



Analysis

Communicating Resourcefully: A Natural Field Experiment on Environmental Framing and Cognitive Dissonance in Going Paperless

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ABSTRACT

In a large-scale natural field experiment comprising 38,654 customers of a renewable energy supplier in the United Kingdom, we randomize environmental information and dissonance-inducing messaging to promote an active switch from paper to online billing. We find that environmental information and imagery is ineffective in inducing behavior change. Interestingly, the dissonance-inducing messaging weakly improves uptake by 1.2 percentage points among our main sample but backfires among a subsample of individuals with doctoral educations, decreasing uptake by 6.2 percentage points relative to a control group. Contrary to the majority of the literature on gender and environmental behavior, females in our sample are less likely to switch to paperless billing.

1. Introduction

Businesses and governments are increasingly turning to randomized experiments to discover means by which to increase profitability or pursue policy goals. In a number of contexts, social and private objectives coincide, creating opportunity for partnerships between researchers and businesses interested in either or both of said objectives. Companies with clear sustainability or corporate social responsibility objectives, or whose inputs to production are both socially and privately costly, may be especially motivated to identify cost-efficient means to improve their resourcefulness due to the increased competitiveness and profitability associated with such innovation (Porter and Van der Linde, 1995).

Behavioral social science research has paved a new path for governments to identify innovative and cost-effective means of achieving desired policy outcomes (Benartzi et al., 2017), and the private sector is increasingly pursuing similar strategies in search of low-cost efficiency gains (e.g., Allcott, 2011; Gosnell et al., 2016). Despite this growing trend, little research has been undertaken to understand the resourcefulness of interactions between businesses and their customers. How can companies maximize customers' voluntary participation in programs that increase the efficiency and resourcefulness of business-customer interactions? As a means of improving operational

efficiency, the business sector has seen a rapid capitalization upon technological advancements, such as mobile phone applications and SMS, or automatic bill pay (ABP). However, encouraging or mandating enrollment in such programs may lead to consumer welfare loss.

For instance, Sexton (2015) demonstrates that enrollment in ABP increased average energy consumption by 4.0% for residential energy consumers and 7.3% for small- to medium-sized commercial and municipal customers. Thus, while enrolling customers in alternative bill pay schemes may decrease transaction costs for retailers and improve resourcefulness, the act may come at a cost in terms of customer satisfaction, convenience, financial awareness, and ultimately retention. Similarly, while defaulting energy customers into green tariffs increased adoption of such tariffs tenfold in a field experiment in Germany, the ethical implications of such nudges in terms of consumer welfare are highly debated (Ebeling and Lotz, 2015; Schubert, 2017). Instead, companies may offer customers the option to enroll themselves voluntarily, though status quo bias and potential costs (e.g., from increased consumption, as shown above) suggest that many consumers may refrain from opting in.

In a large-scale natural field experiment comprising 38,654 customers of a green energy supplier, we investigate means to facilitate such cost- and resource-efficient change without imposing the change upon

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the customer. Specifically, we explore a role for targeted messaging to promote an active switch to online (as opposed to paper¹) energy billing in the UK, where consumer research by a prominent consumer choice advocacy group has suggested that many customers either have a preference for, solely have access to, or may be harmed by involuntary discontinuation of paper billing (Keep Me Posted, 2013). We implement a fractional factorial design, randomizing (i) information on environmental damages associated with paper use and (ii) messaging rooted in theories of cognitive dissonance, a phenomenon centered upon a desire for consistency in self-perception, with (iii) vivid environmental imagery. The research design rests on the assumption that the customer base of Good Energy, a 100% renewable electricity supplier in the United Kingdom and our partner in this study, is characterized by high environmental preferences. In light of the social mission of Good Energy and its customers' selection into their customer base, we conceptualize a utility function characterized by social preferences and cognitive dissonance, designing interventions to manipulate these arguments.

We find that both imagery and information on environmental costs associated with the status quo are ineffective in increasing uptake of paperless billing beyond that of a control group. On the other hand, dissonance-inducing messaging increases uptake among our main sample. Our data allow for exploration of the roles of both gender and education, two demographic factors that have been shown to increase pro-environmental behavior (Kollmuss and Agyeman, 2002). We find significant heterogeneity of uptake, both broadly speaking and with respect to treatment. Interestingly, dissonance-inducing messaging backfires among our highly educated sample. To our knowledge, this study is the first to demonstrate such nuanced heterogeneity among a large and presumably educated sample.² Additionally, the data suggest that women are less likely than men to sign up to paperless billing. Overall, the research suggests that individuals may be carefully targeted with various forms of messaging to increase environmentally advantageous behaviors at no additional cost, and calls into question the general conclusion in the literature that women are more inclined than men to behave in line with social or environmental objectives (Croson and Gneezy, 2009; Kollmuss and Agyeman, 2002).

The remainder of the paper is structured as follows. Section 2 reviews the relevant literature and provides a conceptual framework of behavior that motivates the experimental design. Section 3 outlines the experimental design and details the interventions implemented across Good Energy's customer base. Section 4 reveals the results of the field experiment, and Section 5 concludes.

2. Literature Review and Conceptual Framework

Economics research on household cooperation in waste management—predominantly recycling behavior—has primarily focused on the role of convenience, incentives, intentions, attitudes, demographic characteristics, and moral considerations (see Briguglio, 2016 for a review). A vast majority of this research aims to understand households' waste-sorting behavior, with very few studies focused on illuminating the determinants of waste minimization. One example of the latter is a field experimental study on green nudges to deter junk mail, which demonstrated that mandated choice is more effective than active choice

¹ Excessive printing is costly from both a private and a social perspective. According to Smith (2011), printing costs constitute up to ten percent of corporations' revenue, and reducing paper use by ten percent among U.S. corporations alone could prevent 1.6 million tons—or 280,000 cars' worth—of greenhouse gas emissions annually. Moreover, continued rapid growth in household waste is becoming particularly problematic, comprising a majority of municipal solid waste globally (Briguglio, 2016).

² Prior studies have demonstrated that education leads to higher green energy uptake (Jacobsen et al., 2013).

in overcoming status quo bias with respect to placement of “No Junk Mail” stickers on mailboxes (Liebig and Rommel, 2014). Furthermore, with scant literature on the role of communication in household waste decisions, there is a need for enhanced understanding of the role of costly and prevalent communication campaigns in addressing waste reduction objectives, as well as how these campaigns can be optimized for effectiveness (Briguglio, 2016). We begin this exploration by reviewing the relevant literature pertaining to the role of consequential information, cognitive dissonance, and imagery in human decision-making.

2.1. Information Provision

Neoclassical economics holds that individual decision-making derives from rational maximization of one's utility function with full information regarding the potential consequences of one's actions. Evolutionary and economic theories—both within and outside of the utility maximization framework—have posited that such decision-making processes incorporate altruistic preferences, so that other-regarding considerations may play a role in decision-making (Becker, 1974; Andreoni, 1989, 1990; Simon, 1993). Similarly, while the rational economic man of neoclassical theory is primarily influenced by incentives, social psychology and behavioral economics reserve a role for nonstandard—e.g., non-egoistic, evaluative, normative, and identity-driven—beliefs and motivations in dictating personal norms that, in turn, influence behavior (Ajzen and Fishbein, 1980; Akerlof and Kranton, 2000; Elster, 2000; Stern, 2000; Kollmuss and Agyeman, 2002; DellaVigna, 2009; Nyborg, 2018). For instance, according to the norm-activation theory of Schwartz (1973) and the value-belief-norm (VBN) theory of Stern et al. (1999), knowledge of negative consequences associated with one's actions—or particular undesirable conditions for which one is perceived to be responsible—spurs altruistic behavior. Therefore, information regarding particular externalities may change individuals' beliefs and intentions, in turn altering their proclivity to engage in socially beneficial behaviors (Stern, 2000).

Empirically speaking—and despite the overwhelming tendency of social campaigns to communicate information with the goal of changing behavior (Bruvoll and Nyborg, 2004)—the impact of consequence-based information on subsequent behavior is quite unclear, showing promise in the lab while inducing mixed results in the field. Demand for such information is apparent in the laboratory experiment of Cain and Dana (2012), where a significant proportion (63%) of subjects chose to reveal the negative external consequences of their actions when given the opportunity to either reveal or remain ignorant. More surprisingly, 24% actually *paid* to become aware of such externalities. Of those who revealed, 44% and 50%, respectively, chose the more altruistic option, whereas all subjects who did not reveal made the selfish choice, consequently imposing a negative externality on their counterparts in the study. Remaining ignorant to the externality, therefore, allows for justification of action solely upon one's own private utility (i.e., without regard for external costs).

However, interventions that impose consequence-based information in the field have not always demonstrated such an effect. A meta-analysis of interventions intended to reduce household energy consumption demonstrates that information regarding externalities may increase knowledge but does not subsequently alter behavior (Abrahamse et al., 2005). On the other hand, Ferraro and Price (2013) find that information on the extent and consequences of water use among its (environmentally unconscious) customer base increased the implementation of water-saving strategies, especially among high-consumption households. Similarly, in a field experiment in Brazilian favelas, Toledo (2016) finds that environmental persuasion increases take-up of LED (energy-efficient) light bulbs by six percentage points (or 13%); however, it is important to note that subjects were asked to participate voluntarily and therefore the findings may suffer from

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