



RESEARCH BRIEF

The Behavioral Effect of Pigovian Regulation: Evidence from a Field Experiment

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Market-based regulation, and in particular Pigovian taxes/subsidies, have the potential to make consumers internalize socially harmful external effects associated with their choices. Recent behavioral literature, however, suggests that explicit financial penalties/rewards may undermine willingness to behave prosocially. In this paper, we use data from a field experiment to quantify how negative behavioral effects may affect the design of Pigovian interventions.

Economists traditionally argue in favor of price-based instruments to regulate externalities such as climate change or local air pollution. Among these, a Pigovian approach to regulation sets up a corrective tax/subsidy to make agents internalize external effects associated with consumption or production decisions (Pigou, 1920). Introducing financial penalties/rewards associated with the externality aligns social and private interests and, in a canonical microeconomic framework, mechanically restores market efficiency.

Growing evidence from economics and experimental psychology, however, suggests that when agents are willing to voluntarily exert an effort, explicit financial incentives may have a detrimental impact on effort provision (Gneezy et al., 2011; Bowles and Polanía-Reyes, 2012). As Pigovian interventions associate an external monetary incentive with efforts to behave prosocially, behavioral effects may attenuate the effectiveness of the regulation (Frey and

Oberholzer-Gee, 1997; Bénabou and Tirole, 2003). From this perspective, these behavioral traits may call for an adjustment to externality-correcting taxes/subsidies (e.g. Allcott et al., 2014; Farhi and Gabaix, 2015).

The objective of this work is to shed light on the magnitude and policy relevance of these behavioral effects. We exploit experimental data gathered in a chain of UK supermarkets (see Perino et al., 2014) in which subjects make real consumption decisions about ordinary grocery products, with a set of clean and dirty alternatives as determined by their embodied carbon emissions. After an initial product choice, we randomly assign subjects to one of three treatments: (i) information about embodied emissions of each product, revealing the propensity to voluntarily contribute to the emission reduction effort; (ii) a Pigovian price change, combining a change in relative prices in proportion to external costs and information

about the regulatory nature of the price changes; and (iii) a neutrally framed change in relative prices, which mimics market-driven price variations and has the exact same magnitude as the Pigovian intervention. We further consider four categories of products, for which substitutability between clean and dirty alternatives is expected to vary: cola-type sodas (in plastic bottles or in aluminum cans), spreads (margarine or butter), milk (skimmed, semi-skimmed or whole), and meat (chicken or beef).

In this setting, we quantify the impact of alternative policy interventions by observing choices before and after each intervention, and comparing how consumers of different products responded to different treatments. More formally, we use observed choices to estimate a structural demand model for differentiated products, from which we derive the following implications. First, we find that providing information about the carbon content of products induces a voluntary transition towards cleaner products, suggesting that consumers are willing to exert an effort in the form of a substitution from one of the dirty products to a cleaner one. Translated to monetary value, this effort corresponds to GBP30.69-165.15/tCO₂ depending on the product category, which is significantly above most estimates of the social cost of carbon (see e.g. Greenstone et al., 2013).

Second, we exploit the neutrally framed price change (treatment 3 above) to show that substitutability between clean and dirty alternatives varies substantially across product categories. A cross-product comparison reveals that policy interventions are more effective if a close-substitute clean alternative is available. This finding is intuitive, and it is already recognized in the literature (e.g.

Bjorner et al., 2004). However, the ability to assess, in a controlled environment, how substitutability affects the behavioral impact of information vs. price interventions is novel.

Finally, experimental results show that a monetary incentive explicitly motivated by the regulation of carbon emissions is less effective as compared to a neutrally framed price change of the same magnitude. This is evidence of negative behavioral effects associated with price-based regulation of externalities. We further observe that the extent of behavioral effects varies with substitutability: for products with close substitutes (cola and milk in our setting), we observe very substantial negative behavioral effects, while for products where substitution requires more effort (spreads and meat) behavioral effects are small and statistically indistinguishable from zero.

An implication of our results is that the price signal of Pigovian regulation would need to be set above its socially efficient level (i.e. marginal damages) in order to compensate the negative behavioral effect associated with an external monetary intervention. Quantitatively, our results suggest that the compensatory increase of the Pivovian price signal (we use GBP19/tCO₂) is around GBP48.06/tCO₂ for cola products, GBP37.46/tCO₂ for milk, while for spread and meat products our point estimates (GBP6.07/tCO₂ and GBP0.22/tCO₂, respectively) are not statistically significantly different from zero. Given the growing use of market-based instruments for environmental policy, as well as the emerging literature on behavioral public finance (e.g. Chetty et al., 2009; Mullainathan et al., 2012), these results call for further research in this area, notably on the role of self-image concerns in relation to monetary incentives.

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