

An Analysis of Fuel Economy Efforts and Their Connection to OPEC Oil Imports and U.S. Automobile Gasoline Consumption

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Abstract:

As a method of reducing the United States foreign dependency on oil and environmental pollution, the government instituted Corporate Average Fuel Economy (CAFE) standards in 1975. This paper investigates the CAFE standards and the correlation between the changes in CAFE standards and OPEC oil imports and U.S. automobile fuel consumption over the years 1970-2000. During the period of 1979-1985, there was an 8 mpg increase in fuel economy standards, a 68% drop in OPEC imported oil and a 3% drop in fuel consumption. After fuel economy standards were decreased by 1.5 mpg in 1986-1987, imports increased by 21% and automobile fuel consumption increased by 2.5%. The 1.5 mpg increase in fuel economy of 1988-1990 prompted OPEC oil imports to increase 24% and fuel consumption to decrease by 1.6%. It was concluded that only significant changes in fuel economy have the desired effect of reducing foreign dependence on oil. Since a dramatic increase in efficiency is not expected in the near future, it is suggested by this paper that alternative energy sources be the focus of the federal government efforts to reduced dependence on foreign oil.

Introduction

As our country approaches possible military action in Iraq, one might beg the question whether our involvement lies solely on the nature of Iraq's weapons program or whether there is some hidden agenda to relieve control of Iraq's immense oil reserves from Saddam Hussein. Without a doubt, our country engages in conflict resolution in the Middle East because of its bountiful natural oil resources and our economy's dependence on the same oil. Alan P. Larson, the Under Secretary for Economic, Business, and Agricultural Affairs, testified before congress in June of 2002 that the United States imports 52% of its oil from foreign sources, and that number is increasing as domestic consumption increases (The International Aspects of U.S. Energy Security). This degree of reliance is called a "serious national security threat" by Congressman Larry Combest (R-TX) in his weekly column dated March 1, 2002. Although the current situation seems unavoidable, many experts believe that future conflicts are avoidable by reducing our dependence on foreign oil, particularly from OPEC (Organization of Petroleum Exporting Countries), by increasing domestic production, seeking sources of renewable energy, and more urgently, increasing the fuel economy of automobiles.

This paper investigates the issues surrounding the last effort, to increase automobile efficiency over the past few decades. Moreover, the paper examines how changes in automobile fuel economy, mainly through the Corporate Average Fuel Economy (CAFE) Standards, have correlated with the levels of OPEC imports and U.S. automobile fuel consumption levels from the years 1970-2000.

The nature of fuel economy standards and trends within the past 30 years are examined first, followed by how certain trends subsequently correlate with OPEC oil imports and U.S. consumption of fuel. As automobiles become more efficient, levels of

OPEC imports decrease and fuel consumption decreases, *ceteris paribus*. However, when fuel economy decreases, imports increase and consumption increases. The most successful periods of reducing imports and consumption occur when there is a substantial increase in the fuel economy of automobiles. It should become apparent, however, that the efforts taken thus far to increase fuel economy have been unsatisfactory in tackling long-term goals of energy self-reliance. Furthermore, by looking at the arguments and data to follow, it is the goal of this paper to subtly suggest that highly efficient automobiles powered by renewable energy are a very practical solution to the problem of foreign energy reliance.

Fuel Economy Efforts Since 1975

The efforts to increase automobile fuel economy with the intent of reducing foreign dependence on oil, among other goals, have been somewhat of a recent development. In the Energy Policy and Conservation Act of 1975, the government set regulations for automobiles called the Corporate Average Fuel Economy (CAFE) standards. These standards set an average fuel economy, in terms of miles per gallon (mpg), that producers must meet for their entire fleet of vehicles, from passenger cars to light trucks and SUVs (Sport Utility Vehicles). The standards appeared during the Middle East oil crisis of the 1970s, not only to wean the American economy from the dependence of foreign oil, but also to reduce emissions and promote a healthier environment. The foreign dependence on oil and the environmental concern continue today to be the two strongest justifications for further increasing automobile fuel efficiency.

The CAFE standards proved to be effective because they provided forced automobile manufacturers to produce more efficient vehicles or face stiff fines for not

complying. Each model year, the entire fleet of a given automobile manufacture is tested for compliance with the standards. The compliance is based on calculating a sales-weighted mean of fuel economies and is calculated differently for domestic and foreign produced vehicles. Failure to comply with the standards results in fines of \$5.00 per 0.1 mpg under the standard per vehicle sold. For example, if a manufacture produced an automobile that achieved 20 mpg when the standard was set at 25 mpg, the manufacture would pay \$250 in fines per vehicle it sold. According to the National Highway Traffic Safety Administration, BMW of North America was fined \$26.4 million for their 2000 fleet (NHTSA Section III-C). Some manufacturers "...see the fines as a cost of doing business" because of the types of vehicles they produce, whether it be high performance or large vehicles (Healy). Most manufacturers, including Ford, GM, Daimler-Chrysler, Toyota, and Honda were not included in the list of those fined in 2001, showing that the CAFE standards have been successful in promoting fuel-efficient fleets. However, some would argue that the standards have not been stringent enough to force manufacturers to alter their businesses around making highly fuel-efficient vehicles.

While there are many proponents for the increase in fuel efficiency, their efforts have met blockades from the powerful lobbyists of the automobile industry who claim it is too costly to comply with the fuel efficiency standards. This explains why there hasn't been a dramatic increase in fuel efficiency over the past 30 years. As declared in the National Energy Policy of 2001, the Bush Administration's goal is to "...craft CAFE standards to increase efficiency without negatively impacting the automotive industry" (NHTSA Section III-E). According to automobile makers, building more efficient automobiles forces the manufacturers to spend more time and money developing new engines, aerodynamic design, and safety systems. However, a recent study by the

American Council for an Energy-Efficient Economy shows that major improvements in fuel economy could be achieved by using technology that is already widely available (DeCicco). Many economists would cite the lack of consumer demand for fuel-efficient automobiles as a major reason why manufacturers have not produced them. In a study by J.D. Power and Associates, fuel efficiency ranked 15th among the most important attributes in buying a new car in 1997, while only 10% of people surveyed in 2000 ranked fuel economy as the most important attribute overall (Trends in Vehicle Attribute Preference). As long as there is no significant demand for high efficiency automobiles from the consumer perspective, the companies feel no obligation to produce such vehicles. Thus, there has been somewhat of a tug-of-war between groups supporting highly efficient automobiles and the industries that feel no need to build them.

The standards set by the government for passenger automobiles from 1975 to the present are shown in Graph 1 along with the actual fuel economies of passenger vehicles. The graph indicates that the actual fuel rates, although having increased since the standards were set in place, have not yet reached the standards set by the government. The reasons for this phenomenon could include the fact that the actual fuel rates include many older cars with less efficient systems or that certain automakers strategically produce substandard fuel-efficient vehicles and embrace the fines that are charged in order to make a profit, as described earlier. The standards are therefore set for the new automobiles being introduced into the market and for the purpose of this paper, will be further assumed to represent the actual fuel economy of automobiles in the United States.

The major trends of improvement of fuel economy standards occurred during 1979-1985 and 1988-1990, where fuel economy standards increased by 8 mpg and 1.5 mpg respectively. During 1986, the Reagan administration and the NHTSA pushed back

the standards 1.5 mpg from 27.5 to 26 mpg in response to petitions by manufacturers (Bamberger). For a little over a decade, the standards have remained constant because of the pressure on policymakers from the auto industry. In 1994, this pressure resulted in Congress prohibiting the use of appropriated funds for rulemaking on CAFE standards (Bamberger). Using the time periods of the trends previously mentioned, the amount of imports from OPEC into the United States will be analyzed.

OPEC Imports 1970-2000

“Over half of our oil supplies are imported – much of that from politically volatile nations including Iraq, Saudi Arabia, Venezuela and Nigeria” states Anthony Pereira, CEO of Alternative Power, Inc. (Griscom 72). The countries aforementioned make up OPEC, an organization that regulates many aspects of the supply and demand of world oil. The stated goal of policymakers, however, is to look at what actions can be taken to reduce our reliance on OPEC nations for oil. Advancements in energy efficiency and conservation were the primary reasons for the drop in imported oil (Geller 471-485). Similarly, the U.S. dependence on foreign oil increased when efficiency standards were decreased in 1986 (Schipper 455-504).

It is thus beneficial for economists to look at how oil imports from OPEC correlate with the changes in fuel efficiency, through the CAFE standards. In essence, we are looking at how changes in demand from U.S. consumers may change the amount of imports or amount of oil supplied by OPEC. By looking at graph 2, we see the total OPEC imports from the years 1970-2000.

Looking at how the oil imports from OPEC changed during the years where fuel economy standards increased, 1979-1985 and 1988-1990, it is expected that an increase in efficiency would cause less oil demand from OPEC, thus imports should decline by the

same scale, with all else remaining equal. It is evident that in the 1979-1985 period, when the fuel economy standards made an impressive 8 mpg increase, the imports from OPEC consequently fell from 2,057,669 thousand barrels to 667,962 thousand barrels, or 68%, over that same time period. During the 1.5 mpg increase of 1988-1990, imports from OPEC increased by 21% and peaked at 1,568,093 thousand barrels in 1990 before declining again. Since the fuel efficiency increase during the 1988-1990 time period was a mere 1.5 mpg (compared to the 8 mpg increase from 1979-1985), it is likely that the fuel economy standards increase were not a major factor in the decrease of imports during that time. Moreover, the correlation between the import levels and the standards does not imply a causal relationship, as there are many other factors involved.

After looking at the two periods where fuel economy standards increased, it is fascinating to look at the period of fuel economy decrease of 1.5 mpg between 1986-1988. Graph 2 shows that during this period, the imports from OPEC actually increased from 1,035,341 thousand barrels to 1,288,202 thousand barrels, or a 24% increase. If the amount of OPEC imports were strictly related to the fuel economy levels, we would see a predictable pattern of increases and decrease of imports. After looking at what happens to import levels when the fuel economy changes, it is apparent that there are many more factors involved in the amount of imports other than fuel efficiency, but it is interesting to note the correlation where fuel economy increases significantly and the imports also fall.

Motor Gasoline Fuel Consumption 1970-2000

With the current trend of highways populated with gas guzzling SUVs, it becomes a timely issue to talk about how fuel economy efforts have changed the amount of fuel consumed over the past thirty years. To the average consumer, automobile gasoline is an abundant resource that has a relatively inelastic demand curve. That is, people will be

willing to consume the same amounts even if the price increases. From the automobile producers perspective, there has been no demand for more fuel-efficient cars, which is apparent by the success of the SUV. Since the eventual demand for fuel-efficient cars would come too far into the future in the minds of environmentally and politically conscience people, it is then the job of the federal government to regulate fuel economy standards if it wants to reduce domestic fuel consumption in the short run and the long run.

Analysis of fuel consumption by automobiles over the past 30 years shows a slight increase overall, but small trends that correspond to the changes in fuel economy are seen upon closer inspection. As cars become more efficient, they consume less gasoline and total consumption decreases, which makes intuitive sense economically speaking. But, as the population naturally increases, there are more drivers, more cars, and more gasoline being consumed. During the large fuel efficiency standard increase of 1979-1985, Table 1 shows that motor fuel consumption actually decreased during this time from 2,516,933 thousand barrels to 2,433,578 thousand barrels. For the fuel efficiency standard increase of 1988-1990, the table also shows a decrease in fuel consumption from 2,627,407 thousand barrels to 2,584,316 thousand barrels. When the fuel economy standards were reduced in 1986, the fuel consumption increased 2.5%, from 2,507,937 thousand barrels to 2,569,852 thousand barrels. The small changes in consumption correspond with the variations in fuel economy, showing that there could be a causal relationship between the two.

Conclusion

Upon analyzing affects of changes of fuel economy standards on OPEC imports and U.S. motor fuel consumption, it becomes apparent there are many other factors

involved that affect each set of data. Like most economic analyses, however, a simple model has to be examined to get an idea of the whole picture. Trade embargos, tariffs, laws, political ideology, and many other factors can affect the amount of imports into a country. Likewise, fuel consumption can fluctuate with seasons, the amount of new drivers, alternative forms of transportation, and other issues. Controlling for these factors in the analysis proved to be too daunting of a task. It is thus difficult to conclude that the changes in fuel economy standards in the past were highly successful at reducing imports and automotive fuel consumption.

The data showed that with an increase in fuel efficiency of 8 mpg during the early 1980s, the OPEC imports declined and fuel consumption also dropped as expected. A summary of the trends can be found in Table 2, in the appendix. During the decrease in fuel economy of 1986, imports promptly rose, as did consumption.

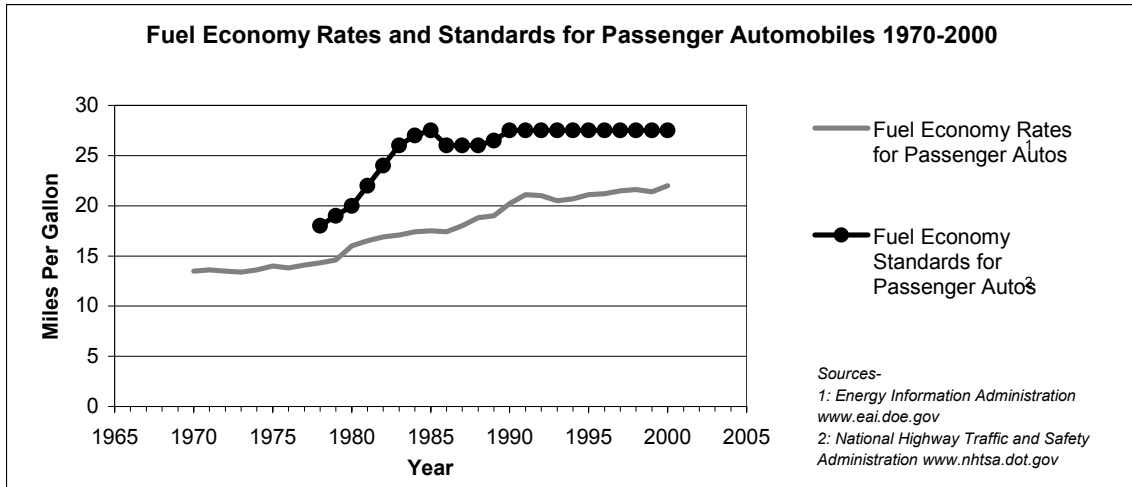
Overall, the changes in OPEC imports and fuel consumption seem to correlate well with the fluctuations in fuel economy standards and make sense at a fundamental economic level. Because of the many factors involved for the levels of imports and consumption, it must be understood that fuel economy could not have been the sole reason for the overall effects on imports and consumption, but rather the efforts were a significant device contributing to the political policy at the time.

As the conflict over oil still looms today, it leaves many wondering if continued measures to deal with the oil problem are outdated compared to the obvious attention needed for development of a renewable energy source. It is surprising how the fuel economy standards, often cited as a major factor in the reduction of oil imports, have not changed in the past 15 years even though cars have been revolutionized in safety, performance, and durability. The government has shown that it has given into the

pressures from the automobile manufacturers at the cost of increasing foreign dependence on oil and fuel emissions. The emissions from the inefficient automobiles continue to take their toll on the global environment. With the signing of the Kyoto Protocol, the U.S. has pledged its commitment to reducing greenhouse gases, which can be accomplished through increasing fuel efficiency. The fact that current policymakers are proposing such minuscule fuel economy changes shows reluctance on their part to commit to the said goals of reducing dependence on foreign oil and reducing automobile emissions. It is clear that dramatic changes in fuel economy, combined with other efforts to reduce fuel consumption, have had a larger effect than subtle changes over time. The U.S. government must not take the interests of the auto manufacturers as their first priority when making policies. Rather, the industry should change and conform to the new fuel efficiency standards that become better over time. Ultimately, the industry should be prepared to embrace the market for automobiles that use renewable energy. This would be the surefire way to reduce foreign dependence on oil and improve environmental conditions. Currently, the push for renewable energy is not comparable to the race to put a man on the moon or build an atomic bomb, both of which were almost completely overseen by the federal government. Until that same resolve is directed towards the alternative fuel economy, the United States will continue to be embattled with the handling of oil and fuel economy.

Appendix

Graph 1: Fuel Economy Rates and Standards for Passenger Automobiles 1970-2000



Graph 2: Total OPEC Petroleum Imports 1970- 2000

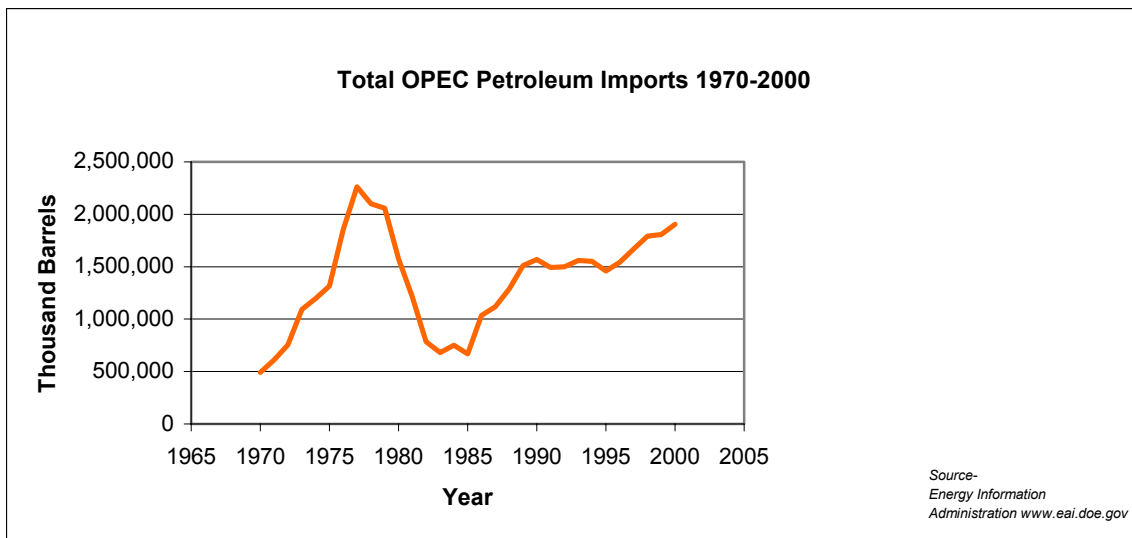


Table 1: Motor Gasoline Consumption by Transportation Sector 1979-1990

Source: Energy Information Administration www.eai.doe.gov

<u>Year</u>	<u>Consumption (Thousand Barrels)</u>	<u>Year</u>	<u>Consumption (Thousand Barrels)</u>
1979	2,516,933	1986	2,507,937
1980	2,357,261	1987	2,569,852
1981	2,356,584	1988	2,627,407
1982	2,343,844	1989	2,617,423
1983	2,376,228	1990	2,584,316
1984	2,398,629		
1985	2,433,578		

Table 2: Summary of Findings

Years	MPG change	OPEC Imports (% change)	Motor Gasoline Consumption (% change)
1979-1985	8 mpg increase	-68%	-3%
1986-1987	1.5 mpg decrease	+21%	+2.5%
1988-1990	1.5 mpg increase	+24%	-1.6%

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