

Study Questions

Chapter 9. Monopsony - Japan and the Asia Pacific LNG Market

Study Question 9.1

9.1a What is the temperature of LNG in degrees Fahrenheit? Degrees Celsius? What equation converts degrees Celsius to degrees Fahrenheit?

9.1b How many cubic meters of LNG are there per tonne of LNG? How many cubic meters of natural gas are there per tonne of LNG? I believe the conversions in data_BP12.xlsx for a tonne of LNG into cubic meters and cubic meters of natural gas are incorrect. Check these conversions and see if you agree with me.

9.1c Other cargoes more typically are measured in deadweight tonnes (DWT), which is the number of metric tons a ship can carry including cargo, bunkers, crew, and provisions. DWT tonnes are a bit larger than the cargo space. How many deadweight tons would a 135,000 cubic meter LNG tanker carry? (Ignore non cargo capacity for this computations unless you can find a value for it.)

9.1d How many miles in a nautical mile? How many kilometers?

9.1e Suppose you have a 4 million metric tonne per year project that will deliver LNG 3000 nautical miles away. If you have ships that carry 135,000 cubic meters and travel at 20 knots, loading and unloading each takes 12 hours, how many ships would you require for your project? You may assume that ships do not have any downtime. (This would be roughly the distance from Australia to Japan. The distance from the Middle East to Japan would be about 7000 nautical miles.)

9.1f If LNG cost \$4.31/MMBTUs, what would be the per barrel oil price on an energy equivalent basis for a barrel of oil that has 5,800,000 BTUs/barrel and an Mcf of gas that has 1,026,000 BTUs?

Study Question 9.2 Since Japan has some of the most efficient power plants in the world, redo the example in the text beginning at equation 9.1 assuming the efficiency of a combined cycle power plant using LNG is 50%.

9.2a. How much LNG would Japan import, if it were a monopsonist? What would be the price paid? What would be the total cost of imports?

9.2b How much would Japan gain by being a monopsonist instead of a competitor?

9.2c Explain how combined cycle gas turbines work. Why are they more efficient?

Study Question 9.3 Now suppose we have a downward sloping marginal revenue product curve as in Figure 9.2 in the text. Let $MRPL=103.8-0.215L$.

9.3a Now how much LNG would Japan consume and what price would they pay?

9.3b What is producer and consumer surplus and social losses?

Study Question 9.4 Suppose that Japan lost its monopsony power in the Study Question 9.4.

a. Graphically show the new solution.

b. How much LNG would Japan import? What would be the price paid? What would be the total cost of imports?

c. Is monopsony power stronger or weaker (stronger would indicate it could push price lower) when supply is more elastic? Justify your answer with a diagram.

Study Question 9.5 Redo the example in Study Question 9.4 assuming that Japan is a perfectly price discriminating monopsonist.

Study Question 9.6. Diagrammatically compare the case in study question 9.3 to the case where Japan is a monopsonist on the input and a monopolist on the output market. Does Japan buy more or less LNG in this case? Is the price of LNG higher or lower?

Study Question 9.7. Suppose we have a bilateral monopoly. The monopolist has a cost curve $MC=2+4Q$, and the monopsonist has an inverse demand curve $P=50-4Q$. They are negotiating the price for 4 units of the product.

a. What is the monopolist's reservation price for 4 units?

b. What is the monopsonist's reservation price for 4 units?

Study Question 9.8 You are an integrated oil company that produces and refines crude oil. You produce a 1000 b/d, your annual depreciation is 200, you pay royalties on your lease of 12% of price, your operating cost is \$5.10 per barrel, you pay corporate taxes of 40%, and you sell your product to your refinery at \$60 per barrel.

a. What are your annual after tax accounting profits for crude oil production?

b. Your refinery processes the crude oil. The product gains 5% in volume with refinery and sells for an average of \$30 per barrel. Your depreciation for the refinery is 500, operating costs per barrel are \$4. You pay a corporate tax rate of 40%. What are your after tax accounting profits for your refinery? What are your total profits.

c. Now suppose that Congress passes a depletion allowance of 20%. This means that you will be able to deduct 20% of your gross profits after royalties from your profits before computing your corporate tax. What are after tax production profits now?

d. What happens to your after tax profits, if you charge the refinery \$20 for the crude oil instead of \$15?