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ON POINT 5:17

A Trillion Gallons of Gasoline

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A Trillion Gallons of Gasoline

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Fuel economy improvements to cars and light trucks since 1975 have saved U.S. drivers more than a trillion gallons of gasoline (1.5 trillion) and about $4 trillion in fuel costs. A trillion is such a large number that it's hard to comprehend. One and a half trillion gallons of gasoline are enough to power all the cars and light trucks in the U.S. for more than ten years at the 2015 rate of gasoline consumption. With a trillion gallons of gasoline a typical passenger car could drive around the world one billion times at the equator (if there were a road that went all the way round). 1.5 trillion gallons is more than all the petroleum consumed in the entire world in 2016 (bp, 2017). It's an impressive amount of energy, and it's a number every American should know.

Americans should know about the 1.5 trillion gallons of gasoline because they prove that energy efficiency works. Today's cars and light trucks get about twice as many miles per gallon as the 1975 models (EPA, 2016). And they're safer, cleaner, more reliable, more comfortable, bigger and faster. Higher fuel economy along with increased domestic oil production reduced U.S. oil imports to 24% in 2015, the lowest level of import dependence since 1971 (EIA, 2017). Furthermore, as a recent Baker Center study showed, fuel savings to date have far outweighed the cost of fuel economy improvements for all U.S. income groups (Greene and Welch, 2017).

How was it done? Better technology: better engines, transmissions, tires, materials, accessories and designs. Automotive engineers, take a bow.

Data, Methods, and Savings

Our data on gasoline use and vehicle travel come from the U.S. Department of Transportation's Federal Highway Administration (FHWA, 2017) which has been measuring highway fuel use since 1919 and vehicle travel on our nation's roads since 1936. Figure 1 shows the FHWA's data on vehicle miles of travel and fuel use by passenger cars and light trucks since 1965. Until 1975, vehicle miles traveled (left axis) and fuel consumption (right axis) by light-duty vehicles (passenger cars and light trucks) increased together, indicating no improvement in fuel economy. Following the energy crisis of 1973-74 (see, e.g., Yergin, 2008, Ch. 29) and the Energy Policy and Conservation Act of 1975 that established fuel economy standards for light-duty vehicles, fuel consumption and vehicle travel began to diverge.

If fuel consumption had continued to grow at the same rate as vehicle travel, gasoline use in 2015 would have been 209 billion instead of 126 billion gallons, a difference of 83 billion gallons in 2015 alone. Summing over the years 1975 to 2015, the total savings estimated this way comes to almost 2 trillion gallons (1.96 trillion). But economists have long recognized that improving fuel economy reduces the fuel cost per mile of driving, which encourages more driving (Greening et al., 2000). This driving "rebound" due to fuel economy improvement has been extensively studied leading to a near consensus that a 10% increase in fuel economy will result in about a 2% increase in vehicle miles traveled.[1] The implication is that if fuel economy had not increased, there would have been less vehicle travel. The gray dashed line in Figure 1 shows estimated vehicle miles of travel adjusted downward for a 2% rebound effect. If gasoline use had increased at the rate of the "unrebounded" vehicle miles of travel, 63 billion rather than 83 billion more gallons of gasoline would have been consumed in 2015. Taking the rebound effect into account, the sum of gallons saved from 1975 to 2015 comes to 1.50 trillion gallons. Gasoline savings in 2016 will be at least as great as in 2015, so savings through the end of last year exceed 1.5 trillion gallons and are still growing. Valuing the savings at the price of gasoline (including taxes) in each year (in 2015 $), the total dollar savings to motorists add up to $3.8 trillion dollars.[2]

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[1] The literature on the rebound effect for vehicle travel is extensive (e.g., Greene et al., 1999; Greening, et al., 2000; Small and Van Dender, 2007; Greene 2012; Hymel and Small, 2015). Nearly all U.S. studies' estimates of the rebound effect fall in the range -0.05 to -0.25 (Gillingham et al., 2016).

[2] Gasoline taxes provide a large share of the cost of the cost of roads in the U.S. (FHWA, 2016). Fuel taxes have been adjusted upwards over time to account for the erosion of revenues due chiefly to inflation and fuel economy improvements (Greene, 2011). Still, the share of road costs funded by motor fuel taxes decreased from 61% in 1975 to 42% in 2015. As a result, net savings to motorists 1975-2015 were less than $3.8 trillion but not a lot less.

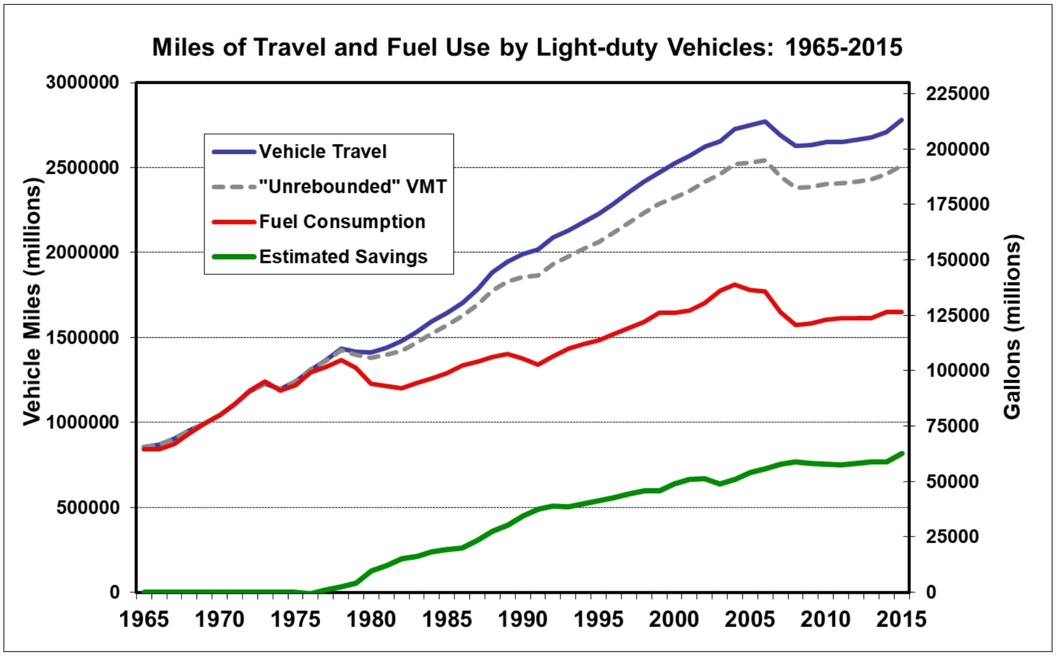

Figure 1. Miles of Travel and Fuel Use by Light-duty Vehicles: 1965-2015 (FHWA, 2015).

Improving energy efficiency is at least as important for the future. According to the Global Energy Assessment (GEA, 2012), sustained improvement in energy efficiency is the world's #1 strategy for lessening the harmful effects of climate change. Future fuel economy improvement is necessary to continue to reduce dependence on imported petroleum. Fortunately, the National Academy of Sciences has shown that the potential for future, cost-effective improvements remains great (NRC, 2013; NRC, 2015). And the recent Baker Center study cited above estimates that all income groups will also benefit from future fuel economy improvements, with the greatest gains as a percent of income going to the lowest income groups. **1.5 trillion gallons of gasoline…and growing.**

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