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Peer Comparisons Reduce Residential Energy Use

When utility customers are told how much energy their neighbors use, those who are consuming more than average tend to cut their consumption. Average energy use declines by 1.2 to 2.1 percent, and the savings are sustained for periods of many months, according to a new study by **Ian Ayres, Sophie Raseman**, and **Alice Shih.** In **Evidence from Two Large Field Experiments that Peer Comparison Feedback Can Reduce Residential Energy Usage** (NBER Working Paper No. 15386), the authors examine data from field experiments carried out by two west coast public utilities. "Together, the [two] experiments provide compelling evidence that properly framed peer comparisons can predictably lower energy consumption, particularly of the highest energy using households," they write.

Previous studies of the provision of peer information have found mixed results. However, this study analyzes a far broader customer base than past studies: 35,000 customers of the Sacramento Municipal Utility District (SMUD) and 40,000 customers of Puget Sound Energy (PSE). It also examines the phenomenon over a relatively long period (12 and seven months, respectively), looks at daily impacts on energy use, measures changes for both electricity and natural gas, and investigates the effects of different timing and formats of energy-saving messages.

> "When customers received information on the energy consumption of their neighbors, average energy use declined by 1.2 to 2.1 percent."

In both the SMUD and PSE experiments, certain households were randomly assigned to control and test groups. The test groups were sent reports, either on a monthly or quarterly basis, showing the energy use of similar homes in their area. These reports contained not only data but also messages (including emoticons, computerized happy faces) designed to convince customers of the virtues of energy conservation.

On average, the effects of such reports were larger for families living in lower-value houses than for families in higher-value houses. Also, the households with relatively higher energy use tended to save more than those with relatively lower energy use.

In Sacramento, the energy reports did not produce a "boomerang" effect — there was no evidence that households using the lowest amount of energy *increased* their energy consumption once they found out how much more energy their neighbors were using. But in the PSE experiment, the homes using the least amount of energy before the study did boost their consumption by an average of 3.4 percent. By contrast, the highest energy-using households decreased their energy use by an average of 6 percent, so overall energy demand declined.

In the SMUD experiment, households receiving *monthly* comparison reports saved $31 a year in reduced electricity usage; those getting *quarterly* reports saved $13. Extrapolating from these results suggests that if the mailings had been sent to all of SMUD's customers, they would have saved $15.2 million and used the equivalent of 9 million fewer gallons of gas.

In the case of PSE, the average

household saved almost $14 a year in reduced electricity usage and $11 in reduced natural-gas use if they received *monthly* reports with comparisons. Those who received the mailings *quarterly* saved almost as much: $11.19 and $11.09, respectively. If the program were extended to send quarterly comparisons to all PSE customers, the authors estimate that the utility's customers would save $20.7 million a year and use 14.3 million fewer gallons of gas.

In both experiments, energy use dropped almost immediately after the mailings went out, suggesting that households were making behavioral rather than durable changes (remembering to turn off lights rather than, say, caulking their windows). Also, in the PSE experiment, where researchers could track daily energy use, the biggest changes came during two-day periods around the weekends, suggesting that reductions occurred because customers were being more mindful of their energy use. The authors warn that these results are not conclusive, however.

The authors conclude that "experiments suggest that privately-delivered peer comparison feedback, such as direct mailings, might prove an effective tool in a range of other situations." For example, "schools might mail parents reports of how many absences or times late their children had compared to peers. Dentists might send mailings to their infrequent visitors indicating how often typical patients come in for cleanings. A gym might inform its lazier patrons of how often typical members work out."

— Laurent Belsie

Help with Aid Applications Raises College Attendance

Higher education can help individuals attain social and economic success, but decades of federal and state financial aid policies have not closed the gap between high- and low-income students' college attendance rates. Growing concerns about low awareness of and take-up rates for government support programs have spurred calls to simplify the application process for these programs and enhance their visibility.

In **The Role of Simplification and Information in College Decisions: Results from the H&R Block FAFSA Experiment** (NBER Working Paper No. 15361), co-authors **Eric Bettinger**, **Bridget Terry Long**, **Philip Oreopoulos**, and **Lisa Sanbonmatsu** consider how to provide application assistance in a practical manner that would truly increase college attendance rates and aid receipt. Overall, their analysis suggests that individuals who receive help completing a simplified FAFSA — the federal application for financial aid — are substantially more likely to submit the aid application, to enroll in college the following fall, and to be awarded more financial aid. These results suggest that assistance and simplification could be effective ways to improve college access. However, only providing aid-eligibility information without also giving assistance with the application form seems to have no significant effect on FAFSA submission rates.

> "Individuals who receive assistance with the FAFSA — the federal application for financial aid — and information about what aid is available are substantially more likely to submit the aid application, [and] to enroll in college ..."

This study involved over 23,000 individuals and was targeted to families who were unlikely to be aware of financial aid resources or how to access them. The authors worked with H&R Block, a national tax-preparation firm, to set up an experiment in which tax professionals would help low- to moderate- income families complete the FAFSA. The families were then given an estimate of their eligibility for government aid as well as information about local and postsecondary schooling options. In a second version of the experiment, a randomly-chosen group of individuals — referred to as the "information-only group" — received only personalized aid-eligibility information but no help in completing the FAFSA.

The researchers find that dependent students who received assistance completing a simplified FAFSA *and* easy-to-understand information about aid eligibility relative to costs were 40 percent more likely to apply for financial aid than the information-only or control group. For independent individuals with a high school degree but with no prior college education, the authors observed a near tripling of the submission rate of aid applications; independent individuals with some prior college experience were 20 percent more likely to apply for aid.

After receiving both FAFSA help and information, high school seniors and recent high school graduates were 25 to 30 percent more likely to enroll in college (from 28 percent to 35 percent). Similarly, providing both information and help with the FAFSA increased college enrollment among low-income adults with no prior college experience by about 20 percent.

For individuals with previous college experience, the provision of information and assistance with FAFSA did not affect college enrollment. But low-income families, who according to the U.S. Department of Education were not expected to contribute towards their child's college expenses, were influenced most by the intervention. The experimental program also increased financial aid receipt for all participants who received help with forms and information, including those who had previously attended college. The increase in financial aid received ranged from 13 to 33 percent depending on the educational experience of the individual.

— Claire Brunel

Private Information about Health Risks Can Undermine Insurance Markets

Personalized genetic information is increasingly available, and continuing advances in technology are likely to make even more such information available in the future. For example, a perfectly predictive genetic test for Huntington Disease (HD) has been around since 1993. Individuals who learn that they carry the HD genetic mutation and will develop HD can expect to begin to deteriorate mentally and physically between the ages of 30 and 50. They could face about twenty years of intensifying disability and increasing need for care before dying. Such individuals are likely to want to purchase long-term care insurance before their symptoms occur, and without necessarily revealing their risk for HD to an insurer.

In **Genetic Adverse Selection: Evidence from Long-Term Care Insurance and Huntington Disease** (NBER Working Paper No. 15326), co-authors **Emily Oster, Ira Shoulson, Kimberly Quaid,** and **Ray Dorsey** ask how this asymmetry between what individuals and insurers know might affect the markets for individual-payer insurance, and perhaps eventually influence the viability of long-term care insurance. In this study, the researchers compare rates of long-term care insurance ownership among asymptomatic individuals from the general population to long-term care insurance ownership rates among asymptomatic individuals who are at risk for HD. Analyzing data drawn from the Health and Retirement Survey (HRS) and from a 1,000-person prospective cohort study (PHAROS), they find that the long-term care insurance ownership rate among those at genetic risk for developing HD (50 percent) is five times the rate of ownership in the general population (10 percent). Furthermore, among individuals whose genetic testing shows that they are 100 percent at risk to develop HD, 50 to 75 percent own insurance. This strongly suggests that individuals make different insurance ownership choices based on the degree of private information they have. That is called "adverse selection" in individual-payer insurance markets.

> "The long-term care insurance ownership rate among those at genetic risk for developing HD (50 percent) is five times the rate of ownership in the general population (10 percent)."

The timing of individuals' purchase of long-term care insurance is also consistent with HD risk generating adverse selection. The data used here reveal limited evidence of increased insurance among tested individuals *before* private testing but a large increase in ownership among individuals after testing.

In addition to HD, three other diseases with long disability periods and similar long-term care needs — Parkinson's, Alzheimer's, and Lou Gehrig's or ALS — have some genetic basis. At least some individuals affected by those three diseases could have perfect genetic information prior to any symptoms, an asymmetry that could multiply the effect of adverse selection on private long-term insurance.

As more individuals gain private information about the likelihood that they will require costly long-term care, adverse selection may threaten the viability of private long-term care insurance, at least in its present form. The authors illustrate that if a monopoly insurer were to offer a single premium price in a market with two types of individuals — those with private genetic information and a very high probability of needing long-term care and those with neither — and there were relatively few of the higher risk individuals (as is the case with HD), then the insurer could make a positive profit. The risks in the group would be pooled, because some lower-risk people are willing to purchase insurance at actuarially unfair prices. But as the share of higher-risk individuals in the pool increases, the market eventually shifts, abruptly, to selling only to that type of person — and this shift occurs when the share of the high-risk type is quite small, around 3 percent. The authors conclude that even relatively limited increases in genetic information may threaten the viability of private long-term care insurance in the near future.

— Sarah H. Wright

Consolidation in the Health Insurance Industry Contributes Little to Rising Premiums

The private health insurance industry provides coverage to over 160 million non-elderly Americans, gathering $850 billion in annual premiums. These figures do not include publicly-insured individuals whose coverage is outsourced to private insurers, or the elderly who purchase private supplemental insurance. The annual growth in private health insurance premiums has exceeded the annual growth in worker earnings in all but one of the last 20 years, in most years by a wide margin.

In **Paying a Premium on Your Premium? Consolidation in the U.S. Health Insurance Industry** (NBER Working Paper No. 15434), co-authors **Leemore Dafny, Mark Duggan**, and **Subramaniam Ramanarayan** investigate whether and to what extent consolidation and market concentration in the U.S. health insurance industry is responsible for the growth in premiums for employer-sponsored health insurance in recent years. Using data from employer-sponsored plans that covered over 10 million Americans annually between 1998 and 2006, the authors estimate that in a typical market, rising concentration in the health insurance industry contributed to a 2.1 percentage point increase in real premium levels. To place this change in perspective, the authors note that real health insurance premiums doubled over the same period.

According to this study, most Americans live in markets dominated by a small number of insurers. Indeed, 99 percent of markets were "highly concentrated" in 2006, up from 68 percent in 1998. However, this increase in consolidation has had a deeper impact on health care personnel than on premium levels, the authors find. Consolidation reduced the employment of physicians and raised the employment and wages of nurses, suggesting that consolidation facilitates the substitution of nurses for doctors. The authors further observe that premiums may not have increased much as a result of the increased consolidation, because the industry was relatively concentrated to begin with.

> "Consolidation explains very little of the steep increase in health insurance premiums in recent years."

The analysis here relies on changes to market concentration produced by the 1999 merger of industry giants Aetna and Prudential Healthcare — the authors caution that their findings are based on a sample of premiums for large firms. Within this sample, only a small share of premium growth was attributable to the resulting change in the degree of insurer competition. "Our results confirm that Americans are indeed paying a premium on their premiums. However consolidation explains very little of the steep increase in health insurance premiums in recent years," the authors conclude.

— Frank Byrt

Intracompany Governance and Innovation

In **Intracompany Governance and Innovation** (NBER Working Paper No. 15304), authors **Sharon Belenzon, Tomer Berkovitz**, and **Patrick Bolton** find that while in the United States most innovating firms are publicly-traded conglomerates, a substantial fraction of innovation is concentrated in private firms and business groups in continental Europe. Business groups, the authors explain, "may take the form of pyramidal structures, where a single controlling company has direct or indirect controlling stakes in multiple subsidiary companies, or business alliances, where the companies in the alliance are connected through interlocking stakes."

The authors base their conclusion on data for a cross-section of private and publicly traded firms in the United States and 15 European countries. They match all of the corporate patents granted by the United States Patent and Trademark Office (USPTO) and the European Patent Office (EPO) to these firms. They single out firms that publish their research in academic journals and identify about 64,000 firms that hold at least one patent from the EPO or USPTO, or have published at least one scientific article in a scientific journal. Of these 64,000 firms, about 60 percent are American, 11 percent German, 8 percent British, 4 percent French, and 5 percent Italian. Germany appears to be the most innovative European country, holding 12 percent and 20 percent of USPTO and EPO patents, respectively. For scientific publications, about 70 percent of the articles are published by U.S. corporations, 10 percent by German corporations, and 3 percent by French and British firms.

Organizational form varies significantly across industries. For example, business groups tend to be concentrated in industries where innovation takes time, is highly uncertain, and where the intellectual protection of the innovator may be of paramount importance. Conglomerates, on the other hand, are more prevalent in industries with rapid, incremental innovation, and where their ability to promptly identify the relevant innovation and to quickly redeploy assets internally may give them an edge over business groups.

> "... while in the United States most innovating firms are publicly-traded conglomerates, a substantial fraction of innovation is concentrated in private firms and business groups in continental Europe."

The authors also find that firms with substantial involvement in R and D tend to choose the corporate form that is most conducive to innovation. This is especially true in Europe, where there are fewer regulatory hurdles to the formation of business groups and to hybrid corporate forms. That is not the case in the United States, where tax and regulatory hurdles essentially eliminate any gains from forming business groups, and where a highly visible venture capital and private equity sector provides an alternative to business-group financing of R and D.

The authors note that the distribution of innovating firms in the United States is heavily skewed towards those that are publicly traded. The fraction of patents held by publicly traded American corporations is above 60 percent, while in Europe this fraction is only about 40 percent. In some large European countries, the share is even lower. In France, for example, publicly traded firms hold only 9 percent of U.S. Patent and Trademark Office patents and only 18 percent of European Patent Office patents; in Italy, the percentages are 3 percent and 7 percent, respectively. Also, in Europe the publicly traded innovating firms are more likely to belong to a business group: more than 40 percent of innovating firms in France and Germany belong to a business group, compared with only 2 percent and 1 percent respectively in the United States and Great Britain

— Lester Picker

Economic Analysis in Developing Nations: Two Studies from Kenya

Two recent NBER Working Papers report the results of randomized controlled trials in Kenya. In the first, **Nudging Farmers to Use Fertilizer: Theory and Experimental Evidence from Kenya** (NBER Working Paper No. 15131), co-authors **Esther Duflo, Michael Kremer,** and **Jonathan Robinson** note that many agricultural experts and developing-country policymakers see fertilizer as critical to raising agricultural productivity, and heavy subsidies as necessary to induce farmers to use fertilizer. Most economists, in contrast, have assumed that farmers have incentives to use efficient amounts of fertilizer without subsidies, and have argued that heavy subsidies induce overuse of fertilizer, subsidize richer farmers, and lead to a large state role in fertilizer supply, with the attendant risks of politicization and inefficiency. Duflo, Kremer, and Robinson examine an area of Kenya with low fertilizer use but where experiments on farmers' plots are consistent with the agricultural experts' view that fertilizer is profitable. They seek to explain why many Kenyan farmers do not invest in fertilizer in spite of its potential economic benefits. They focus on insights developed by behavioral economists, who argue that the small fixed costs of making investments can lead to indefinite procrastination, and that apparently small measures to reduce these fixed costs can substantially increase investment.

The authors find that farmers are 46 to 60 percent more likely to use fertilizer if offered a small, time-limited subsidy designed to limit the scope for procrastination (free delivery) immediately after harvest. In contrast, they are less influenced by a large subsidy (a 50 percent discount) at the time fertilizer needs to be applied. When offered a choice of timing, many farmers choose to pay for fertilizer early, which is consistent with the hypothesis that they want to commit themselves to using fertilizer. While most farmers are subject to procrastination, some appear responsive to traditional subsidies. Heavy subsidies would lead these "rational" farmers to overuse fertilizer and put a heavy fiscal burden on the government. The authors argue that small, time-limited discounts at the time of harvest could help farmers subject to procrastination to commit to fertilizer use without inducing substantial overuse of fertilizer by "rational" farmers.

A second paper on Kenya notes that social norms, codified into law, often prohibit landowners from charging neighbors for access to water sources on their property. It observes that changing property rights might increase the incentives for landowners to invest in upgrading the water sources. In **Spring Cleaning: Rural Water Impacts, Valuations, and Property Rights Institutions** (NBER Working Paper No. 15280), **Kremer, Jessica Leino, Edward Miguel**, and **Alex Peterson Zwane** report on a randomized evaluation of investments by a non-profit organization in improving source-water quality through spring protection. They measure the health impacts of these investments, estimate community members' valuation of these improvements by seeing how much further people will walk to use these cleaner sources, and then model how landowners would respond to alternative systems of property rights in water.

"Farmers are 46 to 60 percent more likely to use fertilizer if offered a small, time-limited subsidy designed to limit the scope for procrastination (free delivery) immediately after harvest."

The authors find that infrastructure investments reduce fecal contamination by 66 percent at naturally occurring springs. Such investments are moderately effective at improving household water quality, and cut child diarrhea by 24 percent. Community members proved willing to walk approximately three more minutes to use these cleaner water sources rather than alternatives. The implied valuation of a statistical life from the travel cost analysis is just one fifth of the values typically used in health cost-effectiveness analyses in low-income countries, but is consistent with models in which willingness to pay for health rises sharply with income.

The authors estimate that current common property rights in water in Kenya reduce investment in water source improvement. The effects of changing property rights to allow landowners to charge for spring water are likely to vary as a function of the income of the affected community. In low-income areas, allowing landowners to charge for water might spur only modest additional private investment while creating large inefficiencies, as people would have to walk further to find free water, often at contaminated public sources such as streams or lakes. In higher income communities, however, private property norms might induce substantially more investment. An alternative property-rights system, under which spring owners could charge for protected spring water only if they also allowed continued free access to unprotected water, yields slightly higher estimates of consumer welfare than the communal status quo. Econometric estimates also suggest that a voucher system to encourage landowners to invest in spring protection or direct government water investment could increase consumer welfare. The authors note, however, that in either case, achieving the gains in consumer welfare would depend on effective government implementation of these policies.

— Claire Brunel

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