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Loss Aversion, Temporal Framing, and Household Energy Decisions

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Selected Poster prepared for presentation at the
2016 Agricultural & Applied Economics Association Annual Meeting,
Boston, MA, July 31- Aug. 2

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Introduction

US residential consumers used 10.2 quadrillion BTU of energy in 2009. This amounted to nearly \$230 billion spent on utility bills, and negative environmental and health externalities (EIA 2009 RECS).

One challenge of promoting energy-efficient behavior is that it requires change. Limiting energy use often requires sacrificing convenience and comfort now and in the future.

We can nudge energy efficiency by making the costs and savings more salient, for example, with cost comparisons of incandescent and CFL bulbs on product packaging. Yet there is substantial variation in how costs and savings are presented (e.g. per day, per month, per year) and we lack a comprehensive framework for understanding how people respond to this information.

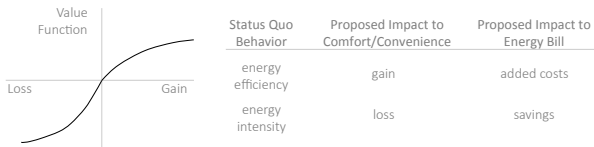
We use survey data to understand how temporal framing of costs and savings can reduce the effects of loss aversion in the context of household energy decisions, investigate underlying mechanisms for this interaction, and how we might apply our findings to encourage energy efficiency.

Background

Loss aversion for comfort

Defaults are sticky [5]. Consumers keep a contractor's arbitrary light bulb choice, despite zero switching cost and the potential for monetary savings [2].

Switching from energy-intensive to efficient behaviors, consumers lose comfort and convenience [3]. Under Prospect Theory, consumers prefer to segregate savings and integrate costs [6].



Pennies-a-day (PAD)

However, consumers tend to neglect small recurring costs [1]. Do consumers similarly neglect small recurring savings or small non-monetary consequences?

Save \$0.25 per day by choosing the energy-efficient alternative. Pay an additional \$92 per year on energy costs for the energy-inefficient alternative.

Boundaries of loss aversion

Consumers experience decreased loss aversion for money they plan on spending [4]. Can we align their energy decisions with their budgets to reduce loss aversion?

Objectives

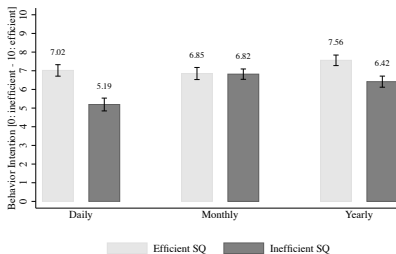
- Identify which temporal frame reduces loss aversion in the context of household energy decisions.
- Identify and test potential underlying mechanisms. Specifically, determine whether cognitive fluency plays a role in how individuals respond to framing of costs/savings.
- Investigate how providing an explicit context for evaluating costs affects individuals' intentions conditional on whether the context frame matches the cost frame.

Framing can minimize loss aversion

We presented $N = 353$ individuals recruited using Amazon MTurk with energy-related household decisions in a between-subjects experimental survey design. We manipulated status quo behavior (inefficient, efficient) and how the costs or savings of switching behaviors was framed (per day, per month, per year).

Scenario example:

When doing the laundry, you can choose what water temperature your washing machine uses. Some people choose to use warm or hot water because they think warmer water is most effective for cleaning laundry. However, warm and hot water use more energy than cold water. Suppose you often use warm water, but you are considering whether to use only cold water for your laundry. If you only use cold water, you will save 17 cents per day on energy costs. What do you think you would do?



$F(2, 347) = 4.33; p < 0.05$

Simple main effects of status quo at temporal frame:

Daily: $F(1, 347) = 17.27^{***}$

Monthly: $F(1, 347) = 0.01$

Yearly: $F(1, 347) = 7.01^{**}$

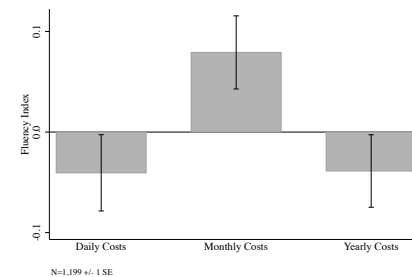
*** and ** indicate significance at the 1% and 5% levels, respectively, using the per family error rate.

We found significant evidence of loss aversion/status quo bias when daily or yearly costs/savings were presented but no evidence of loss aversion when costs/savings were framed as monthly.

Cognitive fluency plays a role

Individuals typically receive a monthly energy bill. This may provide an implicit context for easily understanding how much energy inefficient behaviors cost and enable individuals to be more calculating in their decisions. Could cognitive fluency – the ease of processing information – influence how people respond to temporal frames?

We surveyed $N = 1,204$ individuals recruited using MTurk using similar energy-related scenarios as described above (interaction controlling for passing attention check: $F(1, 1197) = 2.79; p < 0.1$). Afterwards, we elicited cognitive fluency using five measures regarding involvement, clarity, and ease of understanding the energy decision and financial impacts. We aggregated these fluency measures using Cronbach's alpha ($\alpha = 0.790$) and compare across cost frames.



Main effect of temporal frame:

$F(1, 1197) = 3.48^{**}$

$p < 0.05$

Cognitive fluency is significantly higher when costs/savings are presented as monthly, relative to daily or yearly frames.

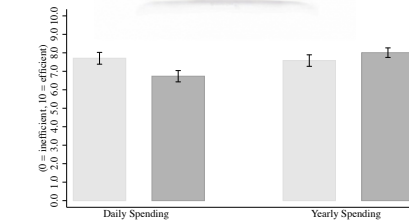
Provide a context for unfamiliar frames

In contrast to the implicit monthly spending contexts in previous surveys, we provide an explicit context for total energy spending in a survey of $N = 132$ individuals recruited using Qualtrics. Individuals were presented with typical total energy costs framed either daily or yearly (left fig) and costs of engaging in energy-inefficient behaviors frame as daily or yearly (right fig).

Daily spending context:



Daily cost of inefficiency:



Main effect of yearly spending context: $F(1, 131) = 3.70; p < 0.1$

Main effect of yearly cost frame: $F(1, 131) = 0.82; p > 0.1$

Interaction effect: $F(1, 131) = 5.47; p < 0.05$

Supplementing cost information with a spending context in the same frame can increase efficiency intentions, particularly if costs and spending context are framed broadly.

Conclusions

Efficiency advocates and energy managers should consider messaging with monthly savings to overcome status quo bias in the absence of an explicit typical spending context.

Providing a context for total energy spending in the same frame as costs of energy inefficiency may help reduce resistance to adopting energy-efficient behaviors.

Yearly framing of costs/savings coupled with annual total energy spending may encourage the most energy efficient behavior intentions.

Acknowledgments

We thank Ethan Rix for excellent research assistance and are grateful for funding from URI's Undergraduate Research Initiative Grant and Qualtrics Behavioral Research Grant. We also thank participants of URI's Mental Accounting and Pricing Lab and Experimental Economics Discussion Groups for helpful feedback, as well as insights from attendees at the 2015 Annual Meeting of the Society for Judgment and Decision Making.

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