Case Study 4.3: Forcing Fuel Efficiency on Consumers Doesn't Work

Resource Material: "Forcing fuel efficiency on consumers doesn't work" by Jerry Taylor, Cato Institute, *Lincoln Journal-Star,* August 21, 2001.

Learning Goals: The learning goals of this case study include analyzing quantitative arguments about economics of fuel efficiency, devising reasonable assumptions for information not supplied by the writer, analyzing the effects of different assumptions on costs and savings, using linear and exponential equations to model costs and savings, graphing linear and exponential equations, using graphs to compare costs and savings over time, and interpreting features of graphs in terms of the situation being modeled.

This Op-Ed article argues that fuel efficiency resulting from government requirements on automobiles and trucks is not economically sound. There are several quantitative assertions in the article, some of which can be critiqued after making assumptions about various quantities that are not given in the article.

The mathematical concepts that are involved in critiquing the article's assertions include linear equations (sometimes specialized and called cost equations) and exponential equations that give the amount of money in accounts earning interest.

Warm Up Exercises for Case Study 4.3

1. Assume the gasoline version of a Honda Civic costs $21,000 and gets 35 MPG while the hybrid version costs $26,500 and gets 47 MPG. Assume you drive 11,000 miles per year and gasoline costs $2.90 per gallon. Let G be the purchase cost plus the gasoline cost for x years of the gasoline versions and H be the purchase cost plus the gasoline cost for x years for the hybrid version of the Civic.

    a. Give G and H as equations in terms of x.

    b. Give the graphs of the equations from a) on the rectangular coordinate axes system using a horizontal axis scaled in years from 0 to 50 and a vertical axis scaled in dollars from $20,000 to $50,000.

    c. How many years will be required to break even on the extra cost of the hybrid? What part of the graph exhibits this answer?

2. Assume the yearly savings in gasoline costs due to the purchase of a hybrid automobile are $400 and the extra cost of purchasing the hybrid is $4500.

    a. Produce an equation of net savings over a period of x years.

    b. Graph this equation on an appropriate rectangular coordinate axis system and identify the point that indicates the number of years required to break even. How long does it take to break even?

Article for Case Study 4.3

Forcing fuel efficiency on consumers doesn't work

By Jerry Taylor

Although the late, great energy crisis seems to have come and gone, the political fight over yesterday's panic rages on. The big dust-up this fall will be over SUVs, light trucks and minivans. Should the government order Detroit to make them get more miles per gallon? Conservationists say "yes." Economics 101 says "no."

Let's start with a simple question: Why should the government mandate conservation? When fuel becomes scarce, fuel prices go up. When fuel prices go up, people buy less fuel. Economists have discovered over the long run, a 20 percent increase in gasoline costs, for instance, will result in a 20 percent decline in gasoline consumption. No federal tax, mandate or regulatory order is necessary.

Notice the phrase "over the long run." Energy markets are volatile because consumers do not change their buying habits much in the short run.

This has led some critics to conclude that people don't conserve enough when left to their own devices. They do, but consumers need to be convinced that the price increases are real and likely to linger before they'll invest in energy-efficient products or adopt lifestyle changes. But even in the short run, people respond. Last summer was a perfect example: For the first time in a non-recession year, gasoline sales declined in absolute terms in response to the $2 per gallon that sold throughout much of the nation.

Mandated increases in the fuel efficiency of light trucks, moreover, won't save consumers money. A recent report from the National Academy of Sciences, for instance, notes that the fuel efficiency of a large pickup could be increased from 18.1 miles per gallon to 26.7 miles per gallon at a cost to automakers of $1,466. But do the math: It would take the typical driver 14 years before he would save enough in gasoline costs to pay for the mandated up-front expenditure. A similar calculation for getting a large SUV up to 25.1 miles per gallon leads to a $1,348 expenditure and, similarly, more than a decade before buyers would break even.

"Fine with me," you say? But it's one thing to waste your own money on a poor investment; it's entirely another to force your neighbor to do so. You could take that $1,466, for instance, put it in a checking account yielding 5 percent interest, and make a heck of a lot more money than you could by investing it in automobile fuel efficiency.

Even if government promotion of conservation were a worthwhile idea, a fuel efficiency mandate would be wrong. That's because increasing the mileage a vehicle gets from a gallon of gasoline reduces the cost of driving. The result? People drive more.

Energy economists who've studied the relationship between automobile fuel efficiency standards and driving habits conclude that such mandates are offset by increases in vehicle miles traveled.

If we're determined to reduce gasoline consumption dramatically, The right way to go would be to increase the marginal costs of driving by increasing the tax on gasoline. Now, truth be told, I don't support this idea much either. A recent study by Harvard economist Kip Viscusi demonstrates that the massive fuel taxes already levied on drivers (about 40 cents per gallon) fully "internalize" the environmental damages caused by driving. But conservationists reject this approach for a different reason: Consumers hate gasoline taxes and no Congress or state legislature could possibly increase them.

Look, it's a free country. If you want to buy a fuel-efficient car, knock yourself out. But using the brute force of the government to punish consumers who don't share your taste in automobiles serves no economic or environmental purpose.

Study Questions for Case Study 4.3

"Forcing fuel efficiency on consumers doesn't work" by Jerry Taylor
Lincoln Journal-Star
August 21, 2001

1. Locate the following quantitative assertions in the article. Are there others? What are they?

The quantitative assertions include the following:

I. Economists have discovered that, over the long run, a 20 percent increase in gasoline costs, for instance, will result in a 20 percent decline in gasoline consumption.

II. A recent report from the National Academy of Sciences, for instance, notes that the fuel efficiency of a large pickup could be increased from 18.1 miles per gallon to 26.7 miles per gallon at a cost to automakers of $1,466.

III. But do the math: It would take the typical driver 14 years before he would save enough in gasoline costs to pay for the mandated up-front expenditure [$1466].

IV. A similar calculation for getting a large SUV up to 25.1 miles per gallon leads to a $1,348 expenditure and, similarly, more than a decade before buyers would break even.

V. You could take that $1,466, for instance, put it in a checking account yielding 5 percent interest, and make a heck of a lot more money than you could by investing it in automobile fuel efficiency.

2. Answer the following:

a. **Which of the assertions can be checked without considerable research?**

b. **What assumptions would need to be made in checking assertion III?**

c. **What assumptions would need to be made in checking assertion IV?**

d. **What assumptions would need to be made in checking assertion V?**

3. Answer the following:

a. **Is the assertion III above reasonable? Explain why or why not.**

b. **What would be the effect of increased costs of gasoline on assertion III?**

c. **What would be the effect of increased miles driven per year on assertion III?**

d. **Assume the cost of gasoline in 2001 was $1.40 per gallon and that it would take 14 years for the "typical driver" to recover the $1466 through savings in gasoline costs. How many miles per year would the "typical driver" drive?**

4. Answer the following:

a. **Is the assertion IV above reasonable? Why or why not?**

b. **How would the savings be affected if the current MPG of large SUVs were lower than 18.1 MPG?**

5. Answer the following:

a. **Is assertion V above reasonable? Why or why not?**

b. **If the $1466 is placed in one account at 5% interest and the annual savings from gasoline are deposited in a second account earning 5% interest, compounded annually, how do the amounts in the two accounts compare?**

6. Use $1.40 per gallon for gasoline and 12,000 miles per year and compare the amount of money in a bank account where the $1,466 is placed at 5% interest, to the savings in gasoline with no interest earned on the savings over x years.