

Section Exercise for February 24/25: Externalities

A standard 42-gallon barrel of West Texas Intermediate oil sold at the standard contract reference delivery point of Cushing, Oklahoma in August 2014 for \$100/barrel. By February 2016 the price was down to \$30/barrel.

The long-run demand curve for oil, in billions of barrels/year and \$/barrel, is currently given by:

$$P = 400 - 10Q$$

In the short run, as systems and industries adjust, demand will be different. The long-run demand is what demand will be if the price stays the same and the economy fully adjusts.

1) What was the long-run quantity demanded of oil back in August of 2014? What is the long-run quantity demanded of oil today?

****The long-run demand curve tells us that at a price of \$100/barrel long-run demand for oil is 30 billion barrels/year. At a price of \$30/barrel long-run demand for oil is 37 billion barrels/year****

2) Current estimates are that the additional global warming from burning an extra barrel of oil and thus turning its carbon into atmospheric carbon dioxide is some \$10/barrel. How much additional environmental harm will be done if the oil-using sector is in its long-run equilibrium corresponding to \$30/barrel rather than \$100/barrel?

****The extra 7 billion barrels/year of oil consumption will impose \$70 billion/year of future environmental harm via global warming.****

3) What is the optimal Pigovian tax to impose on oil in order to force the market to make the right decisions as to how to trade-off the usefulness of carbon energy in the present versus the dangers of global warming in the future?

****\$10/barrel****

4) By how much would the optimal Pigovian tax on this pollution externality reduce long-run oil consumption?

****By about 1 billion barrels/year****

5) At a price of \$100 a barrel, what is the total consumer surplus generated in the oil-using sector?

****The average willingness to pay is \$250 per barrel. The price is \$100 per barrel. The wedge between the average willingness to pay and the price is \$150 per barrel. At 30 billion barrels per year that is \$4.5 trillion a year in consumer surplus. That is a pretty big number in a world in which total global economic product is still less than \$100 trillion a year.****

6) At a price of \$30 a barrel of oil, what is the total consumer surplus generated in the oil using sector?

**** at a price of \$30 a barrel the wedge is \$185 a barrel and the quantity is 37 billion barrels a year. That gives us \$6.845 trillion a year of consumer surplus.****

7) Assume that (a) we do not care about how much producer surplus is generated in the oil sector, and (b) that the recent collapse in oil prices is a permanent shift that will be sustained. Is the collapse in oil prices good news or bad news? How good (or bad) is it as news? And for whom is it good or bad news?

****It is very good news for oil users. Their consumer surplus goes up by \$2.345 trillion a year. Offsetting that \$2.345 trillion gain is a \$70 billion cost to those living in the future to have to deal with the consequences of global warming. (In addition, the incomes of oil producers fall from the \$3 trillion a year to \$1.11 trillion a year. I have not given you enough information to calculate the change and producer surplus.)****

****If I may get a little preachy: The extreme and vociferous opposition of that part of the oil industry centered in the US and Canadian oil patches to sensible global warming policies--even the policy is like cap and trade that promise to substantially mitigate the costs imposed on current oil producers in the process of adjusting to clean energy--makes very little sense as a matter of political economy. Much larger shocks that has much bigger impacts plus and**

minus on the income and wealth of oil producers hit the oil factor almost every decade.**

8) How would you adapt your analysis to take account of the fact that estimates of the costs of global warming in the future are highly uncertain—that they might be much larger than \$10/barrel, and might be much lower?

****There appear to be three vital considerations: (a) a higher carbon tax than \$10/barrel now would be a prudent step to take to buy insurance against disaster scenarios by curbing the amount of global warming that will take place; (b) more research into clean energy alternatives would be a prudent step to take to buy insurance against disaster scenarios by making it easier for us to make a much more-rapid transition away from carbon energy should that become advisable; and (c) the value of better information from more study of the science and the political economy of global warming is extremely high.****

****The consideration raised by the Koch brothers and their allies—that a carbon tax might cause us to make investments now in clean energy that we will later regret having made—seems simply off the scale given the very large magnitude of investments made that we turn out later to regret in the oil industry every decade.****