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Car buyers and fuel economy?

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Abstract

This research is designed to help researchers and policy makers ground their work in the reality of how US consumers are thinking and behaving with respect to automotive fuel economy. Our data are from semi-structured interviews with 57 households across nine lifestyle "sectors." We found no household that analyzed their fuel costs in a systematic way in their automobile or gasoline purchases. Almost none of these households track gasoline costs over time or consider them explicitly in household budgets. These households may know the cost of their last tank of gasoline and the unit price of gasoline on that day, but this accurate information is rapidly forgotten and replaced by typical information. One effect of this lack of knowledge and information is that when consumers buy a vehicle, they do not have the basic building blocks of knowledge assumed by the model of economically rational decision-making, and they make large errors estimating gasoline costs and savings over time.

Moreover, we find that consumer value for fuel economy is not only about private cost savings. Fuel economy can be a symbolic value as well, for example among drivers who view resource conservation or thrift as important values to communicate. Consumers also assign non-monetary meaning to fuel prices, for example seeing rising prices as evidence of conspiracy. This research suggests that consumer responses to fuel economy technology and changes in fuel prices are more complex than economic assumptions suggest.

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Keywords: Fuel economy; Fuel efficiency; Automobiles; Car buyers

1. Introduction

1.1. It's a gut feeling

B., the male head of household, starts by saying, "$2000…I'm so wanting a spreadsheet right now." He laughs.

M., the female head of household, makes a joke about a colleague writing the spreadsheet program. They both laugh.

Then M. says, "$4000…it's a gut feeling."

B., "I was trying to calculate it [in my head], but I didn't carry it through very far."

M., "We probably drive each car about 7000 or 6000 miles every year."

She then suggests they might save 1000 gallons per year [for one car]; B. thinks this might be too much.

B. summarizes their initial responses, saying "$2000 to $4000."

Then, in unison, M. and B. say, "Call it $3000."

M. and B. are responding to our inquiry about their willingness to pay for a 1.5 times improvement in the fuel economy of an SUV they have designed during their interview—we have proposed to increase its fuel economy from 11 to 17 miles per gallon (MPG). They both work as financial service professionals. They appear to negotiate a lot with each other, having done so throughout the interview. Prompted by a desire to buy a vacation home, they have been reviewing their expenses to determine how much they can afford. They eventually offered a single number as their answer—$3000—but their dialog illustrates they do not think about their vehicle purchases in this way.

If a household in which both household heads are financial professionals has trouble providing realistic answer to a willingness to pay question in our extensive

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interview, how valid could their response be to the same question during a phone survey? How could we expect less capable households to answer such a question? Does it make any sense to even ask such questions?

1.2. Expert views on efficiency and fuel economy

There are at least three ideas behind most experts' thinking about efficiency and fuel economy. The first is a physical model: energy out of the crankshaft of an engine can be apportioned to a variety of end-uses. This model is summarized in Fig. 1. Increases in efficiency can be apportioned to more power, moving a larger or less aerodynamic vehicle, facilitating other on-board energy use, and increasing fuel economy. Fuel economy is codified as miles per gallon (under specified test conditions). This physical model imposes a design envelope on choices offered to consumers—the more energy apportioned to one use, the less is available to others.

The second idea is basic economics: maximum profit occurs when automakers offer consumers their most highly valued distribution of the possible end-uses of the energy produced by a vehicle's engine. In practice and regardless of any abstractions such as units of "utility" or "happiness," the value of these end-uses is typically measured in dollars, e.g., willingness-to-pay. In this view, the value of fuel economy is measured in cents per mile (of fuel savings).

Unfortunately, this idea has lead to the confusion of the measure for the thing being measured, i.e., that the only value to consumers of fuel economy is private monetary savings. Saving money is related to household income and budgets. As the price of gasoline goes up, consumers may, according to their incomes, buy more fuel economical vehicles or take other actions to stay within income and credit limits.

A third idea is that consumers, for the most part, value power, size, energy-consuming options and accessories (and according to a widely cited anecdote, cup holders) more than they do fuel economy, at least as long as fuel costs are low and incomes are high.

How do these three ideas relate to how consumers actually think about fuel economy? How do we reconcile M. and B.'s story, and those of the 56 other households we interviewed with these "expert" ideas? These households' personal histories with automobiles will prove to be crucial.

1.3. A short history of fuel prices, fuel efficiency, and fuel economy

For most of the past 90 years the real cost of gasoline declined. Notable exceptions include the Great Depression, the two "oil crises" of the 1970s and early 1980s, and recent years. This history is summarized in Fig. 2. For most of our households, their personal history with this trend dates back no further than the 1960s. Even people as old as 40 had no direct consumer experience with prolonged rising gasoline prices until the last few months of our study period (in 2004).

Over this time manufacturers delivered roomier, stronger, and faster vehicles, as well as more amenities such as automatic transmissions, all-wheel drive, air conditioning, and entertainment systems. What was the effect on fuel economy? Systematic data on fuel economy for the US fleet of light-duty vehicles is available starting in the mid-1970s.

Since then, only during the oil crisis of the 1970s and early 1980s and following the deployment of corporate average fuel economy (CAFE) standards did average fuel economy increase. This trend is illustrated in the Fig. 3, which shows a simple index of weight, power, and fuel economy plotted against fuel economy, and traced over time.

Once oil shocks were over, CAFE standards ceased to increase, and gasoline prices dropped, then automakers quickly shifted back to increased power and size while fuel economy improvements stopped. Fig. 3 understates this

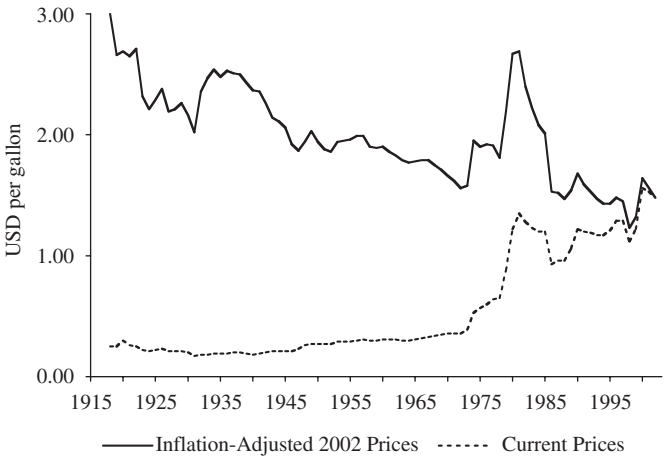

Fig. 2. Current and 2002 inflation-adjusted US prices for gasoline from 1918 to 2002. (American Petroleum Institute, 2002)

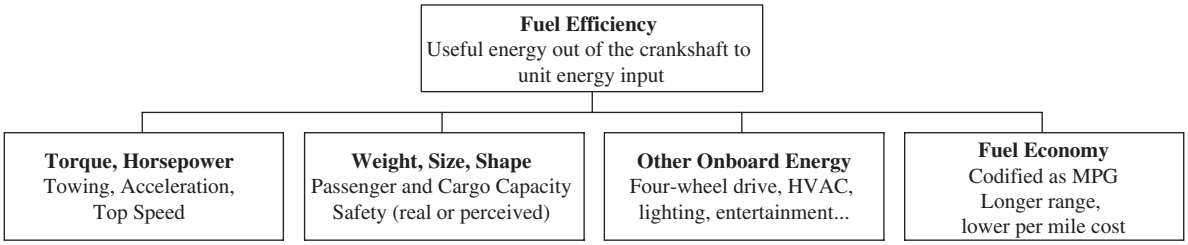

Fig. 1. Physical model of fuel efficiency–fuel economy relationship.