



Loads of green washing—can behavioural economics increase willingness-to-pay for efficient washing machines in the UK?

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HIGHLIGHTS

- ▶ 465 UK residents made a hypothetical washing machine purchase via an online survey.
- ▶ Respondents were exposed to either running cost or running emissions information.
- ▶ Running cost information increased willingness-to-pay (WTP) for efficiency.
- ▶ Lifetime running cost information increased WTP more than annual costs.
- ▶ Running emissions info increased WTP for efficiency, especially when loss framed.

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ABSTRACT

The EU energy efficiency labelling scheme has successfully increased demand for efficient appliances by providing a prominent letter rating to consumers during their product search. Behavioural economics (BE) suggests the adoption of efficient appliances could be accelerated further by: (i) monetising efficiency, (ii) directly communicating the link between efficiency and carbon emissions, (iii) communicating the long-term (e.g., operational life) financial and environmental impact of product choices, and, (iv) framing the information as avoided losses ('extra') rather than gains ('savings'). This study tested these hypotheses via an online, stated preference survey of 465 UK residents using actual market pricing and efficiency data for washing machines. The provision of information about either running costs or running emissions did encourage selection of more expensive and efficient products (strongly correlated variables in the choice set and actual market) ($p < .001$, $r = .30-.41$) with no statistically significant difference between their impact. Providing *lifetime* running cost information also nudged respondents towards more expensive, efficient products than *annual* information ($p = .006-.027$, $r = .15-.18$). Finally, *loss-framed* running emissions information encouraged selection of more expensive, efficient products than *gain-framed* information ($p < .05$, $r = .13-.16$). The EU label is an impracticable means of communication, but digital communication channels (e.g., price comparison websites) may offer potential for inexpensive localisation and personalisation of the information. The results suggest that successful communication could benefit the private sector whilst making a contribution to reducing carbon emissions.

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1. Introduction

The EU labelling scheme has successfully increased the mean efficiency of appliances in its member states. Findings in behavioural economics suggest that information strategies could increase demand for efficient appliances further by: (i) monetising efficiency, (ii) directly communicating the link between efficiency and carbon emissions, (iii) presenting running cost and emissions information on long timescales (e.g., the operational life of the

product), and, (iv) framing the information as avoided losses ('extra') rather than gains ('savings'). In the context of energy efficiency, this study adds to a small existing evidence base that suggests willingness-to-pay (WTP) can be marginally increased through lifecycle cost disclosure. None of those studies examined how the effectiveness of the information could be increased further through framing. Although there is empirical evidence that some consumers are willing to pay for reducing carbon emissions, this appears to be the first study of the impact of disclosing running emissions on appliance purchase behaviour.

Section 2 outlines the background to the introduction of appliance energy labelling and identifies supplementary information strategies informed by findings in behavioural economics and

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relevant energy efficiency research. Section 3 specifies the resulting research hypotheses, methodology and questionnaire design. Section 4 presents the results, whilst section 5 considers the theoretical and practical implications. Section 6 concludes.

The study confirms that behavioural economics could make a contribution to promoting household demand for efficiency and suggests that the private sector could benefit from applying its insights to marketing efficient products.

2. The EU energy label and behavioural barriers to energy efficiency

2.1. The origins of appliance energy labelling

In the late 1970s and 1980s, economists observed that consumers often failed to make investments in energy efficiency even though the returns were much higher than market rates for borrowing and saving (Train, 1985). This was paradoxical from a standard economic approach that assumed individuals were self-interested, utility maximising, cognitively unlimited and ultra-rational in their choices—a characterisation of decision-making dubbed *homo economicus* (Persky, 1995) or ‘Chicago man’ (Mcfadden, 1999).

An intense debate ensued about the causes and appropriate policy intervention to reduce what became known as the ‘energy efficiency gap’ (Hirst and Brown, 1990). This identified a series of ‘market barriers’ (Hirst and Brown, 1990, Howarth and Andersson, 1993) to be addressed, among them a lack of consumer awareness about the energy efficiency performance of products. As a result, a number of International Energy Agency (IEA) member states introduced labelling schemes for household appliances in the 1990s to address the information deficit and correct this market failure. Although it is difficult to isolate the outcome of specific policy programmes, most assessments conclude that they have been effective at narrowing the gap (Schiellerup, 2002, Geller et al., 2006, Nordkvist, 2006, Lane et al., 2007, Sanchez et al., 2008).

2.2. The rational choice model and appliance purchase

In the economic analyses used to identify the energy efficiency gap, *homo economicus* is assumed to approach appliance purchases as if they were investment decisions involving an initial capital outlay (the product’s price) followed by a stream of running costs and benefits, the latter requiring adjustment to compensate for future uncertainty and time preferences. The time-adjustment process involves the application of a constant discount rate that reduces the value of deferred costs and benefits reflecting individual preferences for immediate rather than delayed gratification, the opportunity cost of today’s capital expenditure and the declining real value of money. A further adjustment is applied to account for the uncertainty associated with future costs and benefits. The more temporally distant running costs are, the more uncertain they become and the higher the probability they will deviate from expectations. Individuals are assumed to be risk averse and therefore add a risk-premium to the discount rate to compensate for the uncertainty. Consumers calculate their *expected* utility by conducting a cost-benefit analysis in which possible future scenarios are probability weighted and adjusted to a net present value via the discount rate. The product with the highest expected utility is selected.

2.3. Behavioural economic barriers to valuing appliance efficiency

Neoclassical economics has been criticised for lacking psychological realism in its conception of individual behaviour from numerous sub-disciplines and specialisms across the social

sciences. In particular, behavioural economists and decision psychologists have demonstrated consistent and widespread departures from the predictions of rational choice theory through the careful design of laboratory experiments (Kahneman and Tversky, 2000; Rabin, 2002; Thaler and Sunstein, 2008; Ariely, 2009), which has been described by one economist as “like watching master carpenters construct the scaffold for your hanging” (Mcfadden, 1999, p. 79).

The accurate valuation of future appliance costs assumed by the rational choice model would be extremely complex and computationally demanding. There is overwhelming evidence that individuals faced with such complexity do not attempt the calculations. Instead, individuals tend to rely on heuristics (rules of thumb) to guide them to *good* rather than *optimal* decisions—a process known as ‘satisficing’ (Simon, 1956). The decision-making process effectively employs a mental rulebook derived from past experience that is adapted in light of new data. Unfortunately, these heuristics are malformed for energy decisions because the moment of energy consumption and payment are disconnected by infrequent billing in arrears, which is often based on inaccurate consumption estimates rather than actual usage and lacks itemisation. Consequently, consumers lack awareness of how much energy their appliances use and their estimations are too high for highly visible energy services that need to be consciously activated (e.g., lighting) and too low for invisible, automatic energy services (e.g., water heating) (Stern, 1986; Stern, 1992). As a result, individuals employ ‘folk quantification’ techniques for energy (Kempton and Montgomery, 1982) that lead to systematically erroneous valuations even if they are highly numerate (Kempton and Montgomery, 1982; Stern, 1986; Kempton and Layne, 1994; Yamamoto et al., 2008; Attari et al., 2010; Frederick et al., 2011).

Energy efficiency also tends to be overlooked during the evaluation of purchase options. Product selection involves a trade-off between many heterogeneous factors (e.g., multiple aspects of functionality, aesthetics, performance and price) and is likely to focus on salient product characteristics rather than uncertain and intangible factors, such as expected future energy costs. Thus, energy efficiency is often a ‘shrouded attribute’ (Gabaix and Laibson, 2006) that is overshadowed by other more prominent considerations during the buying process.

2.4. The limitations of energy labelling and supplementary information strategies

The EU energy label can be regarded to be a partial attempt to go beyond the information deficit approach to address these behavioural barriers. Purchasers can rely on the label’s simple, familiar letter grading instead of employing folk quantification. And the use of colour coding and prominence of the information partially unveil a shrouded attribute of the product.

Whilst the EU energy label goes some way towards providing energy efficiency information to consumers in a comprehensible, salient form, other findings in behavioural economics suggest there are opportunities to communicate efficiency to consumers more effectively.

2.4.1. Monetising efficiency

Individuals have no easy means of relating the letter rating to the product’s running costs. This is clearly an obstacle to deciding whether an efficient appliance is worth its extra capital cost. Providing consumers with financial information about the implications of their appliance purchases could therefore reduce cognitive error further. In addition, highlighting the financial implications of efficiency could help increase the impact of the information by communicating it in a form that resonates with the recipient.

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