



ROBERT H. LEE
GRADUATE SCHOOL

Some Research Questions on Achieving Sustainability in the Maritime Supply chain

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Governing Sustainability in the Maritime Supply Chain

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Potential Research Areas

1. Designing incentive contracts for co-investment in greening technology
2. Risk Allocation and Supply Chain Sustainability

“Ship owners, who would normally borrow for such upgrades, do not benefit from lower fuel bills. It is the firms chartering the vessels that enjoy the savings. But their contracts are not long enough to make it worthwhile to invest in green upgrades.”

Economist March 11, 2017

- This statement was contained in a recent article discussing green finance for dirty ships
- The article implied the fundamental problem with charter contracts is they were too short for ship owners to invest in upgrades to reduce fuel use and pollution
- *Solution:* proposed by an NGO is “share the fuel savings between the ship-owner and the charterer over a longer contract, giving both an incentive to make the upgrades.”
 - Is this a feasible solution?
 - What are the economic issues here?

- **Is there a problem?**

- Ocean Vessels carry 90 percent of world's trade but produce 3 percent of green house gases – 😇
- 15 largest vessels burning heavy oil produce more of the noxious oxides of nitrogen and sulphur than all the world's cars put together - 😞
- IMO has agreed to cap emissions for Sulphur from 2020.
- Without upgrades ships will not be usable (banned?), firms will fail, banks will suffer (fail?) since they have lent \$400 Billion for these ships

Markets for Vessel Capacity

Charter rates are subject to laws of supply and demand

Dry Time Charter Estimates



ALIBRA

Shipping Limited

Rates updated Wednesday: 22 March 2017

NB Rates may differentiate in Weekly Market Report sent out on Fridays

DRY TIME CHARTER ESTIMATES (\$/pdpr)

SIZE	6 MOS		1 YR		2 YR	
PERIOD	ATL	PAC	ATL	PAC	ATL	PAC
HANDY (32k dwt)	▲ 7,900	▬ 7,250	▬ 8,000	▬ 7,250	▬ 8,000	▬ 7,500
SUPRA (56k dwt)	▬ 9,250	▬ 8,500	▬ 8,750	▬ 7,750	▬ 8,100	▬ 7,900
ULTRA (62k dwt)	▬ 9,400	▬ 8,700	▬ 9,000	▬ 8,000	▬ 8,300	▬ 8,100
PANA/KMAX (76k-82k dwt)	▬ 11,000	▼ 10,250	▬ 10,500	▬ 10,250	▬ 11,000	▬ 10,500
CAPE (170k dwt)	▲ 14,500	▲ 14,500	▼ 14,750	▼ 14,750	▼ 14,500	▼ 14,500

Weekly Tanker Time Charter Estimates



ALIBRA

Shipping Limited

Rates updated Wednesday:

22 March 2017

NB Rates may differentiate in Weekly Market

Full report sent out on Fridays

WET TIME CHARTER ESTIMATES (\$/pdpr)

SIZE	1 YR	2 YR	3 YR	5 YR
HANDY (40dwt)	 11,000	 11,500	 12,500	 13,750
MR IMO3	 13,500	 13,250	 14,500	 15,500
LR1	 13,000	 13,850	 15,000	 17,500
LR2 (115 dwt cpp & dpp)	 16,000	 16,500	 19,000	 20,000
AFRA (115dwt)	 15,750	 16,250	 18,000	 19,500
SUEZ	 19,000	 20,000	 23,500	 24,000
VLCC	 26,000	 27,500	 30,000	 32,500

From 1-2 Years	From 2-3 Years	from 3 to 5 years
5%	9%	10%
-2%	9%	7%
7%	8%	17%
3%	15%	5%
3%	11%	8%
5%	18%	2%
6%	9%	8%

Financing Upgrades for 'Dirty' Ships

- The market will establish charter rates
- Vessel owner will earn a return contingent on charter rates
- Scenario A: market robust (derived demand), charter rates high, vessel owner can invest in clean technology, reduce fuel costs, obtain a return on the investment, charterer has less incentive for long term contract since rates may come down in the future, how do you design the right incentive contract? Or do you need to?
- Scenario 2: Commodity markets are weak, we may have reached peak trade, charter rates are soft and getting softer. Vessel owner could invest in clean technology and save on fuel costs but charter rates will not cover the costs of the investment, failure to invest means absorbing some costs to remain competitive in a soft market.

What is the point and what are the research questions?

- IMO can set rules (emission standards) that may impact available capacity; ports can do the same things
- Marginal vessels will be retired
- Market sets charter rates and shippers are price elastic (in competitive market)
- Charter markets are efficient, spot markets ensure arbitrage occurs quickly
- *Are there any conditions under which a vessel owner and shipper could engage in a long(er) term contract to co-invest in cleaner technology recognizing two forces are at work – market DD & SS and exogenous influences (e.g. IMO, Port Pricing)*
- *Or should we be pricing the externality which would incentivize vessel owners to invest in clean technology (what happens to the revenue matters)*

Other Areas for Research-Green Shipping-cont'd

- Can risk allocation have an impact on incentives for safety and reducing environmental risk?
 - “The optimal allocation of risk in transporting environmentally dangerous materials utilizes both tort liability and regulation; regulation should incent shippers to invest in or choose structurally safe vehicles affecting *severity* of an incident and tort liability should incent carriers to minimize the *likelihood of an accident*. This will result in an economically efficient allocation of risk.”
 - Yesterday we heard some discussion of combining public and private investments (e.g. spill protections on inland routes)

Risk allocation and Co-Investment cont'd

- Underlying economic issues
 - incentives for care- likelihood and severity of accident
 - Efficient activity levels - volume of shipping
 - Insurance availability - rule directs risks of accident damages to parties that can most efficiently bear the risk – can shipper obtain liability insurance at lower or higher cost than carrier (including self insurance)?

Efficiency has three dimensions:

- Efficiency of rules to generate the right incentives for precautionary investment or **care** to reduce probability and severity of an accident
- Efficiency of **activity** or volume of shipments
- Efficiency in allocating **risk bearing** (liability risk)

Research Issue

Two ways of thinking about risk allocation: Public Markets versus Private Markets

Points: there is an externality and 'best' means full costs of bearing risk minimized

1. Regulations set vessel parameters, public investment establishes a level of protection
2. Regulations set vessel parameters, carrier bears risk and sets socially efficient prices and Insurance markets will provide efficient level of liability coverage

Market Failure in Early Adoption

1. Lack of incentives for early adoption of technologies to reduce environmental damage
2. How do we encourage risk taking in other industries?
3. Can collaboration provide a partial solution or can it lead to 'beggar thy neighbour' approach (e.g incentivize green strings which shifts dirty vessels elsewhere)
4. What 'bank' pays for early adopters? (revenue neutral pricing or public purse?)



Discussion?

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