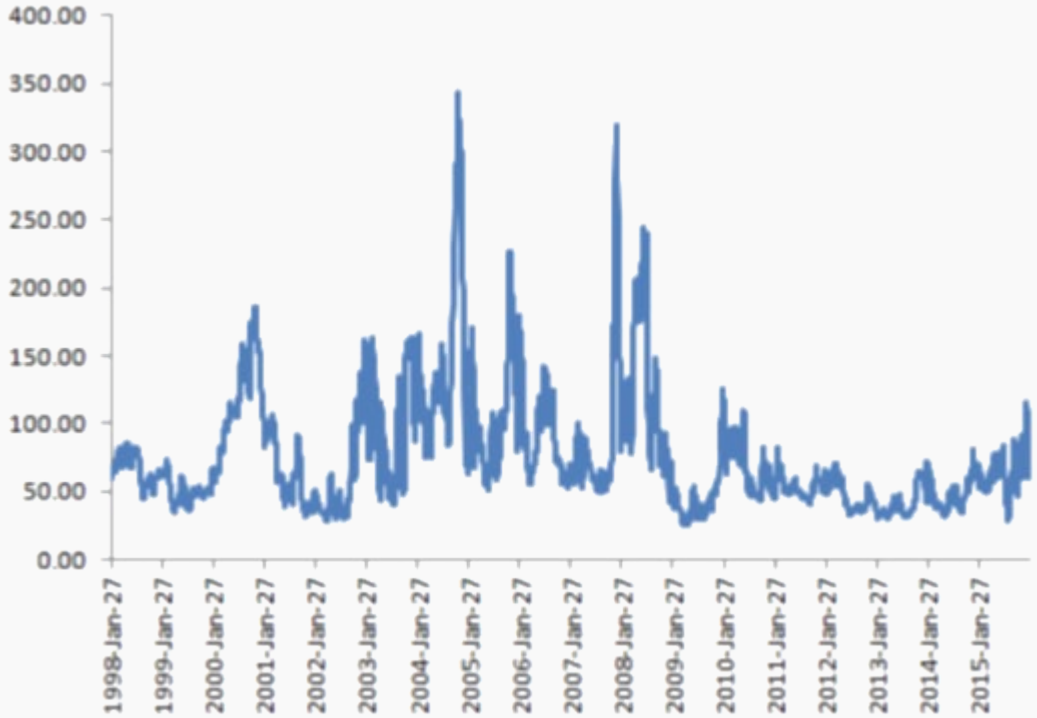
Covered the basic… now shipping

Spot market facts



Source: Adland 2020

- Low rates –Low volatility
- High rates – High volatility (volatility clusters)
- Mean reverting spot rate process

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Demand curve

Source: Adland 2020

- Why is demand inelastic?
- What drives demand horizontal movements?
- Again, from this interaction why are they low and high volatility areas?

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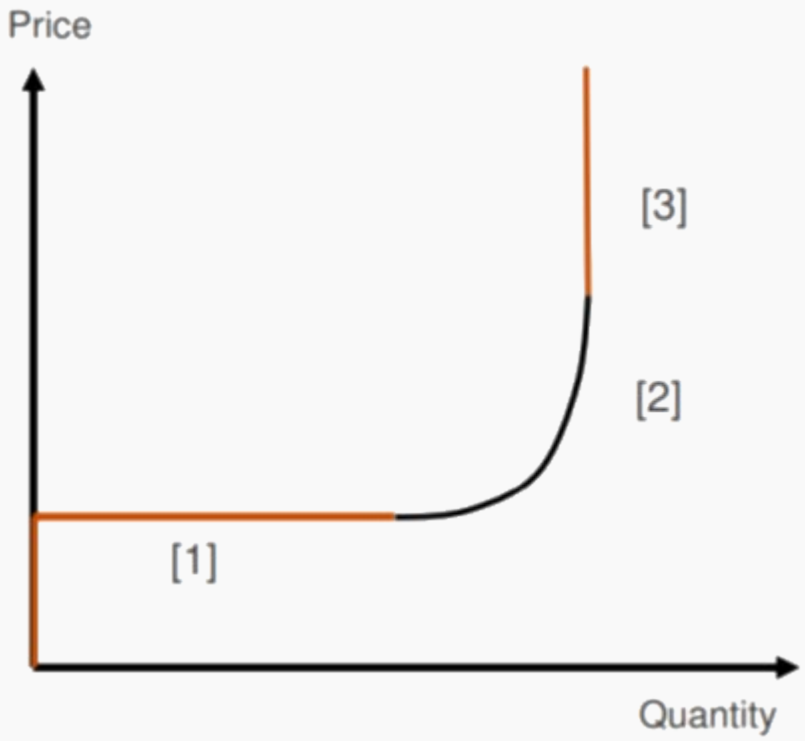
Demand factors

- World Economy
  - Drives trade of raw material and finalized goods
- Seaborne commodity trade
  - Some products seasonality drives the demand
- Average haul and ton miles
  - The distance that a cargo must travel (ton x miles)
- Random shocks
  - War in Ukraine, Panama Canal restrictions, any other geopolitical event restricting vessel passage
- Transport cost
  - A long-term effect – reduction of transport cost (i.e. by new technologies) enhances trade

Supply curve (transport supply) of a single ship



Source: Adland 2020

- A region of elastic supply (1), why?
- A kink (2), shifting area
- A region of inelastic supply (3), why?
- Supply curved is limited to the right, why?

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Supply curve influenced by

- Decision makers (shipowners, bankers, charterers)
  - Indirectly by regulators (IMO)
- Merchant fleet
  - Within a single market (VLCC)
  - Across markets (Product Tankers can operate at the Chemicals market)
- Fleet productivity (ton miles per period of time)
  - Short run adjustment
  - Speed can adjust market supply as it represents more ton miles being delivered
- Shipbuilding production
  - Long run adjustment
- Scrapping/recycling vessels
- Freight revenue
  - Short run adjustment caused by vessels being laid-up

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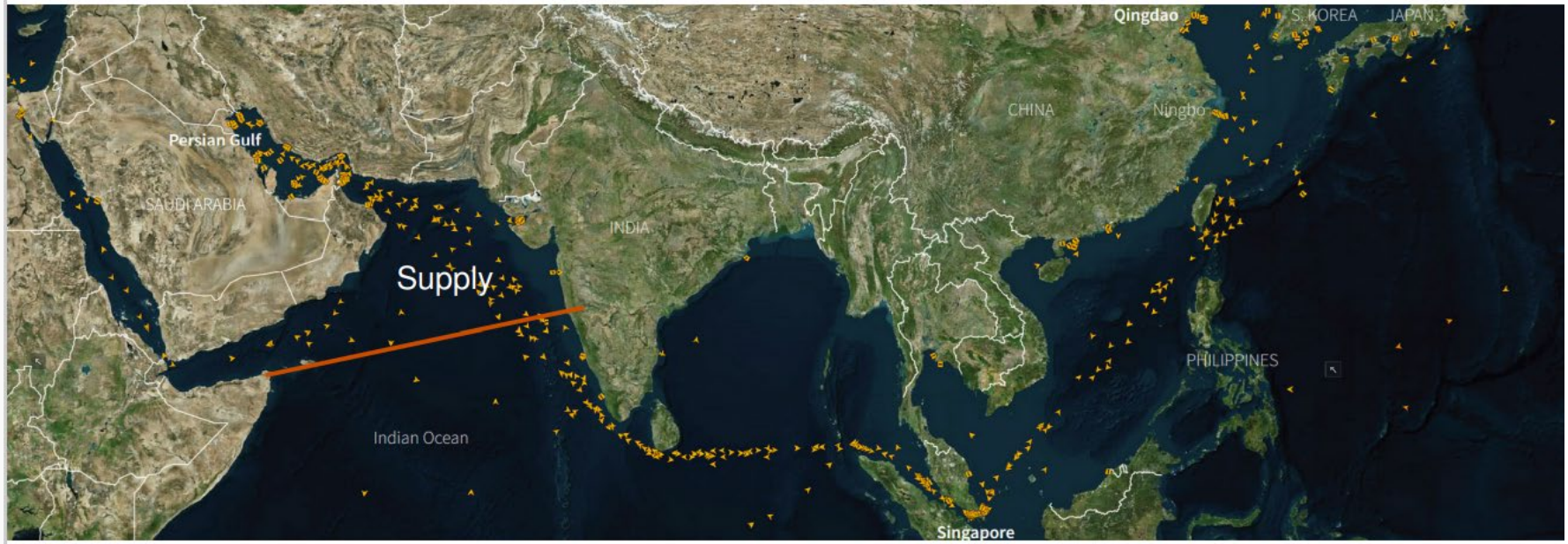
Momentary equilibrium – instantaneous fixture



Source: Adland 2020

- Supply limited to those vessels reaching the cargo on time (micro market auction)
- Demand of cargo to be shipped out of Persian gulf in x days

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BREAK

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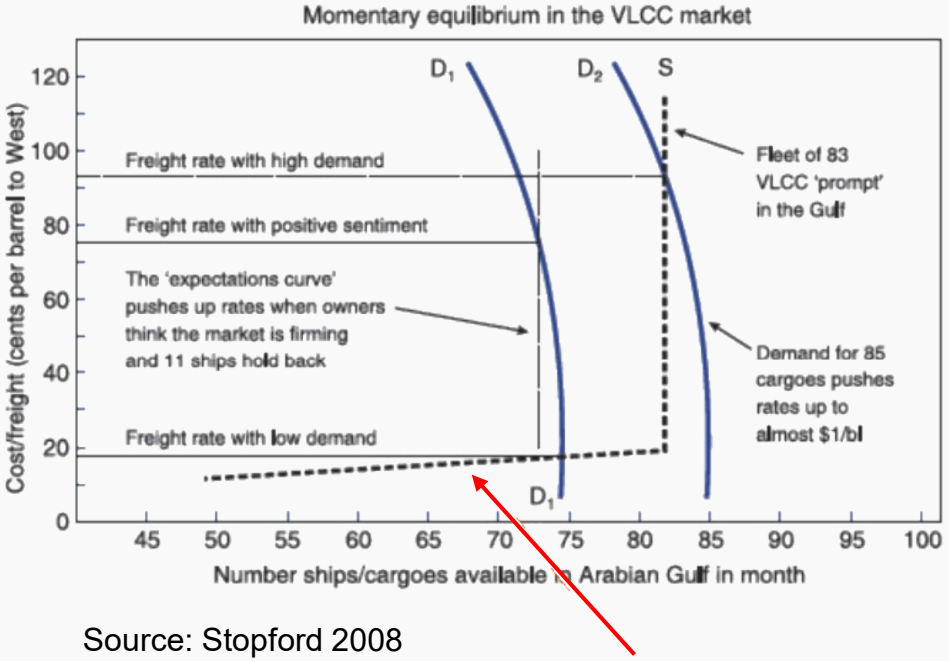
Momentary equilibrium mechanism



Source: Stopford 2008

- Regional equilibria. Disconnected from global market.
- Inelastic supply. No more ships available on short notice..
  - … But supply curve can shift to the left if owner holds vessel back from the market (lay up)
  - … But can backfire if new vessels comes in
- Inelastic demand
  - Derived demand
  - Crude cargoes must be shipped
  - Onshore refineries stock dependent

What sets the lower bound of the supply curve?

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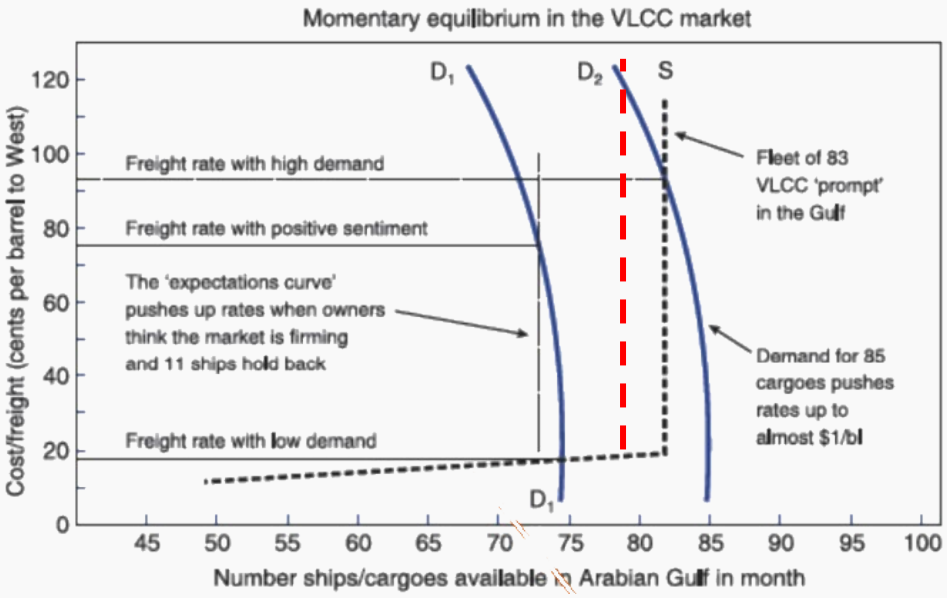
Momentary equilibrium mechanism – Sentiments effect



Source: Stopford 2007

- Tzanetos (1966) introduce the concept of intertemporal substitutions (reschedule the fixing of vessel or cargo in time)
- Sentiments lead often to self fulfilling prophecies
- For an expected high freight:
  - An owner remove her vessels to wait
  - The shipper fix today before price increase
  - Net effect: Increase in demand and reduction of supply.

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Perfect competition about revenues in momentary/short run equilibrium

- Optimal profit comes from Marginal Revenue (MR) = Marginal Cost (MC)
- Marginal cost is the cost of producing an extra unit of outcome (tonne/miles, ships, etc.)
- Translation: an owner accepts to take a voyage as it covers the marginal cost of the voyage
- In short runs, the OPEX (e.g., crewing, maintenance is covered) and CAPEX (e.g., debt installments) are fixed (covered), therefore MC relates to the voyage costs (e.g., bunkers)

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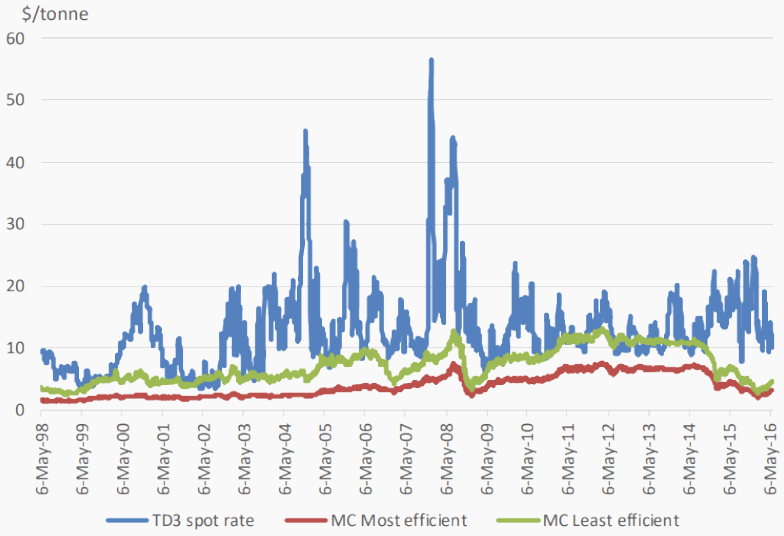
First strike for tramp shipping markets as perfectly competitive markets



- MC≠MR
- Specially on high freight markets
- Spot freight is often higher than MC

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Short run: Global supply and demand

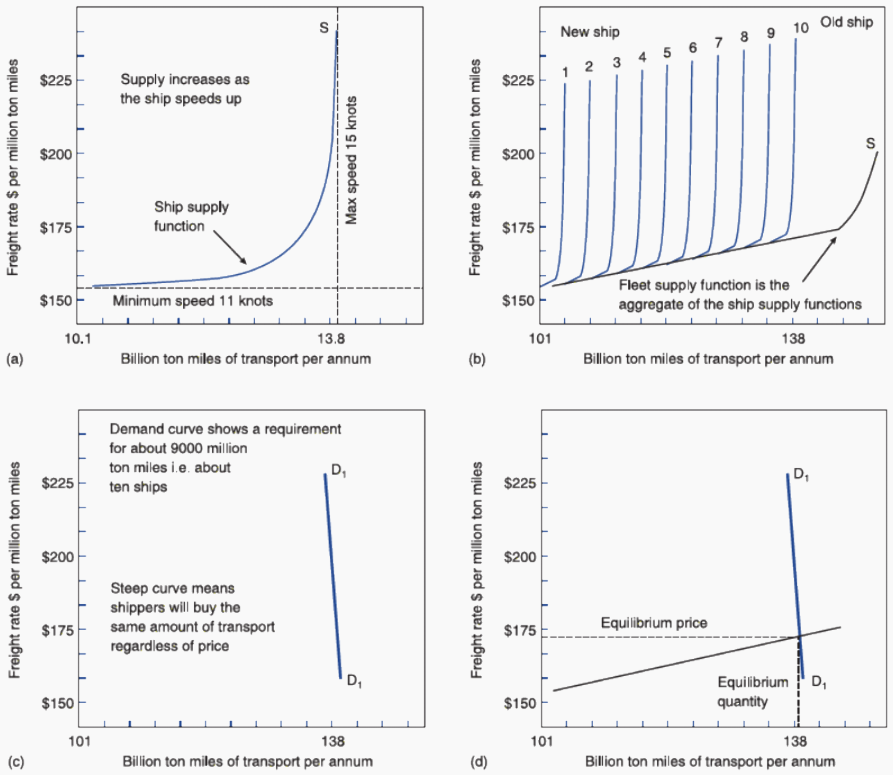

Figure 4.12
Shipping supply and demand functions: (a) supply function for single ship (VLCC); (b) supply function for fleet of ten VLCCs; (c) oil transport demand function; (d) supply–demand equilibrium
Source: Martin Stopford 2005

- Time for short supply adjustments (e.g., lay up, ships at faster speed, activating vessels)
- Boundaries (panel a)
  - Lower: Minimum speed where there is at least equilibrium of cost and profit. Lower than that is a loss so lay up your vessel
  - Right: Maximum avg. speed for all vessels in active
- Fleet model where less efficient vessels are laid up first (panel b)

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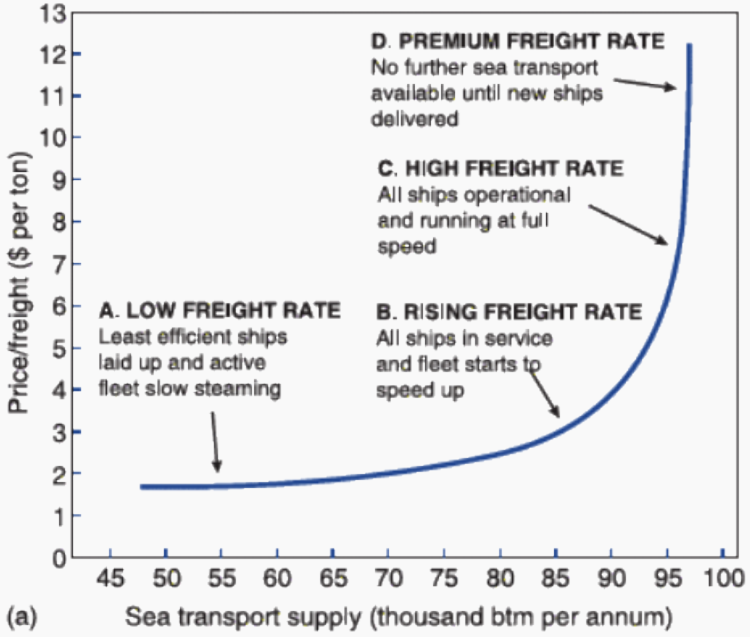
Supply “hockey stick” curve



Source: Stopford 2007

- Elastic area (bottom part) vertical movement based on technical aspects and bunker prices
- Inelastic at high freight rates
  - Not possible to increase supply in short run.
  - Long run adjusted by demolition and new buildings (shift left by demolition or right by new buildings)

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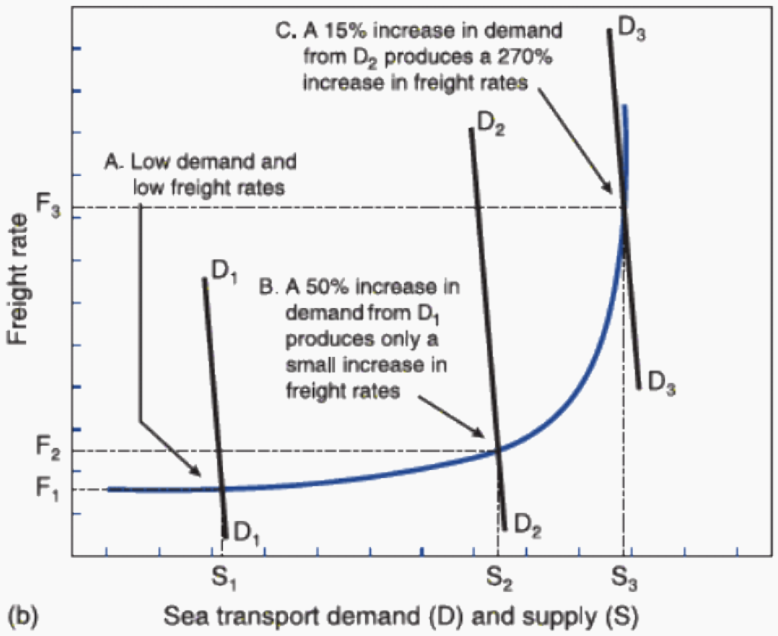
Freight rate volatility



Source: Stopford 2007

- Kink separates two separate rate regimes
- High freight rates areas has high sensitivity to changes of inelastic demand and inelastic demand = high volatility
- Low freight rates are has low sensitivity to changes in demand (elastic supply)
- Leads to cyclical behavior of clusters of highly volatile high rates

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Second strike… Price takers or price makers?

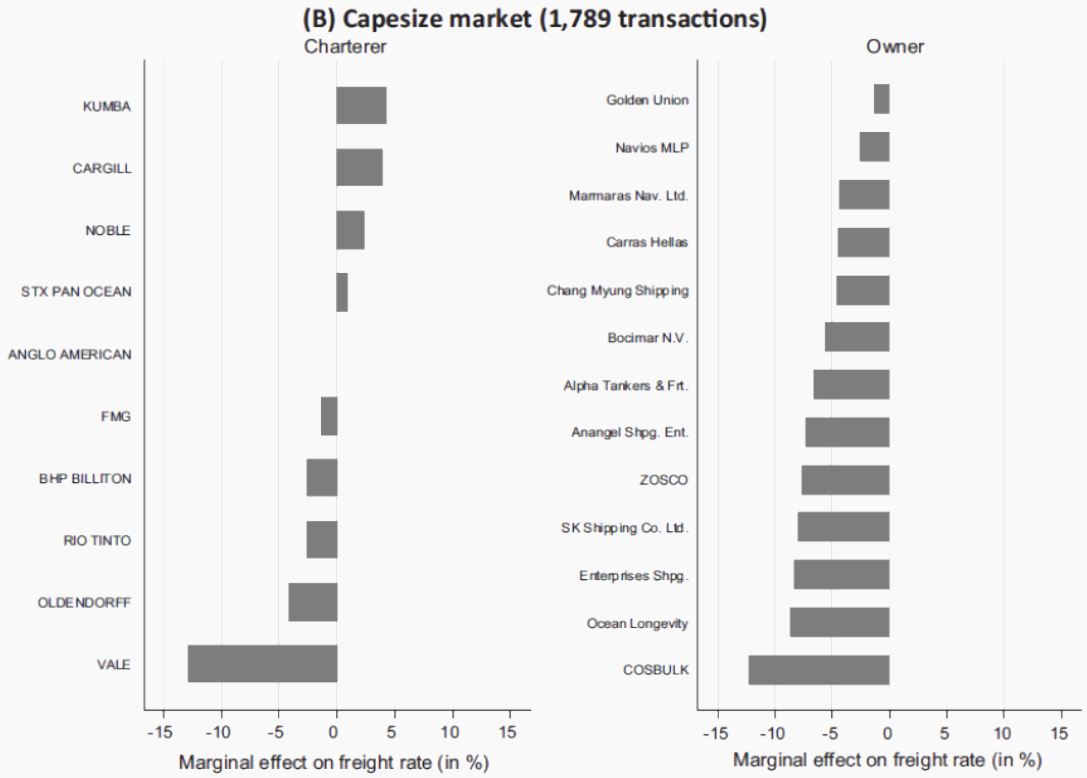

Fig. 4. Influence of main owners and charterers on freight rate. *Note:* The selected owners and charterers are those involved in at least 50 transactions over the period for the VLCC market and 30 transactions for the Capesize market. *Source:* Authors' calculations, data from Clarkson Research (January 2011–April 2014).

Source: Adland et al. 2016

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Now let's see some data

- Open the shared folder at your JupyterHub playground and open

  shared/l3/lecture3_workshop.ipynb

- We are going to follow the tasks together and discuss each one (5 minutes each)

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What have we learned today?

- How perfect competition is interpreted in shipping and where/when does it fails to hold
- How does the law of supply and demand work in shipping
- Characteristics of the supply and demand curves and interpretations of their price elasticities
- Momentary equilibrium based on instantaneous fixtures
- Short run equilibrium and sentiment effect on the supply curve
- Freight rates drivers tested with shipping data
- Shipping as a derived demand market

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References

- Adland, R. Cariou, P., & Wolff, F.-C. (2016). The influence of charterers and owners on bulk shipping freight rates. Transportation Research. Part E, Logistics and Transportation Review, 86, 69–82.
- Panayides, P. (2016). Principles of Chartering: 2nd Edition (p. 229).
- Stopford. (2009). Supply, Demand and Freight Rates. In Maritime economics (3rd ed.) (pp. 135-174) Routledge.

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