

PEER GROUP PROBLEM SOLVING

Name:

Instructor:

Course:

The following table shows the typical marginal cost per barrel associated with extracting oil from different methods, as well as the quantity supplied from these methods. The price of oil is currently \$80/bbl.

Method/Region	Marginal cost/bbl	Quantity supplied (bbls/day)
Onshore drilling	\$29	21 million
Offshore shallow water drilling	\$43	19 million
Offshore deep water drilling	\$53	11 million
North American Shale	\$62	9 million
North American Oil Sands	\$74	8 million

- a) Discuss why the marginal costs vary for different methods of oil extraction.

- b) Graph the supply function for oil.

- c) Suppose the price of oil changes from \$80/bbl to \$55/bbl. How would this change the quantity supplied of oil? How would this change the supply curve for oil?

- d) Now suppose the government imposes a tax of \$10/bbl on producers. How would this affect the supply of oil? If the price of oil remains \$55/bbl after this tax, what is the new quantity supplied?

IN-CLASS EXPERIMENT / ACTIVE EXERCISE

- a) Derive a supply curve by asking students to consider the minimum amount they would have to be paid to be willing to do nothing (stare at a wall without being able to use their cellphones) for exactly one hour.
- b) Now, tell students that after graduating they will get a job in which they earn \$100,000/year, or approximately \$50 per hour. If all students are re-asked the question from part a), how would this likely affect the supply curve? Why?

SOLUTIONS AND INSTRUCTOR NOTES

Discussion Question

In 2010, the price of natural gas was \$4.48/1000 cubic feet. In 2012, the price of natural gas had fallen to \$2.66/1000 cubic feet. Over this same time period, U.S. production (quantity supplied) of natural gas increased from 22.38 million cubic feet to 25.28 million cubic feet.

- a) The law of supply states that when price decreases, quantity supplied decreases, other factors being constant. In this case, price decreased, yet quantity supplied increased. Is this a violation of the law of supply?

This is not a violation of the law of supply, because other factors were not being held constant (ceteris paribus). In particular, if there is an increase in supply, we would expect the quantity supplied to be higher at every price.

- b) What could explain this change in the market for natural gas?

A change in technology is the usual cause for an increase in supply. In this case, hydraulic fracturing, which is a technologically advanced method of extracting natural gas from shale, allowed firms to supply more natural gas at every price. This has caused a rightward shift of the supply of natural gas.

Peer Group Problem Solving

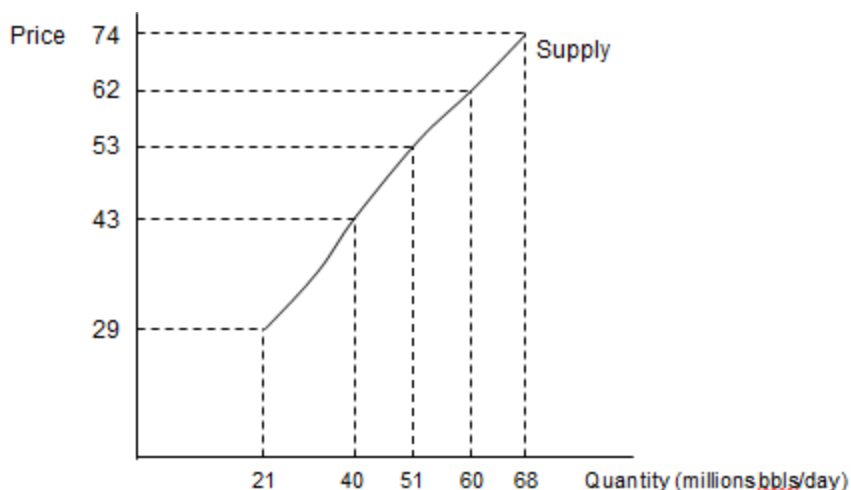
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- a) Discuss why the marginal costs vary for different methods of oil extraction.

Some methods of extraction are more expensive than others, based on exploration, amount of inputs required, and the cost of those inputs. For example, conventional land-based drilling incurs less exploration costs and lower infrastructure costs than drilling in deep water. As a result, land drilling will have a lower marginal cost per barrel than offshore drilling or hydraulic fracturing.

- b) Graph the supply function for oil.



- c) Suppose the price of oil changes from \$80/bbl to \$55/bbl. How would this change the quantity supplied of oil? How would this change the supply curve for oil?

The quantity supplied of oil would decrease from 68 million bbls/day at \$80/bbl to 51 million bbls/day at \$55/bbl. The supply curve for oil would not change as a result of a change in price.

- d) Now suppose the government imposes a tax of \$10/bbl on producers. How would this affect the supply of oil? If the price of oil remains \$55/bbl after this tax, what is the new quantity supplied?

If a tax of \$10/bbl is imposed, the cost/bbl would increase by \$10 for all methods of extraction. The supply function would shift leftward by \$10 at every quantity. If the price of oil stays at \$55/bbl only onshore drilling and offshore shallow water drillers will be willing to produce, so the quantity supplied will be 40 million barrels.

In Class Experiment/Active Exercise

- a) Derive a supply curve by asking students to consider the minimum amount they would have to be paid to be willing to do nothing (stare at a wall without being able to use their cellphones) for exactly one hour.

The supply curve could be graphed by starting with a low price, where quantity supplied equals 0 (say $P = \$1$), then incrementally increasing price. In this case the instructor mentions the concept of opportunity cost, noting that the marginal cost of staring at a wall is given by the opportunity cost of our time spent performing other activities, perhaps working or studying. The supply curve is upward sloping because as price increases, it exceeds the opportunity costs of a larger number of students.

- b) Now, tell students that after graduating they will get a job in which they earn \$100,000/year, or approximately \$50 per hour. If all students are re-asked the question from part a), how would this likely affect the supply curve? Why?

If students have a high paying job they will likely value their time at a higher level, (they face higher opportunity costs). As a result the supply curve would shift leftward, reflecting higher costs at every quantity, or a lower quantity supplied at every price.

For more in-class experiment and active learning ideas, visit www.econedactive.com.