Dry bulk voyage calculation + FFA's + risk assesment on COA vs Time Charter

Question in black. Answers in red.

As a credit analyst in a major Norwegian bank you are evaluating the loan application for the financing of a modern Panamax drybulk vessel. The shipowner has a obtained a 12-month Contract of Affreightment (COA) with a small Indonesian coal miner, Arutmin, to which the ship will be assigned. The COA requires one shipment of W=70,000 tonnes per month between Muara Satui anchorage and Tianjin, China at a rate of R=$7/tonne. The one way sailing distance is 300 nautical miles. The Indonesian terminal relies on floating cranes and barges and has a loading capacity of 10,000 tonnes/day. Discharging capacity in Tianjin is 70,000 tonnes/day but there is an additional average 4 days of waiting at anchorage per trip. Port costs total $26,650 per round trip. The vessel refuels while discharging in China, and fuel prices can be locked in at P=$308/tonne for the next 12 months with a local supplier. Ignore fuel consumption at anchorage and in port. The vessel operates 30 days per month.

a) Find the time charter equivalent (TCE) spot rate ($/day) for the COA under the assumption that the shipowner is optimizing speed and no commission is payable. Show all calculations.

$$TCE = \frac{Wx\ R - Fuel\ costs - Portcosts}{Trip\ duration}$$

The optimal speed is given by:

$$\boldsymbol{V^*} = \sqrt{\frac{\boldsymbol{24xRxW}}{\boldsymbol{DxbxPxa}}}, where\ D\ is\ roundtrip, a = 0.011\ and\ b = 3$$

Daily fuel consumption at speed V is given by $FC = a\ X\ V^b$

Step 1. Find the optimal speed

$$\boldsymbol{V^*} = \sqrt{\frac{\boldsymbol{24xRxW}}{\boldsymbol{DxbxPxa}}} = \sqrt{\frac{24\ x\ 7\ x\ 70{,}000}{6{,}000\ x\ 3\ x\ 308\ x\ 0.011}} = 13.89$$

Step 2. Get the daily fuel consumption at this speed

$$FC = a\ X\ V^b = 0.011x13.89^3 = 29.48\ tonnes/day$$

Step 3. Calculate the number of days per trip

$$\frac{D}{24xV^*} = \frac{6{,}000}{24x13.89} = 18.00\ days$$

Step 4. Get days at port

Total days in port and at anchorage is comprised of 4 days at Tianjin anchorage, 1 day discharging (70,000t/70,000tpd) and 7 days loading in Indonesia (70,000t/10,000tpd), a total of 12 days.

Step 5. Get TCE.

$$TCE = \frac{70{,}000\ x\ 7 - 29.48\ x\ 18\ x\ 308 - 26{,}650}{18 + 12} = 9{,}997.10\ \$/day$$

b) The market rate for a 12 month period timecharter with a high quality charterer is $9{,}997.10\ \$/day$. Explain briefly how the proposed COA may affect the lending decision for the ship.

The timecharter rate and the TCE for the 12-month contract is identical. A good student will observe that default risk is likely higher for a minor Indonesian coal miner than a highly quality charter and the “risk adjusted” TCE is therefore lower for the COA such that the TC is preferred.

A very good student will additionally observe that under the COA, the shipowner is exposed to operational risk such as delays and, should the fuel price contract with a small Chinese supplier not hold, also bunker price risk. For a Time Charter bunkers and delays are charterers risk. For instance, if the vessel is severely delayed, the owner may have to charter in a replacement vessel from the spot market to satisfy the COA requirement on one monthly shipment, or at the very least operate with a higher speed at her own expense to catch up with the schedule.

A very good student may also point to additional risk operating with long periods of idleness in Indonesian waters such as piracy and marine growth (tropics) and added fuel consumption.

c) The ship is financed on January 1st and enters into the COA. After three months there is a sharp fall in the freight market. As of April 1st, the following FFA prices are circulated to your office. How much does your client stand to lose if the

charterer, Arutmin, defaults on the COA on April 1st? Consider fair market value of the contract, assuming a cost of capital at 0% and 30 days per month.

Period	**FFA price ($/day)**
April	4,000
May	5,000
June	6,000
Q3	6,000
Q4	10,000
2018	8,000
2019	8,000

If the charterer defaults, the owner must take whatever alternative employment is available for the vessel. As of April 1st, spot market employment for the remaining nine months of the year is priced in the FFA market as the average Q2 (April/May/June at $5,000/day), Q3 at $6,000/day and Q4 at $10,000/day. The forward price for the nine months (9 x 30 =270 days) remaining of the period, is therefore $\frac{5{,}000+6{,}000+10{,}000}{3} = \$7{,}000\ /\text{day}$. This implies a "fair value" loss of default of $270\ x\ (TCE - \ 7{,}000) = 270\ x\ (9{,}997.10 - \ 7{,}000) = \$809{,}190$