Vessel calculation practice

You work for a drybulk operator as a chartering manager. The company's business idea is to charter in Supramax vessels on a tripcharter contract ($/day basis) and relet the vessels on a voyage charter ($/tonne) for a specific cargo and route and attempt to make a profit from the difference between the voyage TCE and the tripcharter cost.

On December 9 at 12:00, you identify a potential cargo of 50 000 tonnes of metal scrap to be transported from Rotterdam (Netherlands) to Kandla port (India) on a voyage charter. Loading in Rotterdam will commence at 00:00 on December 23. (i.e.midnight 22nd Dec.) with certainty. The charterer requires a sailing speed of 12 knots for the laden voyage. The minimum possible sailing speed for the vessel is 8 knots.

Your broker identifies two identically designed ships of 58,000 DWT that are commercially available to perform the voyage and that can be chartered in on a tripcharter. Vessel A is currently positioned in the port of Iskenderun, Turkey, 3161 nautical miles from Rotterdam. Vessel B is currently located in the port of Marseille Fos, France, 2051 nautical miles from Rotterdam. Both vessels have just completed the previous discharge and are currently in ballast (empty). Assume that either vessel can be chartered immediately without delay due to negotiations etc.

The relationship between the sailing speed V (knots) and daily fuel consumption F (tonnes/day) for the two vessels is given by $F = 0.040907*V^{2.5}$. Ignore fuel consumption at anchorage or in port.

a) Assume that there is no uncertainty with regards to the arrival time (e.g. bad weather delays) for the ballast voyage. Show that the optimal sailing speed to Rotterdam in this case is VA = 9.8 knots for vessel A and VB = 8 knots for vessel B.

The cargo will be transported on a voyage charter, where the operator is responsible for paying the fuel cost. Given that the laycan, voyage rate and laden speed are fixed, the onlydegree of freedom to maximize profits will be to select the ballast speed that minimizes the fuel cost. Since there is no uncertainty with regards to weather or other risk factors, this is simply a matter of sailing at the slowest possible speed that gets you to Rotterdam by the end of the laycan period.

Time available between 9. Dec noon and end of day 22. Dec. is 13.5 days. Given the remaining sailing distances, the corresponding vessel speeds are:

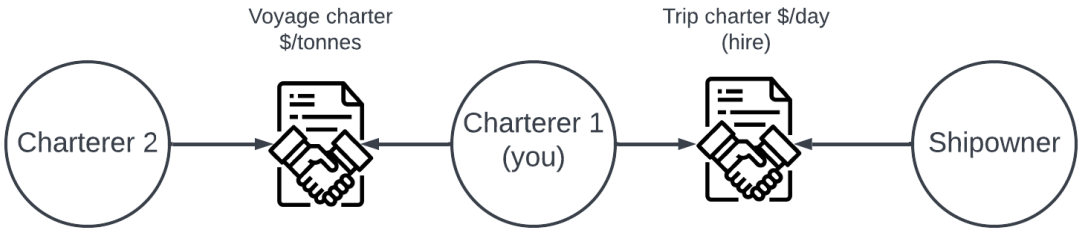
Va = 3161/(24*13.5) = 9.8 knots

Vb = 2051/(24*13.5) = 6.3 knots, which is below the minimum sailing speed of 8 knots

The voyage freight rate for the scrap cargo is $40/tonne. The vessels have enough fuel onboard for the entire trip at a cost of $560/tonne. Total port costs and canal fees are $200,000. The distance from Rotterdam to Kandla via the Suez Canal is 6230 nautical miles. The time spent in ports (loading and discharge) totals 5 days.

b) Calculate the TCE for each vessel for the prospective scrap cargo. If vessel A can be chartered in on a tripcharter for $33,000/day and vessel B can be chartered in on a tripcharter for $35,000/day, which vessel should ultimately be chartered in to maximize the profit for the voyage?

This is the contractual arrangement. Check Lecture 4 slide 16 and 17 for a review on types of charter and who pays for what in every charter.



Calculate the fuel cost for the vessels.

Laden: Daily fuel consumption at 12 knots is F = 0.040907*12^2.5 = **20.41 tonnes/day**

Ballast A: Daily fuel consumption at 9.8 knots is F = 0.040907*9.8^2.5 = **12.16 tonnes/day**

Ballast B: Daily fuel consumption at 8 knots is F = 0.040907*8^2.5 = **7.40 tonnes/day**

Both vessels spend 5 days in port and (6230nm/(12*24) = **21.6 days laden**

Sailing days in ballast are:

Vessel A: 3161/(24*9.8) = **13.5 days**

Vessel B: 2051/(24*8) = **10.7 days**

Total fuel cost for the trip is the product of sailing days, daily fuel consumption on the two legs and the cost of fuel per tonne:

Vessel A: $560/tonne*(13.5days*12.16t/day + 21.6days*20.41t/day) = **339,138 USD**

Vessel B: $560/tonne*(10.7days*7.40t/day+21.6days*20.41t/day) = **291,491 USD**

The timecharter equivalent is TCE = (gross freight - port/canal fees - fuel cost)/trip duration

Assume that the vessels are delivered (taken in control by you) where they become open. Then, the TCEs are calculated as:

*** If the instruction said that the vessel would be delivered at Rotterdam (load port), then you will only be concerned about the laden bunkers and the trip duration will be from Rotterdam + port time + canal time+ leg to Kandla.

Vessel A: TCE = (50000*40-200000-339138)/(13.5+5+21.6) = **36,401 $/day**

Vessel B: TCE = (50000*40-200000-291491)/(10.7+5+21.6) = **40,442 $/day**

After subtracting the daily trip charter cost, the daily profit per vessel is:

Vessel A: TCE-trip charter rate = $36,401/day - $33,000/day = **3,401 $/day**

Vessel B: $40,442/day - $35,000/day = **5,442 $/day**

Using Vessel B will maximize the profit since the duration of the charter is identical.