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Nudge Efficiency

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Only a small portion of the substantial literature on behavioral interventions ("nudges") that developed over the last fifteen to twenty years has considered nudges from an economic perspective. Moreover, despite the importance of the topic for a law and economics assessment of this increasingly common form of regulation, even fewer contributions have examined whether and when behavioral instruments are likely to make an efficient means for increasing social welfare. This chapter therefore offers some basic observations about nudge efficiency: Part I opens with a reminder that behavioral instruments should be implemented only when they are the most efficient means available for advancing a given policy goal. Part II then offers a brief review of typical nudge benefits and costs that policy makers need to account for when assessing the efficiency of behavioral interventions, while Part III describes recent studies that assess the efficiency of nudges and the lessons they offer so far.

I. The Importance of Nudge Efficiency

It is commonly understood, at least in principle, that efficiency is a necessary precondition for regulatory interventions, since inefficient policies do more harm than good.[2] This understanding is manifested through the widespread adoption of cost-benefit analysis (CBA) as an integral part of regulatory impact assessments worldwide. CBA is mandated for U.S. federal regulation[3] and plays an important role in other OECD countries[4] and beyond.[5]

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[1] Professor of Law and Director, Notre Dame Research Program on Law and Market Behavior (ND LAMB). This Festschrift contribution draws on the author's recent work in on behavioral regulation, including *Tor*, The Private Costs of Behavioral Interventions, in: Duke Law Journal, Vol. 72 (2023), pp. 1673 et seqq.; *Tor/Klick*, When Should Governments Invest More in Nudging? Revisiting Benartzi et al. (2017), in: Review of Law and Economics, Vol. 18/3 (2022) pp. 347 et seqq.; and *Tor*, The Law and Economics of Behavioral Regulation, in: Review of Law and Economics, Vol. 18/2 (2022), pp. 223 et seqq.

[2] *Ellig/McLaughlin/Morral.*

[3] Exec. Order No. 12,866, 58 Fed. Reg. 51735 (Oct. 4, 1993).

[4] *OECD.*

[5] *De Francesco*; *Dunlop/Radaelli.*

Recognizing the fact that insofar as efficiency is concerned the value of a policy to society is measured by its net social benefits (i.e., its benefits minus its costs), cost-benefit analysis seeks to quantify the social consequences of legal interventions in monetary terms.[6] Based on this assessment, CBA directs those aiming to advance a policy goal in any regulatory domain to select from the instruments available to them those that offer the highest net benefits and to avoid inefficient policies that fail to offer any net benefits vis-à-vis the status quo.[7]

The maxim that only efficient policies deserve adoption applies to behavioral interventions just as it does to traditional policy instruments like mandates or taxes. After all, nudges that are capable of changing people's behavior are also bound to produce private and public benefits and costs. These effects ought to be assessed and tallied to determine whether a particular nudge makes an efficient policy instrument.[8] Until recently, however, the literature has shown little interest in examining the efficiency of behavioral interventions, largely limiting itself to examining the effectiveness of such polices as a means for behavior change.[9]

A number of causes may explain this failing. For one, the systematic study of nudges is a relatively recent enterprise, so the research in this area is still developing. Many of the active participants in the study of behavioral interventions, moreover, are behavioral scientists from fields such as social psychology or behavioral decision making whose focus is on understanding human behavior or establishing the factors that shape it rather than on an economic assessment of the benefits and costs of nudges.

The lack of attention to the welfare effects of behavioral interventions is also due in part to the notion that they are the proverbial "free lunch" – namely, policy instruments that entail only negligible costs and, therefore, are bound to increase social welfare whenever they are effective. For instance, Thaler and Sunstein, the fathers of the behavioral turn in public policy who coined the term "nudge", stated early on in their eponymous book that "many of those [behavioral] policies cost little or nothing; they impose no burden on taxpayers at all".[10] The large body of scholarship and commentary that followed it since has largely adopted this assertion with little examination. Indeed, the low-cost assumption is so pervasive that even critics of nudging hasten to concede that it "impose[s] nearly zero costs on

6 *Layard/Glaister*, p. 21.

7 *Boardman/Greenberg/Vining/Weimer*.

8 *Tor*, Law and Economics.

9 *Andor/Fels*; *Bauer/Reisch*; *Byerly* et al.

10 *Thaler/Sunstein*, p. 13.

consumers".[11] Policy makers similarly find the purportedly low costs of nudges an important source of their appeal.[12]

Yet, even if it were true that they entailed only low costs, regulators employing behavioral interventions still should assess their overall welfare effects. After all, a low-cost policy that also produces only limited benefits can still turn out to be inefficient. And even nudges with a propensity to produce some net benefits may turn out to be less efficient than other, more costly, behavioral or traditional intervention that generates larger net social benefits.[13] Without a cost-benefit analysis of competing policy instruments, however, such questions cannot be resolved.

Most significantly, however, a closer examination of nudges' welfare effects reveals the notion that they entail little to no costs to be erroneous. Instead, nudges, particularly when they successfully change behavior, can produce a variety of private and public costs. Policy makers that ignore these costs may therefore overestimate the net benefits of behavioral interventions and risk adopting inefficient, socially harmful, policies.

II. The Factors of Nudge Efficiency

To assess the efficiency of behavioral interventions, one must account for their various benefit and costs. On the benefit side, successful nudges can reduce "internalities," helping individuals better align their actions with their preferences and thereby improving private welfare. Such paternalistic policies might encourage people to save more for retirement, exercise more, eat more nutritious foods, take better care of their health, protect their privacy online, and so on. The behavior changes wrought by public welfare nudges may also reduce harmful externalities, as when behavioral interventions cause consumers to reduce their waste or recycle, conserve more energy or other natural resources, or follow public health recommendations.

The empirical evidence documenting the effectiveness of behavioral policy interventions in the field is limited but growing. Recent reviews based on academic publications show that nudges have already received some testing, mainly with private welfare interventions in domains including consumer choice, education, finance, and health, but also with public welfare policies in the areas of environmental protection and sustainability, prosocial behavior, and more.[14] In the academic literature, nudges have been studied most

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11 *Hagmann/Ho/Lowenstein*, p. 484.

12 *Sibony/Alemanno; Sunstein/Reisch.*

13 *Tor/Klick.*

14 *Hummel/Maedche; Szaszi/Palinkas/Palfi/Szallosi/Aczel.*

extensively in health research, often focusing on dietary behavior, [15] but also evaluating other health-related activities, like self-management by patients with chronic diseases[16] or the promotion of physical activity in the general population.[17]

Broad overviews find a great deal of heterogeneity in the effectiveness of nudging as a means for behavior change. With respect to private welfare nudges, for example, a summary of thirty-nine literature reviews and meta-analyses of behavioral interventions to improve dietary choices reported that "virtually all reviews" found that "nudges hold promise in fostering healthier food choices".[18] At the same time, the substantial differences among the tested interventions in terms of the specific instruments they employed, their settings, and the quality of their designs, repeatedly precluded researchers from drawing general conclusions about nudge effectiveness in the health domain.[19]

A similar picture emerges with respect to policies encouraging pro-environmental behavior – the most common public welfare nudging area. For instance, Byerly et al. reviewed 72 studies that tested 160 different interventions – comparing the effects of nudges to those of educational and incentive-based interventions – using a broad definition of pro-environmental policies that covered areas ranging from family planning and meat consumption, through transportation choices and land management, to waste production and water use. While finding that some nudges produced significant effects, the authors cautioned that the effectiveness of behavioral instruments often depends on factors such as the personal characteristics of their targets, the context of the intervention, and more, thereby indicating they are unlikely to be universally effective.[20]

Following these and similar findings regarding the heterogeneity of nudge effects, a quantitative review by Hummel and Maedche compared the effectiveness of different behavioral instruments to assess the relative importance of both the particular context of the intervention and the specific type nudge it employs. The authors identified 100 higher-quality primary publications with 317 independent effect sizes spanning a broad range of policy that reported sufficient statistical information for quantitative comparisons. They found that about one-third of the policies failed to reach statistical significance, while the remainder were nearly evenly split between low, medium,

15 *Bauer/Reisch*; *Vecchio/Cavallo*.

16 *Mollenkamp/Zeppernick/Schreyögg*.

17 *Forberger/Reisch/Kampfmann/Zeeb*.

18 *Bauer/Reisch*, p. 14.

19 *Bauer/Reisch*; *Vecchio/Cavallo*.

20 *Byerly* et al.

and high relative effect sizes.[21] Hummel and Maedche also report that behavioral interventions were most effective in the domains of privacy and the environment (39%), least effective in the energy use category (13%), and intermediate for finance (28%) and health (21%). The variability in the effect size of different nudge types was more dramatic, however: Defaults, the most common and most effective behavioral instrument in the reviewed literature, showed a large median effect size of 50%, while that of simplification – the next most common nudge category – was only 20%. Moreover, reminders and precommitments, for instance, produced only small median effect sizes of 8% and 7% respectively.[22]

Finally, an important recent contribution by DellaVigna and Linos provides further insight into the effectiveness of real-world nudging (excluding the use of defaults) by comparing the results of meta-analyses of behavioral interventions in research studies (like those assessed in the reviews of the academic literature discussed above) with those documented for large-scale policies implemented by two governmental "nudge units" in the United States. After narrowing down the dataset to render the included interventions more comparable to one another, DellaVigna and Linos retained a final sample of 126 randomized controlled trials (RCTs) involving 243 nudges and over 23 million target participants, which they compared to a similar subsample from the set of academic studies that Hummel and Maedche reported on. The study found that academic nudges produced an average relative effect size increase of 33.5% in the desired behavior or an 8.7% average absolute increase in the frequency of that behavior, while the comparable nudge unit figures were a dramatically smaller 8.1% and 1.4% respectively.[23]

When interventions are effective in producing behavior change, they can generate both public and private benefits. Public welfare interventions that produce behavior change can benefit society by reducing harmful externalities through reductions in energy and water use or littering, better compliance with public safety laws (e.g., traffic or parking), or improved adherence to public health advisories (such as self-quarantining to reduce the spread of a pandemic). Similarly, the individuals targeted by paternalistic nudges may benefit from welfare-improving behavior changes. They may benefit, for instance, from increasing their retirement savings contributions, from adopting more healthful lifestyles choices in areas like nutrition, health, or exercise, from better protecting their online privacy, and so on.

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21 *Hummel/Maedche.*

22 *Hummel/Maedche.*

23 *DellaVigna/Linos.*

Just as they produce benefits, however, behavioral interventions also entail both public and private costs. On the public side of the ledger, nudges involve some – often relatively low – implementation costs. They need to be designed, tested, and delivered to the targeted individuals. Although this process may be challenging, particularly when it comes to overcoming organizational inertia to achieve the actual adoption of the nudge (Dellavigna/Kim/Linos, 2022), it usually entails substantially lower costs than those required to implement more traditional policy interventions like mandates or taxes.

Yet the largest costs of successful behavioral interventions usually are their private costs. Some of these are direct consumer costs, such as the cognitive and sometimes financial judgment or decision costs entailed by nudges that lead people to pay greater attention to their choices, process more information, engage in a more thorough deliberation, or even simply to make a choice they would have avoided but for the nudge.

Some behavioral interventions also involve emotional costs, whether because they operate by activating emotions (e.g., graphic warning labels on cigarette packaging[24]), because they lead their targets to engage in emotionally-laden judgments or decisions (such as about whether to use more energy than one's peers),[25] or even just due to the annoyance they produce (e.g., reminders to donate).[26]

Moreover, behavioral interventions can also impose social or economic costs on those who resist them even when the direct financial costs of avoiding the nudge are small. For instance, individuals who refuse to follow a popular nudge may receive social disapprobation or even social sanctions for failing to conform,[27] particularly for nudges that publicly highlight individuals' performance on a socially-relevant metric [28] "public recognition" interventions.

While these direct nudge costs can be substantial on occasion, the most significant costs of most behavioral regulation are those private opportunity costs – that is, the benefits lost to the successfully nudged from their previous behavior. Some public welfare nudges are required to make individuals privately worse off to succeed, as when consumers are led to reduce their energy consumption and lose some of energy-use benefits they were previ-

24 *Noar* et al.

25 *Allcott/Kessler.*

26 *Damgaard/Gravert.*

27 *Legros/Cisglaghi.*

28 *Butera/Metcalfe/Morrison/Taubinsky.*

ously willing to pay for,[29] to purchase more costly "green" energy, [30] or to donate more than they would otherwise.[31] Regardless of their disparate effects and whether they are publicly beneficial on balance, such nudges succeed by increasing charitable contributions at their targets' expense.

Successful private welfare, paternalistically-motivated, nudges also generate opportunity costs. Those who are led to save more for retirement inevitably sacrifice some current consumption; those who are nudged towards healthier eating habits sacrifice the pleasure they previously obtained from consuming less healthful foods, and so on. But paternalistic behavioral interventions can also harm the successfully nudged, on balance, for a variety of reasons. Policy makers may simply err in the direction or, more likely, in the extent to which they nudge (e.g., setting retirement savings defaults that are too high or too low). They may also nudge consumers – intentionally or unintentionally – towards privately costly behaviors in the guise of paternalistic benevolence,[32] or use behavioral instruments that distort people's beliefs (e.g., by triggering unreasoned behavior or emotional reactions).

Finally, in addition to these direct and opportunity costs for consumers, nudges can also generate costs for private third parties, as when they successfully decrease energy consumption and generate net revenue losses to energy providers.[33] Beyond these immediate third-party effects, moreover, nudges can generate both beneficial and harmful spillover effects to other related behaviors (e.g., when increased water conservation affects energy consumption).[34]

III. The Calculus of Nudge Efficiency

As Part II makes clear, one cannot assess nudge efficiency without considering the various benefits and costs involved. And though the empirical evidence is limited, the handful of recent studies that undertook a more systematic welfare analysis of behavioral interventions are instructive.

In the area of energy conservation, Allcott and Kessler conducted a cost-benefit analysis of natural gas Home Energy Reports (HERs), which compare the energy use of the recipient household to the average and the most efficient among its similar neighbors and displays a box that aims to signal

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[29] *Allcott*, Social Norms.

[30] *Ebeling/Lotz*.

[31] E.g. *Altmann/Falk/Heidhues/Jayaraman; Damgaard/Gravert*.

[32] Cf. *Houde*.

[33] *Allcott/Kessler*.

[34] Cf. *Dolan/Galizzi*.

normatively desirable behavior with emoticons. The study assessed a program that sent HERs to approximately 10,000 residential natural gas consumers over two heating seasons (winters). The treatment group received standard HERs during one winter, followed by surveys that measured their willingness to pay (WTP) for another season.[35]

Allcott and Kessler estimated the HERs produced an average net benefit of $0.77 per recipient, with a projected overall social value of approximately $600 million when aggregating this minute per-consumer net benefit over millions of recipients globally as of January 2017. The authors' estimates thus suggest these HERs were socially (slightly) beneficial on balance even though they imposed substantial net private costs on their targets. The study also found a great deal of heterogeneity in consumers' WTP for the reports, with only 41% of these households willing to pay more than the marginal public cost of the nudge. However, this sizable minority valued the HERs highly enough to more than make up for the losses incurred by the remaining 59% of the population. Essentially, the nudge functioned as a tax that may have increased overall public welfare and privately benefited a minority of its targets, but at a net private cost to their majority.[36]

Of further note is the dramatic difference between the outcomes of the study's more comprehensive CBA and the approach typically used to assess nudges. Specifically, studies of energy-saving nudges routinely consider implementation costs and direct energy cost savings to consumers only. Taking such an approach here would have erroneously suggested a private welfare gain of $2.69 per consumer and a public welfare gain of $1.22 billion for the HERs globally.[37] In other words, a failure to account for the full range of these policies' benefits and costs would have led to a two-fold overestimation of their net private and public welfare benefits alike.

Importantly, additional unpublished evidence further suggests that the households' net private costs were in fact greater than the study's baseline estimate. Allcott and Kessler report in an Online Appendix that the large majority of consumers in their study dramatically overestimated their energy savings from the HERs.[38] This finding indicates that consumers' elicited WTP for the HERs – the study's measure of consumer welfare – was likely biased upwards and their true net private costs concomitantly greater than the authors' baseline estimate. Given that the study's main estimate of a net social benefit of $0.77 per household, in the probable case that the WTPs' up-

35 *Allcott/Kessler*.

36 *Allcott/Kessler*.

37 *Allcott/Kessler*.

38 *Allcott*, Social Norms.

ward bias was greater than this figure, a corrected CBA would conclude that the HERs were not only privately costly but also socially harmful, in clear contrast to their public welfare goal.

A similar result emerged from recent work by Tor and Klick,[39] who conducted an illustrative CBA of some energy conservation interventions, including the original electricity consumption HERs first studied by Allcott.[40] Following Allcott and Kessler's approach, this reanalysis recognized that energy conservation entails several public and private benefits and costs: Reductions in electricity consumption produce public benefits by reducing harmful externalities and private benefits by lowering household expenditures, but conservation policies entail public implementation costs (excluding financial transfers among consumers and energy providers) and the private costs of both retailer net revenue losses from diminished electricity sales and consumer costs (both direct and opportunity costs).

Previous claims by Benartzi et al. (using cost-effectiveness analysis rather than CBA)[41] that HERs studied by Allcott[42] far outperformed traditional energy conservation policies that used financial incentives. Yet Tor and Klick's illustrative cost-benefit analysis demonstrated that, in fact, these HERs were either slightly less efficient or noticeably more efficient than the competing traditional policies, depends on one's estimate of the consumer costs of the HERs.[43] Moreover, under either set of assumptions, the net social benefits produced by this ubiquitous behavioral intervention, at best amounted (in 2021 U.S. dollars) to $1.73 a month per household and, more likely, to less than half that amount. These findings are notable in indicating that if the HERs' consumer costs were even just slightly underestimated in this case (as suggested by the discussion above) or if the effectiveness of the early HERs studied by Allcott[44] was higher than in the broader population (as revealed by the thorough analysis of Allcott[45]), these instruments could turn out to be altogether inefficient and thus socially costly, notwithstanding their widespread adoption around the globe.

Beyond the findings concerning the ubiquitous energy HERs, two very recent experimental studies shed further light on the question of nudge efficiency while grappling with the conceptual and practical challenges involved

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39 *Tor/Klick.*

40 *Allcott*, Social Norms.

41 *Benartzi* et al.

42 *Allcott*, Social Norms.

43 *Tor/Klick.*

44 *Allcott*, Social Norms.

45 *Allcott*, Site Selection Bias.

in its measurement. Allcott et al.[46] examine the welfare effects of behaviorally-informed informational labels through two randomized and incentivized experiments in the areas of fuel economy and sugary drinks. The key finding of these authors' theoretical model and experimental results is that the welfare effects of nudges depend not only on their efficacy in countering biases but also on their impact on the variance of choice distortions caused by a combination of these biases and externalities. Most strikingly, the model reveals that efficacious nudges – that is, interventions that move the average behavior of the targeted population in the desired direction – can still diminish overall social welfare when they increase the variance of choice distortions (e.g., by distorting some consumers' beliefs).

Allcott et al.'s experiments further demonstrated such patterns, despite the substantial differences in consumer behavior between the fuel economy and sugary drink contexts (i.e., In the former experiment, relative biases and externalities summed up to only 3% of price on average, while in the latter they amounted to as much as 95% of the same). In both experiments, moreover, the labeling nudges reduced demand for less efficient vehicles or more sugary drinks–that is, operated on average as intended – but also increased the variance of distortions, albeit in different ways. The fuel economy labels simply added noise to consumers' choices, while the sugary drink labels had the adverse effect of reducing willingness-to-pay (WTP) more for those less biased consumers. This increased distortion variance turned out to cause fuel economy labels to reduce total welfare and eliminated much of the surplus gain from sugary drink labels.[47]

In addition, the results of Allcott et al. illustrate how the welfare implications of nudges may not align with their apparent behavioral effects. For example, the point estimates from the sugary drink experiment suggested that graphic warning labels were more effective than standard nutrition fact labels in reducing participants' WTP. Yet the former labels also produced larger increases in the variance of choice distortions, were highly aversive, and exerted a smaller effect on more biased consumers. As a result, the authors concluded that this more effective nudge delivered lower total surplus than the less efficacious nutrition fact label.

The approach developed by Allcott et al. significantly advances the economic analysis of behavioral interventions, offering a framework for evaluating their overall welfare effects that can be used across different contexts. Their findings also make clear that more effective nudges may perform worse in terms of welfare compared to their less efficient counterparts or

46 *Allcott/Cohen/Morrison/Taubinsky.*

47 *Allcott/Cohen/Morrison/Taubinsky.*

other competing regulatory instruments and could even turn out to be welfare-reducing. More generally, these authors' model reveals how even the most appealing and well-targeted nudges that directly affect only biased consumers will indirectly change equilibrium market prices, in most realistic market settings. In these cases, therefore, the indirect effects of a nudge also benefit or harm all consumers, with the effect on price typically increasing with the effectiveness of the intervention.

Allcott et al.'s framework also seeks to overcome the limitations entailed by relying on the elicitation of potentially biased WTP, such as that of Allcott & Kessler's gas consumers who likely overestimated their cost savings from HERs, as noted earlier. To this end, these researchers directly estimated their participants' bias prior to the experimental nudge manipulation, an approach that also allows them measure the effects of the tested nudges on the average bias, externalities, and distortion variance. The car experiment measured bias by the extent to which participants failed to maximize their consumer surplus from leasing a car (due to their over- or under-valuing the lease of a less fuel-efficient option). The sugary drinks experiment, on the other hand, used survey-based measures of participants' nutrition knowledge (compared to the average knowledge of nutrition professionals) and self-control (vis a vis a perfect self-control response of person stating they never drink sugar-sweetened beverages more often than they should).

These sophisticated survey instruments tried to produce direct measures of the magnitude of participants' biased (hypothetical) behavior (in the case of the car experiment) or, at least, a proxy of such bias based on the limits of their knowledge and self-control (in the sugary drinks experiment). Although they offer plausible bases for identifying deviations from rationality and their magnitude, however, the measures employed by Allcott et al. still rely on some strong psychological assumptions regarding the behaviors that manifest deviations from rationality, the effects of the tested nudges, and their welfare implications. In the cars experiment, for instance, the experimenters assumed that a given relative WTP has the same welfare consequences regardless of the nature of the nudge tested. Yet the WTP manifested after a nudge that changes a participant's overall assessment of a car's quality (e.g., via a halo effect associated with the EPA SmartWay certification label tested in one of the experimental condition, as in Houde[48]) bears different welfare implications from those of a relative WTP following a standard informational MPG labeling nudge. The underlying psychological assumptions of what makes a bias are even stronger for the sugary drinks experiment, which used the relative shortcomings of participants' knowledge and self-control as proxies,

48 *Houde*.

thereby assuming, for example, that the behavior of more knowledgeable individuals is less biased.

In an effort to avoid making assumptions about which choices are welfare maximizing and how deviations from these choices translate to welfare, Harrison and Ross propose a different approach to assessing the welfare effects of behavioral interventions.[49] Harrison et al.[50] implemented this approach in a controlled laboratory experiment that required participants to make a series of randomized and incentivized decisions following different behavioral interventions. The researchers directly elicited the individual risk preference of their participants some time prior to their choices over a complex insurance product. This allowed for an individualized assessment of participants' welfare gains and losses from their choices, albeit based on (more limited) assumptions regarding the nature of their utility functions and the applicability of the estimated risk preferences to participants' behavior in the experimental insurance decision context.

The results of Harrison et al. show a number of their behavioral interventions increasing the take-up of the insurance product. Intriguingly, however, the tested informational nudges were found not only to improve the quality of participants' decisions in terms of product pricing but also to promote the take-up of both welfare-increasing, high-quality, products and welfare-decreasing, low-quality, products. The latter finding suggests that the informational nudges produce more complex welfare effects than what might have been assumed based on participants' improved understanding alone. It also provides a cautionary note about the risk of drawing inferences from individuals' levels of knowledge or understanding to the welfare effects of their decisions.

Finally, List and colleagues[51] recently conducted a meta-analysis comparing the welfare effects of nudges versus financial interventions in the markets for cigarettes, influenza vaccinations, and household energy. They recognized that there is "[a] general challenge in this literature…that researchers need to make a number of judgment calls as to how biases affect utility and how nudges may correct these biases".[52] Nevertheless, given the novelty of their research, these authors take "an optimistic stance" in assuming that the treatment effects produced by behavioral interventions actually represent a reduction of bias and entail no major psychological costs to consumers. List

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49 *Harrison/Ross.*

50 *Harrison/Morsink/Schneider.*

51 *List/Rodemeier/Roy/Sun.*

52 *List/Rodemeier/Roy/Sun*, p. 4.

et al. explain they adopt these assumptions to generate a best-case benchmark of nudges' welfare effects compared to those of taxes.[53]

The meta-analysis covered 311 point estimates of the effects of behavioral interventions and taxes in the markets for cigarettes, influenza vaccination, and household electricity, and included studies employing varied nudge instruments, including social information, reminders, prompts, defaults, informational interventions and more. Overall, List et al. find that while the nudges in all three markets were effective, they were not always the most efficient interventions, even under the optimistic assumptions regarding their beneficial average treatment effects. Specifically, the key factors that predict when nudges dominate taxes in these authors' framework are the heterogeneity in the behavioral bias and the size of the average externality.[54]

According to this account, nudges are potentially better at reducing the heterogeneity of behavioral bias, while taxes are better at internalizing externalities. Hence, when the former effect is larger than the latter, as in the market for cigarettes, nudges outperform taxes. On the other hand, in the market for household energy, which offered the most robust set of estimates, the welfare gains from taxation vastly exceeded those of nudging, because the externalities from electricity consumptions are much larger than the standard deviation of behavioral bias. (Taxes also appeared likely to outperform nudges in the influenza vaccination market, where the average positive externality of vaccination was larger than the standard deviation of the behavioral bias.)

All on all, though the systematic assessment of nudges' welfare effects is in its early stages and faces a number of conceptual and practical challenges, the emerging results are informative. Most importantly, these tentative findings already make clear that nudge effectiveness can be divorced from nudge efficiency, even under assumptions that view successful behavioral interventions as generally beneficial. Insofar as the average treatment effects of some nudges represent private and even social welfare losses,[55] the need to subject these instruments to the same cost-benefit scrutiny required of other regulatory interventions becomes even more apparent, the challenges involved notwithstanding.[56]

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53 *List/Rodemeier/Roy/Sun.*

54 *List/Rodemeier/Roy/Sun.*

55 *Tor*, Private Cost; *Tor*, Law and Economics.

56 *Tor/Klick.*

List of References

Allcott, Hunt: Site Selection Bias in Program Evaluation, in: Quarterly Journal of Economics, Vol. 130/3 (2015), pp. 1117 et seqq. (cit. *Alcott*, Site Selection Bias).

Allcott, Hunt: Social Norms and Energy Conservation, in: Journal of Public Economics, Vol. 95/9-10 (2011), pp. 1082 et seqq. (cit. *Allcott*, Social Norms).

Allcott, Hunt/*Cohen*, Daniel/*Morrison*, William/*Taubinsky*, Dmitry: When do "Nudges" increase Welfare?, National Bureau of Economic Research, Working Paper Nr. 30740, Cambridge (MA) 2022, pp. 1 et seqq.

Allcott, Hunt/*Kessler*, Judd B.: The Welfare Effects of Nudges, A Case Study of Energy Use Social Comparisons, in: American Economic Journal: Applied Economics, Vol. 11/1 (2019), pp. 236 et seqq.

Altmann, Steffen/*Falk*, Armin/*Heidhues*, Paul/*Jayaraman*, Rajshri: Defaults and Donations: Evidence from a Field Experiment, in: The Review of Economics and Statistics, Vol. 101/5 (2019), pp. 808 et seqq.

Andor, Mark A./*Fels*, Katja M.: Behavioral Economics and Energy Conservation, A Systemic Review of Non-Price Interventions and Their Causal effects, in: Ecological Economics, Vol. 148/C (2018), pp. 178 et seqq.

Bauer, J.M./*Reisch*, L.M.: Behavioral Insights and (Un)healthy Dietary Choices: A Review of Current Evidence, in: Journal of Consumer Policy, Vol. 42/1 (2019), pp. 3 et seqq.

Benartzi, Shlomo et al.: Should Governments Invest More in Nudging?, in: Psychological Science, Vol. 28/8 (2017), pp. 1041 et seqq.

Boardman, Anthony E./*Greenberg*, David H./*Vining*, Aidan R./*Weimer*, David L.: Cost-Benefit Analysis: Concepts and Practice, 5. Edition, Cambridge (UK) 2018.

Butera, Luigi/*Metcalfe*, Robert/*Morrison*, William/*Taubinsky*, Dmitry: Measuring the Welfare Effects of Shame and Pride, in: American Economic Review, Vol. 112/1 (2022), pp. 122 et seqq.

Byerly, Hillary et al.: Nudging Pro-Environmental Behavior, Evidence and Opportunities, in: Frontiers in Ecology and the Environment, Vol. 16/3 (2018), pp. 159 et seqq.

Damgaard, Mette Trier/*Gravert*, Christina: The Hidden Costs of Nudging: Experimental Evidence from Reminders in Fundraising, in: Journal of Public Economics, Vol. 157/C (2018), pp. 15 et seqq.

De Francesco, Fabrizio: Diffusion of Regulatory Impact Analysis Among OECD and EU Member States, in: Comparative Political Studies, Vol. 45/10 (2012), pp. 1277 et seqq.

DellaVigna, Stefano/*Linos*, Elizabeth: RCTs to Scale, Comprehensive Evidence from Two Nudge Units, in: Econometrica, Vol. 90/1 (2022), pp. 81 et seqq.

DellaVigna, Stefano/*Kim*, Woojin/*Linos*, Elizabeth: Bottlenecks for Evidence Adoption, in: NBER Working Paper Series, Cambridge (MA) 2022, Working Paper Nr. 30144.

Dolan, Paul/*Galizzi*, Matteo M.: Like Ripples on A Pond, Behavioral Spillovers and Their Implications for Research and Policy, in: Journal of Economic Psychology, Vol. 47 (2015), pp. 1 et seqq.

Dunlop, Claire A./*Radelli*, Claudio M.: Handbook of Regulatory Impact Assessment, Cheltenham (UK)/Northhampton (MA) 2016.

Ebeling, Felix/*Lotz*, Sebastian: Domestic Uptake of Green Energy Promoted by Opt-Out Tariffs, in: Nature Climate Change, Vol. 5/9 (2015), pp. 868 et seqq.

Ellig, Jerry/*McLaughlin*, Patrick A./*Morrall*, John.: Continuity, Change, and Priorities, The Quality and Use of Regulatory Analysis Across US Administrations, in: Regulation and Governance, Vol. 7/2 (2013), pp. 153 et seqq.

Forberger, Sarah/*Reisch*, Lucia A./*Kampfmann*, Teresa/*Zeeb*, Hajo: Nudging to Move: A Scoping Review of The Use of Choice Architecture Interventions to Promote Physical Activity in The General Population, in: International Journal of Behavioral Nutrition and Physical Activity, Vol. 16/1 (2019), pp. 1 et seqq.

Hagmann, David/*Ho*, Emily H./*Loewenstein*, George: Nudging Out Support for a Carbon Tax, in: Nature Climate Change, Vol. 9/6 (2019), pp. 484 et seqq.

Harrison, Glenn W./*Ross*, Don: Behavioral Welfare Economics and the Quantitative Intentional Stance, in: Harrison, Glenn W./Ross Don (Eds.): Models of Risk Preference: Descriptive and Normative Challenges, Bingley 2023.

Harrison, Glenn/*Morsink*, Karljin/*Schneider*, Mark: Do No Harm? The Welfare Consequences of Behavioral Interventions, Working Paper 2023, p. 1 et seqq. (available at: <https://cear.gsu.edu/files/2020/07/WP_2020_12_Do-No-Harm-The-Welfare-Consequences-of-Behavioural-Interventions_2021_0409.pdf>, last visited on June 25, 2023).

Houde, Sebastien: How Consumers Respond to Product Certification and the Value of Energy Information, in: The RAND Journal of Economics, Vol. 49/2 (2018), pp. 453 et seqq.

Hummel, Dennis/*Maedche*, Alexander: How Effective is Nudging? A Quantitative Review on The Effect Sizes and Limits of Empirical Nudging Studies, in: Journal of Behavioral and Experimental Economics, Vol. 80/C (2019), pp. 47 et seqq.

Layard, Richard/*Glaister*, Stephen: Cost-Benefit Analysis, 2. Edition, Cambridge (UK) 1994, pp. 1 et seqq.

Legros, Sophie/*Cislaghi*, Beniamino: Mapping the Social-Norms Literature, An Overview of Reviews, in: Perspectives on Psychological Science, Vol. 15/1 (2020), pp. 62 et seqq.

List, John A./*Rodemeier*, Matthias/*Roy*, Sutanuka/*Sun*, Gregory K.: Judging Nudging, Understanding the Welfare Effects of Nudges Versus Taxes, Working Paper Nr. 2023-66, Chicago 2023, pp. 1 et seqq. (available at: <https://bfi.uchicago.edu/wp-content/uploads/2023/05/BFI_WP_2023-66.pdf>, last visited on June 25, 2023).

Mollenkamp, Meilin/*Zeppernick*, Maike/*Schreyögg*, Jonas: The Effectiveness of Nudges in Improving the Self-Management of Patients with Chronic Diseases, A Systematic Literature Review, in: Health Policy, Vol. 123/12 (2019), pp. 1199 et seqq.

Noar, Seth M. et al.: The Impact of Strengthening Cigarette Pack Warnings, Systematic Review of Longitudinal Observational Studies, in: Social Science and Medicine, Vol. 164 (2016), pp. 118 et seqq.

OECD: OECD Best Practice Principles for Regulatory Policy, Regulatory Impact Assessment, 25 February 2020, (available at: <https://www.oecd.org/gov/regulatory-policy/regulatory-impact-assessment-7a9638cb-en.htm>, last visited on June 23, 2023).

Sibony, Anne-Lise/*Alemanno*, Alberto: The Emergence of Behavioural Policy-Making, A European Perspective, in: Sibony, Anne-Lise/Alemanno, Alberto (Eds.), Nudge And The Law, a European Perspective, Oxford 2015, pp. 1 et seqq.

Sunstein, Cass R./*Reisch*, Lucia A.: Trusting Nudges, in: Journal of Consumer Policy, Vol. 42 (2019), pp. 325 et seqq.

Szaszi, Barnabas/*Palinkas*, Anna/*Palfi*, Bence/*Szallosi*, Aba/*Aczel*, Balazs: A Systematic Scoping Review of The Choice Architecture Movement: Toward Understanding When and Why Nudges Work, in: Journal of Behavioral Decision Making, Vol. 31/3 (2018), pp. 355 et seqq.

Thaler, Richard H./*Sunstein*, Cass R.: Nudge, Improving Decisions About Health, Wealth, and Happiness, New Haven (CT) 2008.

Tor, Avishalom: The Private Costs of Behavioral Interventions, in: Duke Law Journal, Vol. 72 (2023), pp. 1673 et seqq. (cit. *Tor*, Private Cost).

Tor, Avishalom: The Law and Economics of Behavioral Regulation, in: Review of Law and Economics, Vol. 18/2 (2022), pp. 223 et seqq. (cit. *Tor*, Law and Economics).

Tor, Avishalom/*Klick*, Jonathan: When Should Governments Invest More in Nudging? Revisiting Benartzi et al. (2017), in: Review of Law and Economics, Vol. 18/3 (2022), pp. 347 et seqq.

Vecchio, Riccardo/*Cavallo*, Carla: Increasing Healthy Food Choices Through Nudges, A Systematic Review, in: Food Quality and Preference, Vol. 78 (2019), pp. 1 et seqq.