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Are Consumers Attentive to Local Energy Costs?

Evidence from the Appliance Market

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Policymakers are increasingly relying on behavioral insights to design programs to alter consumer choices in ways that could improve market efficiency. Consumers make systematic mistakes in their choices for a wide range of products, such as healthcare plans, mutual funds, schools, and what foods to consume, among many others. Whether and how we should regulate markets when consumers are prone to mistakes has become an important and sometimes controversial topic.

In the energy context, policymakers have long argued that consumers undervalue energy operating costs, which has been the primary rationale for the energy-efficiency standards and energy-labeling programs adopted in the 1980s in the United States and elsewhere. A long-held view is that markets for energy-intensive durables, such as cars and appliances, may not operate efficiently if consumers purchase products that are "too energy intensive." Therefore, limiting choices through government standards and empowering consumers with information labels may have the potential to improve welfare by steering consumers to make better choices and thereby reducing externalities.

We ask how responsive U.S. consumers are to energy operating costs when purchasing household appliances. Apart from being a critical input for energy-policy design, investigating consumer responses to energy operating costs in the U.S. appliance sector provides an important case study for the design of regulations and nudges in complex-choice environments. The popular wisdom is that energy costs are a "shrouded" attribute of appliances, although some relevant information is readily available in this decision context because of the presence of two energy labels: the mandatory EnergyGuide label and the voluntary Energy Star label. These labels are examples of imperfectly targeted nudges designed to help consumers that may have unintended consequences. Previous research highlights that the EnergyGuide label provides estimates of energy operating costs that rely on national averages, but substantial variation exists at the local level, which may induce consumers to under- or overinvest in energy efficiency. And the Energy Star label, which only provides a binary signal about the most energy-efficient products in the marketplace, is a very coarse piece of energy information that may crowd out efforts to compute more-accurate energy operating costs. Both types of labels exemplify the difficulties of designing information-based policies: simple and salient pieces of information may still mislead consumers, whereas detailed and complex information might be simply ignored. Similar issues arise in contexts such as consumer financial

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protection, health insurance, and nutrition, to name a few, where policymakers require information disclosure to address potential consumer mistakes.

An important element of our analysis is that we focus on estimating consumer responsiveness to local energy operating costs. In particular, our empirical strategy provides evidence that consumers can overcome imperfectly targeted information in the U.S. appliance market and rely on local average electricity prices to form estimates of appliances' energy operating costs when making a purchase decision. However, it is not straightforward for consumers to incorporate local electricity prices into appliance decisions, since monthly electricity bills are often complex and provide only aggregated usage information, making it difficult to map particular end uses to costs.

We use a unique administrative data set from a large national appliance retailer with individual transaction data on the timing and price paid for each appliance model sold. Since we know the location of each branch of the retailer, we can match county-specific annual electricity prices to each transaction. We focus on refrigerators, which offer two advantages. First, since refrigerators are plugged in continuously over their lifetimes, it is straightforward to model operating costs and abstract away from households' utilization decisions. Second, refrigerators consume a large amount of energy, and there is rich variation in prices and expected energy consumption among models, which allows us to identify households' behavioral responses.

We employ a widely used test of consumer misperception to compare the demand response caused by potentially misperceived costs (e.g., sales tax, shipping and handling fees, highway tolls, or energy operating costs) with salient, correctly perceived purchase costs. Unlike many demand-estimation exercises, the pricing scheme of the appliance retailer results in variation in purchase prices that is plausibly exogenous to local market conditions. The retailer has a national pricing algorithm that induces model-specific idiosyncratic price variation that we are able to exploit.

We estimate demand responsiveness to local energy operating costs using variation in relative operating costs among appliance models that comes from electricity price differences among utilities and over time. We show that these electricity price differences are largely driven by exogenous variation in the fuel costs. The finely grained nature of our data allows us to control for specific county-by-time movements in appliance demand, which allows us to disentangle the effect of energy operating costs on product choice from confounding market conditions that affect the probability of buying an appliance at all.

Contrary to the popular wisdom that local energy costs are a shrouded attribute of appliances, our findings strongly reject that consumers are unresponsive to appliance operating costs. Our estimates suggest that consumers are indifferent between $1.00 in discounted future energy costs and $0.82 in purchase price (i.e., consumers are willing to pay $0.82 more immediately in exchange for a more energy-efficient appliance that will save them $1.00 in the future). These results are consistent with recent studies in car and housing markets, where it is generally considered much easier to map fuel consumption to its cost than it is for household appliances. People tend to know how much it would cost to drive from one place to another in a car, given that many households purchase gasoline one or more times a week and that gasoline prices are prominently posted at gas stations. Heating costs appear seasonally and constitute a bigger jump in natural gas bills than baseload water heating or cooking consumption, making most people aware of how much it costs to heat their homes. Recent estimates of implied discount rates for automobile and house purchases range between 3 and 15 percent, which is in line with our valuation ratio. Overall, our findings suggest that consumers are attentive to local energy operating costs and do not simply rely on information about national averages, which is readily available in this context.

NOTE:

This research brief is based on Sébastien Houde and Erica Myers, "Are Consumers Attentive to Local Energy Costs? Evidence from the Appliance Market," NBER Working Paper no. 25591, February 2019, http://www.nber.org/papers/w25591.