

Fighting Pollution with Nudges

Tamara Houweling
Tilburg University
t.houweling@uvt.nl

ABSTRACT

On the one hand we have nudging: a relatively new policy instrument that promises to be cheaper, less invasive and more effective. On the other hand we have pollution caused, among others by litter and energy waste due to inefficient appliances. The oceans are filled with disposable plastic bags, this forms a great threat to marine life and can even end up in our own seafood. What happens if we use nudging in order to tackle these issues, does it live up to its promise? Case studies of the plastic bag levy and energy efficiency label show that nudging can be a very effective tool, especially if it is embedded in a broader policy.

Keywords

Nudging, pollution, environment, law, policy.

INTRODUCTION

Nudging is using people's predictable irrationalities in order to guide them in a certain direction, without forbidding any options or significantly changing their incentives (Thaler and Sunstein, 2008). A classic example is that an opt-out system brings about more organ donors than an opt-in system. Nudges usually alter the setting of a decision, the so-called choice architecture. And like an architect can increase interactions between people by creating open stairwells (Yeung, 2012), the order in which food is placed in a canteen influences what people pick (Thaler and Sunstein, 2008). Nudging offers the possibility to guide people in a certain direction, whilst still leaving them the freedom to decide differently (Hansen, 2015). Nudging has been mentioned as a supplement or even an alternative to traditional regulation, since it has the potential to be cheaper, less invasive and more effective (Hansen, 2016). Nudges usually work by using people's predictable biases and habits, or by disrupting habits. Critique on nudging is, among others, uttered by Yeung (2012), however, this paper will demonstrate that nudging can be a very effective tool in fighting pollution, by elaborating on two case studies. The topic of the first case study is the Dutch plastic bag levy, installed in 2016 in order to curb plastic bag use. Although there has been debate on whether this is a nudge or a financial incentive, we will argue that it is a nudge. The second case study is about the European energy labelling program which aims to support the purchase of energy efficient household appliances. The main research question is: *What is the effect of nudges and how can they be used to gently 'push' people to behave more environmentally friendly?*

METHOD

This paper will analyze two practical examples of nudges. This holistic multiple-case study is designed as such that the main results are expected to be similar in both cases, this method is called literal replication (Yin, 2002). The case studies will separately analyze to what extent the effects of nudging mentioned in the start of this section are present in that specific case. Differences in results between the cases could point to important factors to take into account concerning nudging. The final

conclusion is drawn from the cross case conclusions, where similar results strengthen the hypothesis. In every case, study references are made to multiple countries where similar laws are in place in order to draw from a bigger pool of data and get more reliable results. The two examples chosen were among a limited number of nudges that are explicitly endorsed by law, since most nudges are more subtle. The case studies are comparable because both nudges are mandated by law and work via businesses to consumers, aiming to adapt the latter's behavior. The policies are mandated by the European Union and in effect in the Netherlands. Besides, both nudges aim to influence consumption, the plastic bag levy more at the counter, the energy labels when doing pre-purchase research as well as at the counter. In addition, both laws are linked to environmental policies.

THE PLASTIC BAG LEVY

Plastic Pollution

Plastic bags are durable, resilient and strong. These same features that make them so popular for shoppers, are the ones that make them disastrous for the environment (Homonoff, 2012). The annual global production of plastic is around 300 million tons, half of which is disposed of after a single-use (Xanthos and Walker, 2017). In the European Union (EU) 98,6 billion plastic carrier bags were used in 2010, this boils down to more than one bag a day per household (BIO Intelligence Service, 2011). The Dutch rate is a little below the European average, since the 3 billion bags yearly used (Rijksoverheid, 2016) come down to 170 bags per person per year. On average, single-use plastic bags are used for 12 minutes, before being disposed of (Environment Protection Authority, 2016). They cause major problems by leaching chemicals, clogging storm drains, posing a threat to the marine environment and plastic particles even end up in our diet through the seafood and accumulate in our bodies in a process of biomagnification (BIO Intelligence Service, 2011). Accumulation of plastics is exacerbated since plastics take up to 1000 years to break down (Clapp & Swanston, 2009). Plastic debris accounts for 60 – 80 % of marine litter and results in plastic gyres like the Great Pacific Garbage Patch. Entanglement of species by marine debris can cause starvation, suffocation, reduced reproductive success and death (Bio Intelligence service, 2011).

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The levy

There has been a global pattern of efforts to restrict the use of disposable plastic bags and tackle the issue at the roots, often in the form of a levy or even a total ban. Ireland was the first country to impose a levy instead of an outright ban. Consumers had to pay a €0.15 tax in 2002, increased to €0.22 in 2007, for each bag. This led to a dramatic 94 percent decrease in consumption in the first year (Homonoff, 2012). In the Netherlands, a levy was installed following European Directive 2015/720. The Regeling Beheer Verpakkingen (2016) prohibits shopkeepers to give out free plastic bags. A levy was preferred over other types of legislation because it was expected to be effective, while

it has a minimum negative effect on society in terms of inconvenience and administrative burden. A ban would merely preclude shops from giving the service of providing a plastic bag, while under this regulation shops can still provide a bag for a minor fee, and the fee can contribute to their revenues. This motivates shops to charge the fee instead of providing an alternative kind of bag, and to obey the regulation (Mansveld, 2015).

The underlying mechanisms (or: why the levy works)

A plastic bag charge can be considered as an economic instrument that incorporates negative externalities into the household budget. In essence the law does not constitute a tax, but compels the retailer to charge the customer directly for the bags, instead of including the cost in the price of other goods. Since the consumer already indirectly paid the costs, the law has more effect on the framing of the costs than on the actual costs (Jakovcevic et al., 2014). That the levy mostly frames the costs is in line with Homonoff's (2012) conclusion that a levy or a loss of 5 cents has a much bigger effect than a 5-cent bonus. The next paragraph will set forth why that is the case. Moreover, the 5-cent fee that most shops charge is a relatively minor added costs and not a very strong economic incentive. That the levy is a nudge, rather than an economic incentive, is underlined by research pointing out that it has more effect on higher income classes than on low income classes (Rivers et al., 2017).

The probability of abandonment of plastic carrier bags is higher when they are given away for free (Bio Intelligence Service, 2011). Oddly, even a small charge of 5 cents could alter the perception of plastic bags from a free commodity to something worth reusing. Other mechanisms at play are the change in default option, change in choice architecture and loss aversion.

Before January 2016, customers often received the plastic bag as a default. "Do you want a bag with that?" was an often heard question in stores. While after the levy came into effect, the question is "can you carry it like this?" The levy obliged customers to make an active choice and explicitly approve or request a bag, creating a choice moment where one was previously lacking (Jakovcevic et al., 2014). Moreover it framed the choice in a way that enabled people to act more environmental friendly, without having to decline anything. Besides, this small change at the counter acts as a 'habit disruptor' (Poortinga, Sautkina, Thomas & Wolstenholme, 2016), activating more conscious thinking and enabling people to find new routines (Poortinga et al., 2016).

Loss Aversion

Neoclassical economic theory suggests that financial incentives will be effective if the incentive for changing behavior is bigger than the costs an individual associates with changing his behavior. Financial incentives can either take the form of a fee or a bonus, and according to standard economic theory individuals should respond similarly to the two types, provided that they are the same amount (Homonoff, 2012). However, research points out that people are loss averse, meaning that they perceive losses more strongly than gains of the same size (Field, 2009 and Hossain & List, 2009). The pattern of loss aversion established in those experiments implies that a

fee would be more effective than a bonus of the same size. Homonoff (2012) evaluated two policies in the Washington Metropolitan Area aimed at reducing the use of disposable bags: a 5-cent tax on disposable bag use and a 5-cent bonus for reusable bag use. In stores that offer no incentive, 84 percent of customers use one or more disposable bags. While 82 percent of customers in stores that offer a bonus used disposable bags, only 39 percent of customers in tax stores used disposable bags. These results are visualized in the figure below.

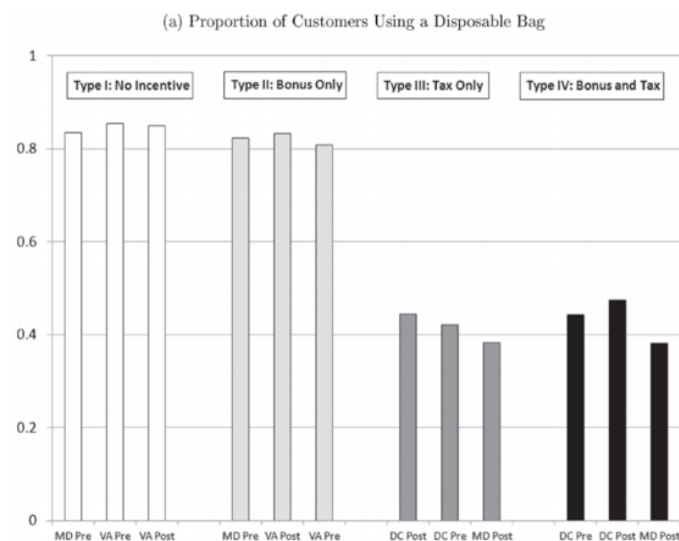


Figure 1: Homonoff 2012, p.78

These results suggest that while a tax has a substantial impact, causing over 50 percent decrease in disposable bag use, a bonus of the same amount has almost no effect on behavior, which is consistent with the model of loss aversion (Homonoff, 2012). Therefore, a policy or a nudge that charges customers a small amount is more effective than a bonus that rewards customers.

The effect of the levy

In the Netherlands, a study commissioned by the Dutch ministry of infrastructure and environment concluded that the use of plastic bags has decreased by 71% compared to pre-levy years (SAMR, 2017). When compared to for example 2014, when 25 million kilos of plastic bags were used (TNS NIPO 2014) a decrease of 71% would amount to a reduction of 17.750.000 kilos of plastic. However, one limitation of the Dutch levy is that plastic bags are partially substituted by paper bags.

Ireland was the first to introduce a tax of €0,15 on plastic bags in 2002. This tax had an immediate effect on consumer behaviour with a decrease in annual plastic bag usage from an estimated 328 bags per person to 21 bags per person (European Environmental Agency, 2016). In other words, use decreased by 90 – 95% in a very short period of time (Clapp and Swanston, 2009). The success of the tax in Ireland was partly attributable to its popularity following an advertising awareness campaign and the public recognition of its success (Dikgang, Leiman & Visser, 2012). After research in Ireland, Convery et al. (2007) nominated the levy as the most popular tax in Europe. In 1999 only 8% of the Irish was reported to be willing to pay €0,15 for a plastic bag, in 2003 this increased to 91%. Research in the United Kingdom shows a similar increase in acceptance and positivity towards the levy. The levy there resulted in a 85% decrease in plastic bag use. (Poortinga et al. 2016).

In short, the minor fee of the levy is not a significant economic value. However, the charge still results in a massive decrease in bag use, like the decrease of 71% in the Netherlands. The levy creates a choice moment where it was previously lacking, and can change the default option. Moreover, since humans tend to be loss averse, a levy of 5 cents works, whereas a bonus of five cents does not. This supports the claim that the levy is effective because it changes choice architecture, rather than because of its economic value.

ENERGY LABELS

Each year, millions of household appliances with different degrees of efficiency are purchased. The energy efficiency paradox postulates that decision makers may fail to invest in energy-efficient technologies (EETs) even though these appear to pay off under prevailing market conditions (Schleich, Gassmann, Faure & Meissner, 2016). Inefficient technology leads to extra energy costs, and a waste of global resources. Fully adopting the EETs that exist today could lower projected U.S. energy use by 25% to 31% by 2030 (Vaidyanathan et al., 2013).

The European Union has a two-sided approach with, on the one hand, minimum standards for product efficiency as set forth in the ecodesign regulations and framework directive 2009/125/EC, and, on the other hand, regulation 2017/1369 requiring labels and standard product information to be shown at sales of major household appliances. The European style energy label shows a scale of colors and grades and places the product on the scale on basis of its energy efficiency. It provides a mechanism for customers to compare devices in the same product group on the basis of their efficiency (Vaidyanathan et al., 2013). Moreover, the label allows industry to transform environmental challenges into economic opportunities (European Commission, 2015). The most recent regulation added rules to rescale the label, since over the years new categories up until A+++ had to be added due to an increase in efficiency, which made the label less effective (Regulation 2017/1369).

The underlying mechanisms (or: why the levy works)

Although information provision appeals to one's ratio, it can also function as a nudge. A lack of time and necessary expertise, combined with cognitive limits and a latent information overload makes it difficult for individuals to assess information properly. Moreover, non-rational factors have major impact on the way information is processed. A traditional approach would focus on the information itself, whereas a policy inspired by behavioral science pays attention to the way in which the information is conveyed, like the design of the label (Baisch, 2016). The label nudges in two ways, first of all the design takes behavioral insights into account. Second of all, it provides a counterweight for the present bias, and compels consumers to take energy efficiency into account.

Research points out that the label is easy to grasp and gives a good overview due to the alphabetical scales and colors. Moreover, the scales allow for comparability (Baisch, 2016). A scale from A to G is more effective than a scale from A+++ to D. Even though the steps in energy efficiency are equal, the difference between A and B is perceived as bigger than the difference between A++ and A+++ (LE London Economics & IPSOS, 2014). This shows that that the framing of information is important to

take into account. Therefore the current rankings will be phased out, and the new grading system will revert back to the A to G rankings (Article 11, regulation 2017/1369).

Often, more efficient appliances cost no more upfront than less efficient models. Even for appliances with an initial cost premium energy bill savings often offset and exceed the incremental purchase price. However, humans often struggle to take future costs into account, due to the present bias. The present bias means that people value current benefits more than - higher - future benefits. Therefore, consumers tend to attach more value to the initial expenses than to life cycle costs. For investments in EETs this means that a consumer is not willing to pay as much now for higher cost-savings in the future. The degree to which each individual discounts future benefits is called implicit discount rate (IDR) (Vaidyanathan et al., 2013). Energy labels act on the IDR on several fronts. First of all, they might work as reminder of someone's pre-existing pro-environmental attitudes, and nudge them to take these into account in the purchase decision. While, in principle, bounded rationality could increase as well as decrease IDR, empirical literature suggests that it mostly impedes the adoption of EETs (Schleich, et al., 2016). The easily understandable label rankings counter humanity's bounded rationality on the topic of energy efficiency. Whereas beforehand households may have considered the purchasing price rather than lifetime costs, labels draw the attention to future energy use and motivate consumers to take related energy costs into account (Schleich, et al., 2016). Allcott and Mullainathan (2010) argue that there is much to win by applying a more behavioral inspired policy into the field of energy use. The ecodesign sets minimum standards for energy products, while the label compares and grades the products, both in terms of efficiency. These two policies supplement each other, as shown in figure 2 (European Commission, 2015).

The effect of the label

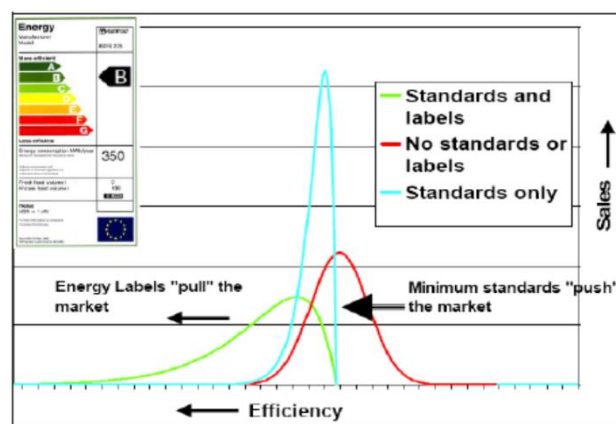


Figure 2 The combined effect (EU impact assessment, 2015, p.12)

Over time, appliances have become much more efficient, but it is hard to trace back how much of this development is caused by the labels. However, in case of vacuum cleaners, a product that only recently got regulated by eco-design and labeling, energy use per product was rather increasing than decreasing, without improving in functionality.

Research done by the European Union estimates that the eco-design and energy labeling measures in place save 175 mtoe ($2,04 \times 10^{10}$ MWh) primary energy per year in 2020 (European Commission, 2015, p.15). An estimated 20% of consumers would buy more efficient products due to an improved label (Vaidyanathan et al., 2013).

DISCUSSION

A lot of sources were available to research the plastic bag levy, however, most of the research was done outside of the Netherlands, while the initial aim was to study the Dutch levy. In this paper, it is assumed that findings about why the levy works from the UK, Ireland and the US can be extended to the Netherlands.

When discussing the results of the labelling program, a major limitation is that most of the information about Europe comes from research done for the European Commission, which is part of the institution that installed the rules, and may therefore be less objective. Unfortunately, this study had to rely on this information since the availability of other sources was very limited.

CONCLUSION

As said in the method section, similar results in both case studies strengthen each other. In both cases, the measures qualify as nudges, since they do not limit or significantly change consumers incentives (Thaler and Sunstein, 2008). Results show that a very minor charge and some extra information can have a lot of impact. Especially in times where pollution and a waste of resources is such a hot topic, it is important to research how these kind of non-coercive methods can play a big role. Moreover, this research shows that behavioral insights, like loss aversion, should be taken into account to make policies more effective.

ROLE OF THE STUDENT

Tamara Houweling was an undergraduate Liberal Arts & Sciences student working under the supervision of Philip Paiement. The student independently came up with the idea of a case study about nudges and the plastic bag levy. The supervisor proposed to incorporate energy labels. The research was done by the student, and where needed discussed with the supervisor.

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