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A tax can nudge: The impact of an environmentally motivated bonus/malus fiscal system on transport preferences

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ABSTRACT

Bonus-malus taxes appear to have been successful in encouraging people to change to less polluting travel options in France (e.g. the tax on large and small engined cars). We hypothesize that they have three possible effects on consumer behaviour. The positive effects are: (1) a price effect (the less polluting option is subsidized and the polluting option is taxed); and (2) a social norm effect (the less polluting option is classified as pro-social and the polluting option as antisocial). The negative effect (3) is that they may decrease intrinsic motivation (crowding out). We provide an initial test of this tripartite model using survey data on students given a choice between taking the plane or the train between Toulouse to Paris. The first study shows that imposing a hypothetical bonus-malus tax has both a price effect (relative to a control condition where only the norm justifying the tax is presented) and a norm effect (relative to a control condition in which only the corresponding price difference is presented without mention of the tax). The second study presents a set of choices where the environmental norms and price differences are held constant, but the size of the contribution of the bonus-malus tax to the final price of each option is varied. This study confirms our prediction that a larger bonus-malus subsidy/tax reduces propensity to choose the less polluting option (i.e. the train). As the positive effects outweigh the negative effects in most of the choices studied, we conclude that bonus-malus taxes constitute a promising policy instrument.

1. Introduction

Fiscal measures to incentivize environmentally responsible behaviour have been met with varying acceptance and success in recent years. For example, using US sales data from 2000 to 2006, Gallagher and Muehlegger (2011) estimated that a sales tax waiver of value $1037 was associated with more than twice as large an effect on demand for hybrid vehicles as a tax credit of value $2011. Some green taxes incite vigorous opposition and have to be withdrawn, whereas others are accepted and seem to work quite successfully. For example, the attempt to introduce a general carbon tax in France in 2009–10 had to

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be abandoned after it foundered on a combination of constitutional difficulties and political opposition. On the other side of the world, the introduction of a carbon tax has proved to be an immense source of controversy in Australia, being introduced in 2011 but rejected in the general election of 2013.

Several studies have examined the effectiveness of financial incentives for promoting pro-environmental behaviour (e.g. Cason, Gangadharan, & Duke, 2003; Cason & Plott, 1996; Cochard, Willinger, & Xepapadeas, 2002; Plott, 1983). Some studies have shown that taxation systems are likely to affect both economic actors' behaviour and their intrinsic motivation to act (Goeschl & Perino, 2012; Tenbrunsel & Messick, 1999), and others have shown paradoxical effects of green fiscal measures on consumer behaviour. For example, Perino, Panzone, and Swanson (2014) found that people are *less* likely to buy a number of food products (milk, butter, meat and cans of soda) if a price reduction is given an environmental justification (e.g. a green subsidy) rather than being explained in terms of reduction in the price of raw materials. However, their study did not examine the psychological mechanisms responsible for the behavioural effects of alternative financial incentives, and is also unable to explain why green incentives sometimes have positive effects, no effects and sometimes negative effects on environmentally responsible behaviour.

Observations such as these suggest that differences in success of various fiscal instruments cannot be assessed in purely monetary terms, and that psychological factors should also be taken into account (for general reviews of the psychological aspects of taxation, see Braithwaite & Wenzel, 2008; Kirchler, 2007; Pickhardt & Prinz, 2014; for a discussion of environmental tax morale, see Frey & Stutzer, 2008). For example, in the bonus-malus fiscal system a monetary bonus is given to encourage a certain type of purchase by making it cheaper whereas a malus is applied to discourage another type of purchase by making it more expensive. The explicitly normative nature of such a taxation system connotes social values, and is more likely to be acceptable if it accords with values that are widely shared, such as fairness (Thøgersen, 1994). For example, taxing large-engined cars and subsidising small-engined cars may fit a general norm of wealth redistribution that is broadly accepted in a country such as France (Alesina & Angeletos, 2005). In contrast, a similarly environmentally motivated tax on plastic cutlery and paper plates in France ("the picnic tax") was planned but later abandoned in 2008 in part because it was perceived as taxing "the poor man's banquet" (Japhet, 2012).

In addition, a bonus-malus fiscal system may have effects on consumer behaviour that go beyond its effect on the prices of the relevant options. One real-world example comes from the introduction of a bonus/malus fiscal system for automobiles in France in 2008, which was followed by such a major change in car-buying behaviour that the state had to effectively subsidise the tax scheme to the tune of 225 million euros in the first year. Although this fiscal system was expected to be self-financing, with the money earned from the maluses being used to finance the bonuses, there was an overshoot due to the unexpectedly strong reaction of French consumers, as the sales of small-engined cars increased by 15% in the six months after the introduction of the scheme, whereas those of large-engined cars dropped by fully 27% in the same period. Importantly, econometric analyses indicate that success of this bonus-malus fiscal system in influencing car-buying behaviour cannot be explained solely in terms of a price effect, thus supporting the view that the nature of the intervention itself also influenced consumers' preferences (d'Haultefoeuille, Durrmeyer & Février, 2011). Following its initial success, the system has been maintained, with an overall reduction of 15.6% in estimated CO_2 emissions in new cars bought in France between 2008 and 2013. (P.K., 2014).

Below, we examine two non-financial aspects of a bonus-malus fiscal system that may influence consumer behaviour. The first, potentially positive factor is that the social values communicated by taxes may influence behaviour through the framing of choices as either "good/clean" or "bad/dirty", which may in turn send social signals about the social desirability of the choices to be made. In this view, an environmentally motivated bonus/malus system may influence choices through communicating an injunctive social norm which may foster environmentally friendly behaviours (e.g. Cialdini, 2003) quite independently of financial incentives. Moral pressure of this kind may be re-inforced by the use of graphic devices such as emoticons for expressing approbation or disapprobation for certain choices (Schultz, Nolan, Cialdini, Goldstein, & Griskevicius, 2007). The second, potentially negative factor is due to the decrease in intrinsic motivation to perform environmentally responsible behaviours due to the use of financial incentives to perform a target behaviour (e.g., Deci, Koestner, & Ryan, 1999; Frey, 1997). It is therefore important to distinguish the potentially positive and negative effects of imposing a fiscal measure on a target behaviour, and we address this question below by suggesting three possible ways in which imposing a bonus-malus tax may affect hypothetical transport choices. These are: price signals; social signals; and decrease in intrinsic motivation.

1.1. A tripartite model of the effects of financial incentives on environmental behaviour

The first effect of imposing a bonus-malus fiscal system on target behaviours can be expected on the basis of basic principles of re-inforcement theory in psychology (rewarding some behaviours leads to reinforcement whereas punishing others leads to extinction). These principles are familiar to psychologists through the principles of operant conditioning (e.g. Skinner, 1953) and are reflected in the tenets of classical economic theory which state that people are utility maximizers who should *ceteris paribus* react to prices, such that applying a tax that increases the price of a choice alternative relative to another should decrease the percentage of people who choose this alternative.

The second expected effect of imposing a bonus-malus fiscal system on target behaviours is that this may signal that some behaviours are considered desirable by society whereas others are undesirable. In France, there is a broad political consensus that the environment has to be protected, hence rendering it plausible that a large section of the population would accept and adhere to an environmentally motivated bonus/malus system. One approach that could explain such effects comes from work on the power of injunctive social norms that concern perceptions of which behaviours are typically