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APPLYING INSIGHTS FROM BEHAVIORAL ECONOMICS TO POLICY DESIGN

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Abstract

The premise of this article is that an understanding of psychology and other social science disciplines can inform the effectiveness of the economic tools traditionally deployed in carrying out the functions of government, which include remedying market failures, redistributing income, and collecting tax revenue. An understanding of psychology can also lead to the development of different policy tools that better motivate desired behavior change or that are more cost-effective than traditional policy tools. The article outlines a framework for thinking about the psychology of behavior change in the context of market failures. It then describes the research on the effects of a variety of interventions rooted in an understanding of psychology that have policy-relevant applications. The article concludes by discussing how an understanding of psychology can also inform the use and design of traditional policy tools for behavior change, such as financial incentives.

> "A lot of our policy models traditionally are based on a rather naïve understanding of what drives behavior. But if you have a more intelligent, nuanced account of how people make decisions, you can design policy that is more effective, less costly, and makes life easier for most citizens."
>
> —David Halpern, Director of the UK Behavioural Insights Team quoted in (Bell 2013)

1. INTRODUCTION

Market failures occur when markets, left to their own devices, generate an inefficient allocation of resources: In short, when $Q \neq Q^*$ in the familiar Econ 101 graphs of supply and demand. A primary goal of public policy is to increase market efficiency by remedying market failures (to the extent possible). The typical taxonomy of market failures—public goods, externalities, information asymmetries, and market power—focuses on inefficiencies that relate to either market structure or the incentives of market participants and gives rise to policy tools designed to change either market structure or the incentives of market participants. The tools conventionally employed in this effort include shifting market prices through either taxes or subsidies, regulating output, and mandating information disclosure.

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The traditional analysis of market failures and the impact of public policy on market outcomes assumes that market actors—consumers and firms—are rational in their behavior, carefully weighing their own costs and benefits in making economic decisions.

More recent research on behavioral economics highlights another potential source of market inefficiency: consumers' cognitive limitations and psychological biases. Congdon et al. (2011) delineate three broad categories of psychological biases: imperfect optimization, bounded self-control, and nonstandard preferences.[1] The first, imperfect optimization, arises because consumers have limited attention and cannot possibly focus on all of the information relevant for all of the decisions they are called upon to make. They have limited computational capacity, which leads them to apply simplifying heuristics to complicated choice problems. And their reasoning is often biased. The second, bounded self-control, is manifest in the discrepancy between the intentions consumers have and their actual behavior. Consumers often plan to behave in a certain way but end up doing otherwise. They procrastinate, their choices may vary depending on their emotional state, and small barriers may in fact constitute significant deterrents to action. Finally, consumer preferences are often context dependent. Individuals exhibit a bias toward the status quo. Their choices are sensitive to how decisions are framed. They evaluate outcomes not in terms of absolutes but relative to (endogenous) reference points. Consumer preferences are also other regarding. Individuals care to some degree about others. They also care about what others think of them (and their choices). They adhere to social norms and are concerned about fairness.

Cognitive bias does not necessarily imply market failure. Barr et al. (2013) note that in some contexts, firms may have incentives to help mitigate consumers' behavioral biases and limit any resulting market failures. But firms may also exploit behavioral biases in ways that create or exacerbate market failures.

A leading example of a behavioral bias that impedes market efficiency is present bias, or the tendency of individuals to place much less weight on the future relative to the present than would be predicted by standard models of time discounting. Present bias can lead individuals to make decisions today that reduce future welfare in ways that individuals will later regret (Strotz 1955, Laibson 1997). Analogous to an externality, the situation in which an individual's decision in the moment creates negative future consequences is sometimes referred to as an internality. Present bias is posited as an explanation for behaviors ranging from a failure to save to smoking. These behaviors can constitute a market failure if there are social costs from individuals saving too little or smoking too much.

The optimal response to market failures may also depend on psychological considerations. For example, Campbell et al. (2011) note that mandated information provision or disclosure is a policy tool often used to mitigate asymmetric information, reduce search costs and limit market power, and remedy the underprovision of information-based public goods. But the effectiveness of mandated information provision will be limited if consumers do not understand the information, believe that it is not relevant to their decision making, or do not know how to access or use it. Campbell et al. (2011) cite the following example: "If

[1]DellaVigna (2009) articulates a slightly different categorization of these psychological biases.

consumers mistakenly believe that they will pay their credit bill on time every month, clear and transparent disclosure of late fees and interest rates may not change behavior because consumers deem the information irrelevant at the time they make a purchase." An understanding of psychology can thus inform how effective the tools traditionally deployed in the case of market failure will be. It can also lead us to the development of different policy tools that better motivate desired behavior change or that are more cost-effective than traditional policy tools.

Efforts to incorporate behavioral economics into the design of more effective policy solutions are underway across the globe. The best known initiative on this front is the Behavioural Insights Team in the United Kingdom, more commonly referred to as the Nudge Unit, whose self-proclaimed mission is to apply "insights from academic research in behavioural economics and psychology to public policy and services" (for more information on the UK Behavioral Insights Team, see https://www.gov.uk/government/organisations/behavioural-insights-team). The success of the Nudge Unit at devising, implementing, and testing new approaches to achieving policy goals in domains ranging from tax collection to unemployment to energy conservation has been widely touted. Several countries are using the UK Behavioural Insights Team as a model for their own efforts to implement more behaviorally informed approaches to policy design, including Australia, Canada, Denmark, France, Saudi Arabia, Singapore, and the United States (Bell 2013, Subramanian 2013).

This article uses the lens of behavioral economics to examine a range of tools at the disposal of policy makers to effect behavior change. I begin by setting up a framework for evaluating traditional versus behaviorally informed policy tools (Section 2). I then discuss an assortment of behaviorally informed policy tools and provide evidence on their impact drawn from a variety of different policy domains. These tools can be broadly categorized as tools that help individuals execute their stated preferences (Section 3) or tools that change either how individuals evaluate the costs versus the benefits of behavior change or how individuals evaluate their preferences (Section 4). Section 5 then considers how behavioral economics informs the use and design of one traditional policy tool—financial incentives. Section 6 concludes with a discussion of some of the factors that matter in evaluating which interventions are most appropriate in a given context.

2. A FRAMEWORK FOR EVALUATING POLICY TOOLS

Consider first a market with a positive externality such as that for influenza vaccines. A traditional analysis of such a market would assume that all actors are fully rational and make decisions that maximize their own private benefit. An introductory economics textbook might depict the outcome in this market as shown in Figure 1.

D^1 shows the observed market demand curve, traditionally taken as the marginal private benefit to consumers from being vaccinated against the flu, whereas D^2 shows the marginal social benefit that accrues to society from vaccination. Because this is a market with a positive externality, D^2 lies above D^1. The socially optimal quantity of vaccines, Q^*, equates the marginal cost of vaccines (as indicated by the supply curve, S) with their social marginal benefit, but this exceeds the quantity that will prevail in the private market, Q^1,

when individuals make vaccination decisions purely on the basis of their own private marginal benefit. The triangle denoted DWL shows the social deadweight loss from the underprovision (relative to what is socially optimal) of flu vaccines in this market.

The traditional policy tools that an introductory economics textbook would advocate in such a market are either (*a*) to subsidize vaccination (change the price) or (*b*) to mandate a vaccination level equal to Q^* (regulate the quantity). The first option, a subsidy, could be directed to either consumers or suppliers of the vaccine. In either case, the impact of the subsidy is to drive a wedge between the supply curve, *S*, and the observed demand curve, D^1, equal to the amount of the subsidy, *s*. Suppose the subsidy is given to consumers. Their private marginal benefit from vaccination now increases from its previous level by the amount of the subsidy. If the subsidy is set at its socially optimal level, the private marginal benefit curve shifts up from D^1 to D^2, and the new equilibrium is the socially optimal vaccination level, Q^*. There is, however, a cost to provide the subsidy that moves the market from Q^1 to Q^*. The subsidy, *s*, is paid to all consumers of the flu vaccine for a total cost equal to the area of rectangle ABCD in Figure 1. If funding this subsidy requires distortionary taxation, economic efficiency can be improved if there is a lower-cost way to shift vaccination demand to the socially optimal level.

The traditional rational actor framework assumes that individuals make vaccination decisions by comparing the marginal benefit of vaccination with the marginal cost. If the private marginal benefit exceeds the private marginal cost, consumers get the vaccine; otherwise, they do not. In this framework, providing a subsidy to consumers increases their marginal benefit, while providing a subsidy to suppliers decreases the marginal cost. But there are other factors that also influence vaccine demand—the ceteris paribus in our economic models. One of these factors is the psychology that underlies how individuals do, or do not, think about decision tasks such as whether to get a flu vaccine. This is where insights from behavioral science can help shape more cost-effective public policy. Modifying the ceteris paribus may be a less expensive approach to behavior change than applying the policy tools traditionally wielded by economists.

For example, although there may be a significant gap between Q^* and Q^1, not all of that gap may result from a wedge between the private and social marginal benefit of vaccination. For example, individuals may intend to get a flu vaccine but fail to follow through (e.g., their employer may offer a free workplace clinic, but they forget which day the clinic is open). In the context of Figure 1, there may be a much smaller wedge between the private marginal benefit and the social marginal benefit of getting a flu shot; rather, individuals may fail to act on their private marginal benefit because they are inattentive, and it is this inattention that drives most of the wedge between D^1 and D^2. In this scenario, Q^3 is the true private marginal benefit curve, but D^1 is the demand curve that we observe; the difference between the two results from consumers' inattention. Providing a subsidy may do little to change market outcomes in this case; if most consumers already perceive the marginal benefit as close to the marginal cost, further increasing the marginal benefit does not change the calculus about whether or not to get a flu shot. If attention is endogenous, then a subsidy may effect some behavior change by motivating greater vigilance about when and where the vaccination clinic will occur. But if attention is the primary problem, and the problem is not

that the private marginal benefit is less than the marginal cost, there may be lower-cost policy interventions to redirect attention (the shift observed in demand from D^1 to Q^3) and move the market equilibrium closer to Q^*. Possible interventions that directly address the problem of attention include reminding individuals more frequently or making reminders more salient, encouraging individuals to make a concrete plan about when and where they will get their flu shot, and moving the vaccination clinic to a central location to increase visibility. The first two interventions are practically free; the third, changing the location of the vaccination clinic, may impose some costs, but these costs are potentially much lower than the costs of providing a subsidy to everyone who gets an influenza vaccine.

Note that there may still be a role for traditional policy tools such as subsidies to change behavior. In reality, we may have heterogeneous consumers who vary both in their degree of inattentiveness and in the extent to which they internalize the positive externalities of vaccination. For those individuals whose private marginal benefit is substantially lower than their marginal cost, interventions to remind or help them plan to get vaccinated are unlikely to change behavior because they fail to make vaccination attractive. In this case, a policy intervention that changes the individual cost-benefit calculus is needed. A subsidy to consumers will make getting the flu shot more attractive by increasing the private marginal benefit. Similarly, a subsidy to providers will decrease the marginal cost and make it more likely that the benefit to consumers of vaccination exceeds the cost. If part of the cost of getting a flu shot is the time cost of getting to the vaccination clinic, then moving the clinic to a central location is an intervention that potentially kills two birds with one stone: For attentive consumers who fail to vaccinate because the cost (inclusive of time) exceeds their private benefit, changing the location of the clinic reduces their marginal cost; for inattentive consumers who fail to vaccinate because they forget when the flu clinic is, changing the location of the clinic provides an effective visual reminder to get a flu shot.

More generally, in thinking about what types of policy tools are likely to be most effective at generating behavior change, a useful starting point is to examine how aligned individual preferences are with the socially optimal outcome. Sometimes individual preferences may be much closer to the social optimum than what is observed in the market. If so, there must be some barrier to behavior change other than the private marginal cost exceeding the private marginal benefit; in this case, helping individuals execute on their preferences may go a long way toward social efficiency. Section 3 evaluates several different types of interventions in this vein. If, alternatively, there is a significant wedge between what is individually and what is socially optimal, then there may be a role for policy in changing the cost-benefit calculation. In some cases, this may be best accomplished through the traditional tools of public policy. In others, there may be more cost-effective approaches to increasing the private marginal benefit or decreasing the marginal cost to effect behavior change; behaviorally informed interventions that target perceived costs and benefits are examined in Section 4. But the bottom line is that in almost any circumstance, understanding what impedes individuals from taking a desired action helps inform the most productive margins along which to target a policy intervention.

3. BEHAVIORALLY INFORMED POLICY TOOLS TO HELP AGENTS EXECUTE THEIR PREFERENCES

As suggested in the preceding section, in some cases in which markets yield inefficient outcomes, market participants may in fact have interests that are aligned (or more aligned) with social optimality but may simply fail to execute on their preferences. For example, individuals may want to get a flu shot, or vote in the next election, or save more, or eat a healthier diet, or exercise more, or reduce their home energy consumption but may fail to follow through on their intentions for a variety of reasons, including present bias, the complexity of the task at hand, inattention, and temptation. Research has evaluated several different types of interventions designed to help individuals carry out the intentions they themselves have, many of which have been or could be fruitfully incorporated into public policy.

The intervention that has received perhaps the most attention in academic, media, and policy circles is changing the default option—the outcome that happens if agents do nothing. In standard economic models, as long as transaction costs are small, defaults should have little impact on economic outcomes; agents will opt out of any default that is not consistent with their preferences. In practice, however, defaults can significantly impact outcomes, even in domains in which the outcome is consequential (financially or otherwise) and even when the direct transaction costs of opting out of the default are small. One such domain is savings. In the United States, savings plan participation rates are substantially higher when the default is automatic enrollment in the savings plan (i.e., individuals must opt out if they prefer not to save) than they are when individuals must take action to participate in the savings plan. In the first study of the impact of automatic enrollment on savings outcomes, Madrian & Shea (2001) document a 50–percentage point increase in savings plan participation for newly hired employees at a large employer that switched from an opt-in to an opt-out automatic enrollment regime. Other subsequent studies document similar participation rate increases (Choi et al. 2004, 2006; Beshears et al. 2008; Vanguard Group 2013). In related research, Thaler & Benartzi (2004) show that enrolling individuals in a program that automatically increases savings plan contributions each year substantially raises deferrals over a four-year period.

These findings have motivated several policy reforms to increase retirement savings. In the United States, the Pension Protection Act of 2006 incorporated provisions to encourage employer adoption of automatic enrollment with automatic contribution escalation (see Beshears et al. 2010 for a discussion of how economic research influenced this legislation). In 2007, New Zealand implemented KiwiSaver, a program that automatically enrolls employees into a national savings plan (see Toder & Khitatrakun 2006). And recent pension reform legislation in the United Kingdom requires firms to automatically enroll employees in occupational pensions (see UK Department for Work and Pensions 2012).

Although automatic enrollment leads to unambiguous increases in savings plan participation, its effects on asset accumulation and social welfare are less certain. First, the savings plan contribution rate set as the default under automatic enrollment is extremely persistent so that asset accumulation is very dependent on whether the default contribution

rate is set high or low.[2] In the United States, most employer savings plans with automatic enrollment have a low default contribution rate of 2–4% of pay. The default contribution in New Zealand's KiwiSaver program is 3%. Research suggests that some individuals who persist at these low default contribution rates would have chosen a higher savings rate in the absence of automatic enrollment (Madrian & Shea 2001, Choi et al. 2004). Thus, although automatic enrollment increases asset accumulation within the plan for individuals who would otherwise have been nonparticipants, it may have the perverse effect of lowering asset accumulation for some individuals who would have saved on their own at a contribution rate higher than the default in the absence of automatic enrollment (those who do not opt out of the default contribution rate). Second, the increased asset accumulation in savings plans subject to automatic enrollment could be offset by leakage from the savings plan before retirement, by lower savings elsewhere, or by increased household debt. There is little evidence on the magnitude of these potential offsets, although a recent study by Chetty et al. (2014) on the impact of a short-term mandatory savings program in Denmark suggests that the extent of crowd out for that program was quite limited. Finally, automatic enrollment may induce some individuals to save who might actually be worse off as a result.

A second policy-relevant domain in which defaults have significantly impacted outcomes is organ donation (Johnson & Goldstein 2003). In many countries, individuals must sign up to be potential organ donors at their death (informed consent), and as with savings plan participation rates when individual must opt in, the fraction of people who sign up to be organ donors is relatively low. Other countries have a system of presumed consent (individuals must opt out if they do not wish to be organ donors), and in these countries, the fraction of people who opt out of organ donation is extremely low. Abadie & Gay (2006) show that actual organ donation rates are 25–30 percentage points higher in presumed-consent countries relative to informed-consent countries, a finding that has precipitated calls for a switch from informed to presumed consent in the former countries.

Although savings and organ donation are the domains in which defaults have received the most attention, there are several other policy-relevant domains in which defaults impact outcomes. In the health arena, influenza vaccines are an intervention for which the estimated benefits exceed the costs of provision (see Nichol et al. 1994, Wilde et al. 1999), yet vaccination rates are well below recommended guidelines. Chapman et al. (2010) estimate that giving individuals a default flu shot appointment time increases vaccination rates by 12 percentage points relative to a baseline vaccination rate of 33%. In the domain of household finance, defaults have been found to impact payday loan repayment. In Colorado, 86% of payday borrowers follow the default option of a 180-day installment loan after their initial loan term, relative to only 10% in Washington, where an installment loan is merely an option rather than a default (Pew Charit. Trusts 2013). Motivated by a desire to reduce consumer use of expensive overdraft coverage, the 2009 CARD Act mandates that financial institutions require consumers to proactively opt in to overlimit coverage on debit and credit card accounts rather than opt out, which had been the prevailing norm. Defaults also impact environmental conservation outcomes; Sunstein (2013b) cites dramatic differences in green

[2]There is substantial persistence and the default asset allocation as well.

energy use in German cities where consumers must opt in versus opt out of purchasing their energy from so-called green sources.

Despite the large body of evidence that defaults impact economically important outcomes, the academic literature has given little consideration to what constitutes an optimal default. Under what conditions is presumed consent socially preferable to informed consent? Do the benefits of higher influenza vaccination rates when individuals are given a default appointment outweigh the costs that accrue when the majority of such individuals fail to show up or cancel their appointment? Should the default contribution rate in a savings plan with automatic enrollment be high or low? And how does changing the default compare to other policy options that could be used to change behavior? Characterizing the nature of optimal defaults is a worthy area of future research.

Carroll et al. (2009) posit that in the case of substantial heterogeneity in consumer preferences, specifying a default may be suboptimal because any default is unlikely to align well with consumer preferences for more than a small minority of individuals. If present bias is an important barrier to consumers' implementing their preferences in the presence of heterogeneity, one intervention that counters procrastination while respecting the diversity of preferences is to require an active choice. In the savings domain, Carroll et al. (2009) compare the outcomes in an employer-sponsored savings plan before and after employees were compelled to make an active choice about whether to participate. They find that when not required to make a choice (opt in), only 41% of newly hired employees enrolled in the savings plan. In contrast, when required to make an active choice about savings plan participation (which could include not participating in the savings plan), 69% enrolled. The 28–percentage point increase in savings plan participation, although not as large as the effects estimated from moving from opt-in to opt-out enrollment, preserves greater heterogeneity in savings plan contribution rates than does automatic enrollment, which tends to corral participants into the contribution rate specified as the default. In the domain of health, in which there is likely to be substantial preference heterogeneity, Beshears et al. (2013a) examine an active choice mechanism to initiate home delivery for long-term prescription drug medications. Under an opt-in regime, take-up of home delivery is low, around 6% of those eligible. The adoption of an active choice approach leads to a sizeable 35–percentage point increase in home delivery adoption. Because home delivery is cheaper than retail pharmacy pick up for many drugs, the switch from retail pick up to home delivery leads to a meaningful reduction in prescription drug expenditures. Similarly, Keller et al. (2011) find that requiring an active choice leads to substantive increases in enrollment in an automatic prescription drug refill program. Active choice has been advocated as a way to increase consent rates for organ donation (Spital 1995) and has been implemented with some success on this front in the United Kingdom, California, and Texas as a part of the driver's licensing process (see http://nudges.org/tag/organ-donation/).

Interventions involving active choice forestall procrastination by requiring (or strongly encouraging) individuals to make a decision. A related idea is to constrain the time window in which individuals can take action without necessarily requiring a choice. O'Donoghue & Rabin (1999) suggest such an approach as a way to encourage timely retirement savings

plan investment reallocation; similarly, Johnson et al. (2012) propose using time-limited windows for policy initiatives such as home energy-efficiency improvement tax credits.

One factor that may generate procrastination in the execution of personally and socially desirable behaviors is the complexity of the task involved. If complexity is the barrier to action, then a natural solution is to simplify the task at hand. One example that has received a fair amount of attention is the process of applying for college financial aid in the United States (Dynarski & Scott-Clayton 2006). Until fairly recently, the gateway to financial aid, the FAFSA form, was eight pages long and included over 100 questions. As a consequence, a sizeable fraction of eligible students did not even bother to apply for financial aid. Bettinger et al. (2012) study a field experiment designed to simplify the financial aid application process by having paid tax preparers help individuals complete the FAFSA form at the time when applicants file their federal taxes. They find that this approach to simplifying the aid application process increases the fraction of targeted families with high school seniors who apply for college financial aid by 16 percentage points; it also increases the fraction of children who actually attend college by 7 percentage points. The effects of this relatively inexpensive intervention are large relative to the estimated effects of changing the price of college (Hansen 1983; Kane 1995; Dynarski 2000, 2003; Seftor & Turner 2002). The US Department of Education has subsequently implemented its own efforts to simplify the financial aid application process.

Hastings & Weinstein (2008) study the impact of simplifying information provision on school choice outcomes in the Charlotte-Mecklenberg school district, which implemented a school choice program in 2002. Initially, the information provided to facilitate choice was unwieldy—more than 100 pages of descriptions provided by the schools with no objective data and no tools to facilitate direct comparisons. The district eventually moved to providing families with a much shorter, three-page list of test scores sorted alphabetically and subsequently cooperated in a field experiment to test the provision of an even simpler one-page information sheet with test score data confined only to schools relevant to each student. Hastings & Weinstein (2008) estimate a sizeable 5– to 7–percentage point increase in the fraction of families choosing a nonguaranteed school in response to simplified information provision (although they find no difference between the three- and one-page information disclosures); importantly, the parents who exercise the choice option also choose better-performing schools when they receive the simplified disclosures.

Simplification is an approach that has also been successfully applied to increase savings plan participation and contribution rates. The essence of these interventions is to send individuals a simple form with a single box and instructions to “check here” to initiate participation in the savings plan at a prespecified default contribution rate and asset allocation or, in a separate form, to increase savings plan contributions to the match threshold in the plan. Choi et al. (2010)] and Beshears et al. (2013b) find an approximately 10–percentage point increase in the targeted behaviors in response to the simplified enrollment and contribution rate change campaigns. Moreover, they find that these effects diminish only somewhat over time so that repeated simplified messaging results in even larger increases accumulated over time.

In the book *Simpler*, Sunstein (2013a) articulates many ways that the US federal government used behavioral insights to streamline and simplify government regulation under the Obama administration's first term. The tax code, unfortunately, is one area that was not successfully reformed with an eye toward simplification, although many have called for such changes.[3] Other countries are following suit in simplifying regulation. For example, Mexico recently restricted the types of fees that investment providers in its privatized social security system are allowed to charge in an attempt to facilitate easier comparison of the fees being charged and thereby stimulate greater market competition between investment providers to lower fees (Duarte & Hastings 2012).

Complexity has also been cited as a potential explanation for low take-up among those eligible for social safety net programs such as Temporary Assistance for Needy Families, Supplemental Security Income, Supplemental Nutrition Assistance Program, and the Earned Income Tax Credit (EITC). Bhargava & Manoli (2011) ran a field experiment in conjunction with the Internal Revenue Service (IRS) to evaluate the effectiveness of different approaches to communicating EITC eligibility to taxpayers who did not claim the EITC but appeared eligible. The most effective intervention studied was replacing the standard IRS mailing with one that incorporated a simplified message about potential eligibility and a simplified worksheet for calculating the potential amount of the credit. This approach increased EITC take-up by 10 percentage points relative to a baseline take-up rate of 16% among those who received the traditional IRS notices.

Note that there is a fundamental tension in simplifying the process for obtaining government aid. On the one hand, a complicated procedure creates a hassle cost that will ideally reduce the incentives to feign eligibility by those who are not (Nichols & Zeckhauser 1982); on the other hand, a complicated procedure also creates a hassle cost for those who are eligible, leading many eligible not to apply, with potential implications for their economic well-being as well as for program costs. The policy tool then is best characterized as the level of procedural complexity, which can be set high or low to achieve different policy outcomes.

The three types of interventions discussed above—changing the default, requiring an active choice, and simplifying—are examples of what Thaler & Sunstein (2008) call choice architecture, the design of the environment in which people make choices. There are several additional choice architecture tools that policy makers can use to facilitate decision making that better aligns outcomes with consumer preferences (see Thaler & Sunstein 2008 and Johnson et al. 2012 for longer treatments on the tools of choice architecture). These include the following:

- A reduced number of options in a choice set. Toffler (1970) coined the phrase choice overload to describe the effects of having too many options from which to choose. These effects include procrastination, avoidance, dissatisfaction, reliance on imperfect heuristics, and potentially mistakes.

[3]Readers are referred to the recommendations of The President's Advisory Panel on Federal Tax Reform (2005) as just one example of many calling for a simpler US federal tax code.

- Decision aids. When choice is complicated, giving individuals access to tools or decision aids to facilitate the selection of the best option from a larger choice set can improve choice outcomes. Many popular websites (Amazon, Netflix, Google) use complicated algorithms to predict which options will be of most interest to consumers, but such approaches have relevance in the policy domain as well. For example, the Medicare.gov Medicare Plan Finder, which is designed to help seniors select the most appropriate prescription drug plan, is one example of such a tool in the policy domain of health.[4]
- Personalized information. When the optimality of a specific option depends on individual attributes of a given consumer, providing personalized information specific to the choice context can improve decision outcomes. For example, Kling et al. (2012) find that providing seniors with individualized information on lower-cost Medicare Part D prescription drug plans induces greater switching to a lower-cost plan (an 11–percentage point increase) than providing generic information about the opportunity to switch drug plans (and results in lower expected costs to consumers as well).
- The presentation of attributes in a way that facilitates informed consumer decision making. Larrick & Soll (2008) show that consumers make more accurate decisions about automobile fuel savings when fuel efficiency is expressed as gallons per 100 miles than with the more traditional miles per gallon measure (the so-called MPG illusion). This is because the relationship between gallons per mile (the measure that matters for determining relative fuel efficiency) and miles per gallon (the measure that matters if you want to know how far you can drive on a full tank of gas) is nonlinear, and consumers do poorly in evaluating nonlinear relationships. The US Environmental Protection Agency has recently revised its fuel economy labeling requirements to increase the prominence of expected annual fuel expenditures to help facilitate better fuel economy comparisons. Stango & Zinman (2009) show a related phenomenon in household financial decision making: Individuals linearize exponential functions, which leads them to underappreciate the cumulative interest costs of long-term debt and the long-term gains from savings due to compounding. The CARD Act of 2009 mandates changes in credit card statements to help consumers better recognize the costs of debt: Financial institutions must report the time it would take to pay off a credit card balance if making only the minimum monthly payment as well as the monthly payment required to pay off the balance in three years.
- Standardized options to increase comparability. Gabaix & Laibson (2006) posit that firms engage in intentional obfuscation of relevant product attributes to reduce the ability of consumers to directly compare the costs and benefits of different options (shrouded attributes). This obfuscation can be a source of market power to firms and can also increase the likelihood that consumers make mistakes in their decision

[4]Health care is a domain that has seen the development of several decision aids designed to help consumers make better informed choices about their medical treatment. Ubel (2013) discusses the inherent difficulties in assessing the effectiveness of the many decision aids in this context.

making. One regulatory approach to facilitate comparison shopping is to standardize product attributes. For example, supplemental Medigap insurance coverage for senior citizens must conform to one of 10 profiles (denominated with letters of the alphabet) delineated by the Centers for Medicare and Medicaid Services.

- Feedback. For some decisions, consumers may have difficulty linking their actions with the outcomes they experience and the outcomes they desire. For example, consumers may see their monthly utility bills and have little understanding about which behaviors will be most cost-effective in reducing future energy consumption. One approach in such settings is to provide better feedback about the link between actions and outcomes. Darby (2006) reviews the literature on providing consumers with feedback on home energy consumption. In general, the studies suggest that direct feedback (e.g., a real-time energy use display monitor) reduces energy consumption by 5–15%, whereas indirect feedback (e.g., better information on energy consumption as part of the monthly bill) reduces energy consumption by 0–10%.

Commitment devices represent another category of interventions that can help individuals execute their preferences in contexts in which they are likely to succumb to temptations that generate short-run benefits that are outweighed by longer-term costs.[5] In the most influential paper in the literature on commitment devices, Ashraf et al. (2006) evaluate a field experiment that offered a commitment savings account to clients of a local bank in the Philippines. Participating clients who opted for the commitment savings product voluntarily restricted their right to withdraw their savings until reaching either an individually chosen goal date or an individually chosen goal amount. Relative to a control group not offered the commitment savings product, those offered the commitment account had bank balances that were 82% higher 12 months later. Corroborating work on commitment savings products in other countries includes Gugerty (2007), Ashraf et al. (2011), Brune et al. (2011), and Dupas & Robinson (2013). This research provides a rationalization for restrictions on the ability to access retirement savings account balances before reaching retirement age.

Soman & Cheema (2011) evaluate an interesting variant of a commitment savings technology in a field experiment targeted at unbanked construction laborers in rural India who are paid cash wages. Individuals earmarked a certain amount of their weekly wages as savings that was then set aside in either one (nonpartitioned) or two (partitioned) sealed envelopes. Realized savings was 39–216% higher for workers whose savings were partitioned into two envelopes rather than put all into one envelope. The authors hypothesize that opening a savings envelope, or violating the partition, induces guilt. Having multiple accounts, or partitions, increases the psychological cost of spending money set aside for a specific purpose and consequently increased the amount saved. The results of this study suggest that having multiple purpose-specific savings accounts may be a more effective way to encourage savings than having individuals rely on multipurpose savings accounts (e.g.,

[5]Readers are referred to Bryan et al. (2010) for a review of the literature on the theoretical motivations for commitment devices, the experimental and field evidence on the demand for commitment, and the impact of commitment devices on outcomes.

having both a retirement income account and a retirement health account may induce higher savings than a single generic retirement account).

Agricultural productivity is another policy domain in which commitment products have policy relevance. Duflo et al. (2011) study several approaches to increasing fertilizer use by farmers in rural Kenya. The context is interesting because there are clear benefits to fertilizer usage, and most farmers understand these benefits and plan to use fertilizer, yet only a minority do so, citing limited financial resources when the time comes to apply fertilizer. Some farmers were given the opportunity to prepay for the next season's fertilizer at the end of this season's harvest when financial constraints are less binding, essentially precommitting to fertilizer usage by prepaying. Fertilizer utilization the next season was approximately 20 percentage points higher for those offered the prepay option relative to farmers in a control group; fertilizer utilization was also higher relative to famers who were offered a price subsidy in the next season (but not the option to prepay at the end of the previous season's harvest). These results suggest both that there is a demand for commitment and that commitment devices can result in meaningful changes in behavior.

Research in psychology has identified a lack of planning as another barrier that impedes individuals from executing on their preferences (Gollwitzer 1999, Gollwitzer & Sheeran 2006). Without a plan for implementation, individuals who face competing demands for their attention are prone to forget what it is they wanted to do. Encouraging people to form a plan to carry out their intentions has been shown to increase the attainment of desired goals in a variety of policyrelevant domains.[6] For example, Lusardi et al. (2009) study the impact of helping employees form and implement a savings plan through the provision of a planning aid that (*a*) encourages individuals to set aside a specific time for enrolling in their savings plan, (*b*) outlines the steps involved in enrolling in a savings plan (e.g., choosing a contribution rate and an asset allocation), (*c*) gives an approximation of the time each step will take, and (*d*) provides tips on what to do if individuals get stuck. This planning aid increased enrollment in the studied employer-sponsored savings plan by 12–21 percentage points for newly hired employees.

Nickerson & Rogers (2010) evaluate the effectiveness of prompting individuals to make a concrete voting plan by asking them a series of questions: (*a*) "Around what time do you expect to head to the polls on Tuesday?" (*b*) "Where do you expect you will be coming from when you head to the polls on Tuesday?" (*c*) "What do you think you will be doing before you head out to the polls?" They find a 9–percentage point increase in voter turnout among voters from singlevoter households, who they posit are less likely to have other support mechanisms in place to encourage voting (this effect is more than twice as large as the next best get-out-the-vote script); they find no effect of this intervention among individuals in multivoter households, presumably because, in these households, individuals encourage and remind each other to vote and effectively substitute for the formal planning prompt. In the health domain, Milkman et al. (2011) evaluate the impact of prompting employees to make a concrete plan for the date and time they will get a seasonal flu shot and find a 4–percentage

[6]Readers are referred to Rogers et al. (2013) for a review of the literature on implementation intentions (planning) and a discussion of the psychology around how plan making impacts behavioral outcomes.

point increase in vaccination rates relative to a baseline rate of 33% among members of the control group. Other studies similarly find that prompting individuals to make a plan increases the frequency of other prompted health behaviors, including tetanus shots (Leventhal et al. 1965), cancer screening (Sheeran & Orbell 2000), healthy eating (Gollwitzer & Sheeran 2006), colonoscopy (Milkman et al. 2013), and mammography (Rutter et al. 2006). In the educational domain, Duckworth et al. (2011) show that having an implementation plan increases the test preparation efforts of high school students. From a policy standpoint, these types of interventions have the attractive feature that they are low cost so that even if their effects on behavior are modest, they may rank highly on the basis of cost-effectiveness relative to other potential interventions. Such interventions could be effective at encouraging a variety of other socially desirable behaviors, such as purchasing life insurance, procuring a will, or switching to energy-efficient light bulbs.

A natural complement to planning aids is the provision of reminders to follow through on a desired course of action. Both planning prompts and reminders are extremely low cost and scalable interventions that address the procrastination that arises because of limited attention. Reminders can take a variety of forms. Austin et al. (2006) show that a verbal reminder immediately before entering a car increases the fraction of drivers buckling their seat belt by 25 percentage points, whereas a reminder given several minutes beforehand has almost no impact. Reminder letters are among the most cost-effective ways to encourage immunization, increasing immunization rates by 8 percentage points on average (Briss et al. 2000, Szilagyi et al. 2000). Reminders have also been effective at encouraging savings. Karlan et al. (2013) evaluate the impact of providing reminders, either text messages or letters, on savings goal attainment in Bolivia, Peru, and the Philippines. They find that reminders increase the likelihood that individuals achieve their savings goals by 3 percentage points and increase the amount saved by 6 percentage points. Similarly, in a savings field experiment conducted in Chile, Kast et al. (2012) find that individuals who received text message reminders saved substantially more than individuals who did not. Soman & Cheema (2011) study visual reminders; they find that lowincome laborers in India saved 15% more when the envelope with their earmarked savings was covered with a picture of their children than when it had no picture. A combination of planning aids and reminders could be an effective way to encourage more active job seeking for workers who have lost a job or to encourage more environmentally conscious behavior on the part of consumers.

4. BEHAVIORALLY INFORMED POLICY TOOLS TO CHANGE HOW INDIVIDUALS EVALUATE COSTS AND BENEFITS

The preceding section of the article focuses on interventions to help individuals execute their preferences that may be aligned with, or are closer to, socially optimal outcomes than what may be observed in the market. Sometimes, however, individual preferences do not align with socially optimal outcomes. In these cases, a different set of policy tools may be called for. As noted in Section 2, the tools traditionally used to change behavior are price mechanisms (taxes/fines to inhibit behavior or subsidies to encourage it), information provision, or regulation. But an understanding of psychology may help inform a set of more

cost-effective mechanisms to change behavior than these traditional tools. The previous section discusses how choice architecture can be used to help individuals execute their preferences. Choice architecture can also be used to change how individuals evaluate the costs and benefits of different choice outcomes. Alternatively, choice architecture could be viewed as a way of impacting how individual preferences are constructed or expressed (Payne & Bettman 1999).

For example, one reason for the persistence of defaults noted above is that decision makers, unsure of the best course of action, may take the default as an implicit recommendation set by a benevolent planner. If so, a naïve decision maker may see little reason to move away from a default. The perception of an endorsement increases the perceived benefit of the default outcome. There is evidence that defaults do create such endorsement effects in the context of savings (Madrian & Shea 2001, Choi et al. 2004).

There are several other tools of choice architecture for changing how individuals evaluate the costs and benefits of their actions. One insight from psychology is that individuals do not make absolute evaluations when making judgments. Rather, they make evaluations relative to a reference point. As consequence, policy can be used to help set the reference points that individuals use, a process called framing (Kahneman & Tversky 1984). One of the foundational theories in behavioral economics, prospect theory, posits that individuals are twice as sensitive to losses as they are to gains of an equal magnitude and that gains and losses are evaluated relative to an endogenously chosen reference point (Kahneman & Tversky 1979). A natural consequence of this theory is the possibility of influencing behavior by changing whether individuals perceive an outcome as a gain or a loss. One area of policy application is tax collection. A natural reference point for taxpayers at the time of tax filing is whether they owe additional tax (relative to what has already been collected) or expect a refund. Engström et al. (2013) find that in Sweden, taxpayers are more aggressive about claiming deductions when they owe additional tax at the time of filing than when they expect a refund, consistent with the predictions of prospect theory. An obvious policy implication is that a tax collection strategy that relies on overwithholding followed by refunds at the time of tax filing may increase tax compliance and total taxes paid. Interventions that recognize individuals' aversion to loss have also been studied in the policy domains of education (Fryer et al. 2012) and re-employment following periods of unemployment (Bloom et al. 2001).

Framing need not be relative to a reference point to have an impact, as in the previous example. For example, Bryan et al. (2011) compare the impact of different ways of framing voting on turnout in two significant elections. They find that voter turnout is several percentage points higher when the importance of voting is framed as a noun ("to be a voter") rather than as a verb ("to vote"). They posit that the noun formulation of voting invokes a valued personal identity and, by so doing, motivates higher turnout. One can easily imagine natural extensions to other policy-relevant domains: to be a saver, to be environmentally conscious, to be healthy, to be honest, and so on.[7]

[7]Readers are referred to Bryan et al. (2013) for experimental evidence showing that individuals are more likely to cheat when dishonesty is framed in terms of cheating rather than being a cheater.

A policy-relevant variant of framing involves the labels used to name or describe government programs. For example, Saez (2009) studies the impact of framing a financial incentive to open an Individual Retirement Account (IRA) at the time of tax filing either as a match or as a tax credit. This inquiry was motivated by a presumption that the Saver's Credit, a feature of the US tax code designed to encourage lower-income households to save, is largely ineffective because people do not understand tax credits. He finds that framing the incentive as a match is indeed more effective; doing so results in more individuals opening an IRA and increases the unconditional contributions to IRA accounts.

There has been a long literature on flypaper effects in economics—money tends to stick where it lands, even if it is otherwise fungible. A related finding is that how money is labeled also impacts how it is spent. In a policy context, the designated use of government transfers impacts how money is spent even if, in reality, the money is fungible. For example, Kooreman (2000) finds that the marginal propensity to consume children's clothing is 10 times larger out of income designated as a "child benefit" than out of other income sources; in contrast, the marginal propensity to consume adult clothing is highly significant for other income sources but is negligible for income from designated child benefits. The labeling of income as a "child benefit" apparently creates in parents a moral obligation to actually spend that money on their children. Similarly, Benhassine et al. (2013) evaluate the impact on school enrollment of a labeled cash transfer program in Morocco that designated the funds for children's education, although the funds could be used for other purposes. They find a sizeable increase in elementary school attendance by children in families who received the labeled cash transfer relative to children in control households who received nothing. They also find that a labeled cash transfer is as effective, indeed for some measures is more effective, at promoting school attendance than is a conditional cash transfer in which payments are made only if a child does in fact attend school (and is significantly less expensive to administer than a conditional cash transfer program).

These results clearly suggest that careful consideration should be given to the names attached to any government program. For example, consider how the names of three different programs that direct resources toward the unemployed might impact behavior. In the United States, these programs are referred to as unemployment insurance, a label that reinforces a recipient's status as unemployed; in contrast, in the United Kingdom, these benefits are referred to as a jobseeker's allowance, a name that emphasizes a recipient's attachment to and activity in the labor force. In Australia, these benefits were for a time referred to as work for the dole, a label that emphasizes the receipt of government benefits and has a pejorative ring to it.

Another application of how choice architecture can be used to change how individuals evaluate costs and benefits comes from the literature on ballot order and election outcomes. In many political jurisdictions, incumbents are listed on the ballot first. California has adopted a different approach to ballot order: Candidates are randomized to their position on the ballot. Ho & Imai (2008) use the naturally occurring variation in ballot order across the state to estimate the impact of ballot order on election outcomes. They find that being listed first on the ballot has an impact on general election outcomes only for nonpartisan

candidates; ballot order has a much larger impact in primary elections, where all candidates benefit from being listed first, and minor party candidates benefit most.

Shu et al. (2012) document another example of ordering effects. They find that asking consumers to sign a statement affirming that the information provided on an insurance form is true before filling out the form were more honest than consumers who were asked to sign the statement affirming their honesty after filling out the form. Yet most forms that request a signature affirming that the information provided is correct ask for this confirmation at the end. Moving the position of this signature request from the end to the beginning of the form has relevance in many policy areas, including tax filing and applications for a myriad of public assistance programs.

The importance of order effects in the outcomes discussed above suggests that other structural features of choice menus may also be relevant in policy design. In the field of financial security, the mix of retirement investment options selected by employees is responsive to changes in menu design. Benartzi & Thaler (2001) find that people exhibit a bias toward diversification and, in the extreme, apply a $1/N$ rule to decisions involving investments across an array of asset categories. Given that the financial impact of such a diversification bias depends on the mix of asset categories, employers could be encouraged by policy makers to offer retirement investment options that parse out favored investment categories.

The different choices and behavior of individuals in response to ad hoc or subjective categorizations are also visible in the field of health. Fox et al. (2005) find that offering individuals a selection from multiple categories of healthy foods and only one category of unhealthy food increased healthy food choices when compared to offering a selection from multiple categories of both healthy and unhealthy foods. Positive health choices have also been observed in response to the structural presentation of healthy options in ways that enable their convenient selection. For example, featuring healthy or unhealthy sandwich options at the start of a menu was found to substantially alter the likelihood of choosing a healthy sandwich by study participants (Wisdom et al. 2010). Research conducted for the US Department of Agriculture suggests that government-funded nutrition programs could use packaging or other presentation methods to help individuals monitor and control the volume of their food consumption (Just et al. 2007).

A final category of behaviorally informed interventions used to impact outcomes derives from the observation that individuals care not just about their own behavior in isolation, but rather evaluate it in a social context, that is, in terms of what others around them are doing and the judgments that others may pass on their behavior. For example, Gerber & Rogers (2009) show that voter turnout is higher when individuals are led to believe that expected voter turnout will be high rather than low. Similarly, Gerber et al. (2008) find that voter turnout is several points higher when individuals are led to believe that their neighbors will be informed ex post about whether they voted. The use of social comparisons has been widely used to influence household behavior in the domain of energy use and the environment. Alcott (2011), Alcott & Rogers (2014), and Costa & Kahn (2013) examine the impact of providing consumers with information on their own energy consumption and that

of their similarly situated neighbors. They all find that sending consumers home energy reports, which contain a social comparison element, diminishes home energy consumption.[8] Social norms have also been used to encourage tax compliance. In a recent test of a social norms approach to reducing tax delinquency, the UK Behavioral Insights Team finds that providing information to delinquent taxpayers on the fraction of people who pay their taxes on time increases tax compliance by almost 15 percentage points (Behav. Insights Team 2012). Although social norms hold some promise for changing behavior at relatively low cost, the effects do not always operate in the way predicted. For example, Beshears et al. (2013c) evaluate whether conveying social norms around savings can be used as a way to increase savings plan participation and contributions. They find a somewhat paradoxical result: Employees who received information on the fraction of their coworkers saving were actually less likely to save as a result. This raises questions about the contexts in which social norms will and will not impact consumer behavior, which is worthy of future research.

5. BEHAVIORALLY INFORMED INCENTIVES

In addition to the many nontraditional behaviorally informed policy tools for behavior change discussed in Sections 3 and 4, there is still a role for traditional policies such as financial incentives in the realm of behavior change. As noted in Section 2, if the impediment to behavior change is that the cost of undertaking a socially desirable action exceeds the private benefit, incentives, either positive or negative, provide one option that can better align benefits with costs to make behavior change attractive. But even within the realm of incentives, there are insights from behavioral economics that can help inform us about when to use incentives and how to structure them. Kamenica (2012) provides a more comprehensive review of the literature on behavioral economics and incentives; I focus here on a few insights that seem particularly relevant for evaluating incentives as a tool for changing behavior from a public policy standpoint.

Although incentives clearly have a role in economic life—many of us would not be working in our current jobs absent any compensation—nonfinancial incentives can be strong motivators in some contexts and may be less expensive than the financial incentive that would be required to generate a similar degree of behavior change. For example, Levitt et al. (2012) examine the effectiveness of several different incentive schemes to motivate student performance on standardized exams. They find that giving students a trophy for meeting performance targets, at a cost of about $3 per student, has roughly the same impact on test scores as a direct financial incentive of either $10 or $20, and in some cases is more effective.

Grant & Gino (2010) study the effort of salaried employees working in a university development office. Some were randomized into a business-as-usual treatment arm, while others were randomized into an “expression of thanks” arm. Employees in both groups received daily feedback on the number of fundraising calls they had made; in addition,

[8]Although the home energy reports evaluated in these studies have a social norm element, and the framing of these papers is largely around social norms, the home energy reports do have other elements that could contribute to reduced energy utilization.

employees in the second condition were visited by the director of annual giving who personally thanked them for their efforts with the following message: “I am very grateful for your hard work. We sincerely appreciate your contributions to the university.” The number of phone calls made each week increased by 50% for employees in the latter group after they were thanked, whereas the productivity of employees in the business-as-usual arm did not change over time. This study did not compare the impact of giving thanks with the impact of a financial incentive, but few studies on financial incentives in other contexts find productivity increases anywhere near this magnitude (and the cost of expressing thanks is virtually free).

Not only can nonfinancial incentives serve as effective motivators in certain contexts, financial incentives can sometimes backfire by crowding-out intrinsic motivation. Gneezy & Rustichini (2000b) show that providing small incentives for behaviors that otherwise tend to carry some level of personal reward can reduce intrinsic motivation and lead to lower performance relative to having no incentive at all. In a related paper, the same authors show that penalizing undesired behavior can also backfire (Gneezy & Rustichini 2000a); when a daycare provider started issuing fines to parents for picking up their children late, the number of late pick ups actually increased. Evidently, attaching a price to late pick up legitimized the behavior in the mind of parents (as long as they were willing to pay). Similarly, Frey & Oberholzer-Gee (1997) find that offering compensation for prosocial behaviors that are personally costly (in their study, the willingness to accept having a nuclear waste repository cited locally) dramatically decreases civic-minded behavior. Although the message of these papers is certainly not that financial incentives never work, they do suggest that incentives must be approached very carefully when the desired behavior has a prosocial element or provides some degree of intrinsic motivation.

Nonetheless, money may be a powerful motivator in many contexts. Lacetera et al. (2014) evaluate a large-scale field experiment that provided varying levels of compensation to donate blood. They find that donation rates increase with the size of the financial incentive. But consistent with the research on intrinsic motivation and incentives, they find that for individuals unaware of the reward when they showed up to donate blood, subsequent donation rates are lower relative to the case when there is no reward. In a study comparing financial and nonfinancial incentives, Just & Price (2014) evaluate a set of interventions around motivating elementary school children to eat more fruits and vegetables at lunch. Children in some schools were offered a financial incentive (25 cents) each day they consumed a fruit or vegetable, while children in other schools were given a lottery ticket entitling the winner to a tangible prize of roughly equivalent expected value. In this study, the quarter was more motivating than the chance to win a prize, although it is impossible to know whether the prize was less motivating because the students perceived it as being less valuable or because the uncertainty about whether the students would receive a prize made it less attractive.

In contexts in which incentives are a potentially cost-effective approach to change behavior, behavioral economics can inform us how to design incentives to make them maximally effective. For example, lottery-like incentives such as the one discussed above may actually be more motivating than linear financial rewards because individuals tend to overweight

small probabilities and underweight larger probabilities in their decision making (this is referred to as probability weighting in the prospect theory model of Kahneman & Tversky 1979). The implication is that if there are two payments of equivalent expected value, a small guaranteed payment and a much larger uncertain amount with a low probability of payment, the latter will be preferred because individuals overweight the low probability of the uncertain payout and act as if it has a higher expected value. In the health domain, lottery-based incentive schemes have been studied as inducements for weight loss (Volpp et al. 2008a), medication adherence (Volpp et al. 2008b), and blood donation (Goette & Stutzer 2008). The results indicate that lottery-based incentives generate greater compliance with the motivated behavior than the absence of an incentive, although none of these studies includes a linear payment condition; as a result, a comparison between lottery-based incentives and linear incentives with the same expected value cannot be made. Prospect theory probability weighting is also the motivation behind prize-linked savings products that are generally illegal in the United States but that have a long history and some popularity in other counties where they are allowed (Kearney et al. 2010). Whether prize-linked savings products actually increase savings is an open empirical question, although one recent paper finds suggestive evidence from a laboratory experiment that lottery-like payouts lead to greater consumption deferrals than do standard linear interest rates (Filiz-Ozbay et al. 2013).

The timing of incentive payments can also impact their effectiveness in motivating behavior change, more so than would be implied by standard discounting. If individuals have present bias, temporally proximate incentives will have a much greater impact than those in the future. Just & Price (2014) find that elementary school students are much more likely to eat a fruit or vegetable at lunch if offered an immediate incentive for doing so (a quarter today) relative to a slightly delayed incentive (a quarter in two weeks). Similarly, List et al. (2012) compare immediate versus delayed incentives for students' exam performance and find that exam performance improves when students are offered an immediate incentive, but delayed incentives have no impact at all. The delayed payment of incentives could help explain why some studies of student incentives for school performance find almost no effect on outcomes (e.g., Fryer 2011). These findings also suggest that providing incentives for certain behaviors through the tax code, which almost necessitates a temporal delay, may not be the most cost-effective approach to providing financial motivation.

Another factor that can impact the effectiveness of incentives is whether they are structured such that they are perceived as a gain or as a loss. Levitt et al. (2012) find that student incentives for test performance are more effective using a loss framing (students are given the reward and then told they will have to give it back if performance is inadequate) than a gain framing (students are told that if exam performance is adequate, they will receive a reward). Similarly, Fryer et al. (2012) compare the effectiveness of financial incentives to teachers for improving student exam performance using a gain framing (the incentive is paid to teachers at the end of the school year after student performance on the incentivized test has been measured) versus a loss framing (the incentive is paid to all teachers at the start of the school year, and teachers are told that they will be required to return the payment at the end of the school year if student exam performance targets are not met). They find that structuring the teacher performance incentive as a loss if targets are not met is almost twice as effective at raising exam performance as structuring the incentive as a gain.

For socially desirable outcomes that are the result of a complicated production process (e.g., education), another important factor in the design of an incentive scheme is the behavior or outcome to which the incentive is tied. Two studies on incentives in education in developing countries where pervasive teacher absenteeism is a significant impediment to educational improvement provide an interesting contrast in how to approach this issue. Duflo et al. (2012) study an incentive scheme in India that tied teacher pay to the number of days actually spent in the classroom each month rather than guaranteeing teachers a fixed monthly salary. They find a 21–percentage point decrease in teacher absenteeism with the incentive scheme compared to the fixed salary. In addition, higher teacher attendance also translated into improved test scores. Glewwe et al. (2010) study a teacher incentive scheme in Kenya where teacher absenteeism is also a problem. The scheme provided incentives to teachers for raising student test performance on a specific exam. They find increased student performance on the incentivized exam, but no better student performance on exams not tied to any incentive, and no change in teacher attendance, homework, or other pedagogy practices. The conclusion is that teachers are teaching to the test or perhaps, more precisely, are channeling effort only into those activities that directly impact their incentive payments. Although these studies are only two in a long literature on incentives in education and other domains, they suggest that incentives work better when tied to behaviors that directly impact the outcome desired.

Overall, financial incentives appear to work best at motivating behavior change if they are simple, tied to controllable outcomes, the outcome matters, and the incentives reinforce what individuals already want to do. Incentives work less well when the structure of the incentive is complicated and when the link between effort and outcomes is less clear (the multitasking problem). And in some cases, incentives can backfire because they are too low or because they crowd out intrinsic motivation.

6. CONCLUSION

This article evaluates the implications of behavioral economics for the design of policy solutions to remedy market failures, redistribute resources, and collect tax revenue. There are at least three substantive insights that come from reviewing the behavioral economics literature as it relates to public policy. First, the psychological biases of consumers can generate market inefficiencies beyond the traditional taxonomy of market failures. Second, the effectiveness of traditional policy tools may be impacted by psychological considerations. And third, an understanding of psychology can expand the scope of policy tools available to remedy market failures, redistribute resources, and collect government revenue.

One policy domain long encouraged by traditional policy tools and more recently by behaviorally informed policy tools is retirement savings. Public policy has historically promoted private saving for retirement using financial incentives. In the United States, the primary inducement to save is the exemption of retirement savings plan contributions (up to a limit) from taxable income. The Joint Committee on Taxation places the magnitude of this tax expenditure in 2014 at $127.2 billion annually (Joint Comm. Tax. 2013). Lower-income taxpayers are also eligible for a refundable tax credit, the Saver’s Credit, as a further

enticement to save. In addition, public policy encourages employers who sponsor retirement savings plans to provide their own financial inducements for employees to save, namely the provision of an employer match.

A large body of literature has examined the price elasticity of savings. A rather consistent finding from this literature is that the behavioral response to changes in the price of saving is not particularly large. Madrian (2013) surveys the literature on the impact of one kind of financial incentive, matching, on savings plan participation and contributions. The studies using the most credible empirical methods find strikingly similar results in a variety of different contexts using a variety of different data sources: A matching contribution of 25% increases savings plan participation by roughly 5 percentage points. In statistical parlance, although the matching contribution *t*-statistic is significant, its partial R^2 is small.

The relatively small impact of financial incentives on savings plan participation suggests that a failure to save is not primarily the result of inadequate financial incentives. Rather, there are other barriers to saving not accounted for by traditional economic models and not addressed by traditional policy solutions. The literature on behavioral economics and savings outcomes points to a myriad of psychological frictions that impede savings, including present bias, complexity, inattention, and temptation. In many cases, countering these frictions leads to increases in savings plan participation and asset accumulation that surpass the effects of a matching contribution alone. This article reviews several behaviorally informed interventions to encourage increased savings that have a greater impact on savings outcomes than do financial incentives: providing defaults (automatic enrollment and contribution escalation), requiring an active choice, simplifying the enrollment process, providing individuals with planning aids, making commitment savings products available, and dividing savings into different partitions. A final behaviorally informed intervention—reminders—has a similar impact to providing financial incentives but is virtually free. All these interventions can be implemented at relatively low cost, at least in comparison to the financial incentive that would be required to generate the same degree of behavior change.

The example of savings shows the power of behavioral economics to help shape more cost-effective policy solutions. Savings is but one of the many domains discussed in this article in which behavioral economics has had, or has the potential to have, an impact on consequential policy outcomes. An important question for policy design is assessing which interventions, whether traditional or behaviorally informed, are most appropriate in which contexts. Several context-specific factors warrant consideration in such an analysis.

In some contexts, individual preferences may be aligned with what is socially optimal, but individuals may have trouble executing those preferences. If this is true across the board, then policy interventions that move individuals in the direction of what is both individually and socially optimal can be Pareto improving—they can make everyone better off without making anyone worse off. Such interventions can be judged by their cost-effectiveness—how much bang for the buck do they deliver? Similarly, individual behavior may be privately optimal but may deviate from what is socially optimal in a fairly uniform fashion. For example, everyone may engage too much in activities that generate negative

externalities (e.g., pollution) and too little in activities that generate positive externalities (e.g., vaccinations). In this case as well, policy interventions that move individuals in the direction of what is socially optimal can improve social welfare and can be judged by their cost-effectiveness.

The most interesting set of contexts involves those where there is heterogeneity in the extent to which individual outcomes deviate from what is individual and/or socially optimal. For example, some individuals may be saving at a socially optimal level, while others may be saving too little. In these situations, policy interventions may generate distributional effects that warrant consideration. Of particular concern is the potential that a policy intervention may in fact cause harm to some individuals. For example, one criticism of using a change in the default to influence outcomes is that many individuals tend to persist at the default option. Indeed, it is this feature of defaults that makes them so attractive from the perspective of trying to effect behavior change. If those for whom the default is socially optimal persist at the default, while those for whom it is not opt out, there may be little cause for concern. But it may be that the default outcome is most persistent for those who are least well informed, and as a result, individuals for whom it is not appropriate could be made worse off.

The interventions enumerated in this article vary in their potential to do harm. Some seem unlikely candidates to reduce welfare for anyone: providing individualized information, giving feedback about the relationship between behavior and observed outcomes (e.g., energy consumption), and presenting attributes in a way that facilitates informed decision making. Others have a greater potential for harm: changing the default option, framing, introducing social influence, and providing commitment devices. When interventions have a heterogeneous impact, and there is potential for harm, the benefits to individuals who are made better off must be weighed against the costs to those who are harmed in determining which interventions have the greatest impact on overall social welfare. In assessing the scope for harm, an important possibility is that the loss function may not be symmetric. For example, the harm from donating the body organs of a deceased individual whose family is opposed to organ donation may differ from (and likely exceed) the harm of not donating the body organs of a deceased individual whose family supports organ donation. A different set of policy tools may be called for in contexts in which there is little scope for harm or the scope for harm is limited relative to contexts in which the scope for harm is more sizeable, in terms of either the number of individuals affected or the magnitude of the harm to those hurt.

Although this article cites many examples of behaviorally informed interventions that have had an impact on policy-relevant outcomes, there are still many fruitful directions for future research in this area. First, we need more evidence comparing different behaviorally informed policies to each other and to the traditional tools of public policy. Second, we need more theoretical and empirical research into the contexts that best lend themselves to different types of interventions (e.g., when is a default preferable to using social influence and vice versa). Relatedly, we need more research on the contexts in which behaviorally informed interventions work well, do not work at all, or can actually backfire. Third, we need more research into the long-term impacts of behaviorally informed policy

interventions. To what extent do the (mostly) short-term effects documented in the existing literature persist, and to what extent are they undone or attenuated with time?[9] Finally, we need more research calibrating the impact of behaviorally informed interventions to the benchmark of social optimality rather than to the status quo. This of course requires taking a stand on what is socially optimal, a task that admittedly is easier said than done.

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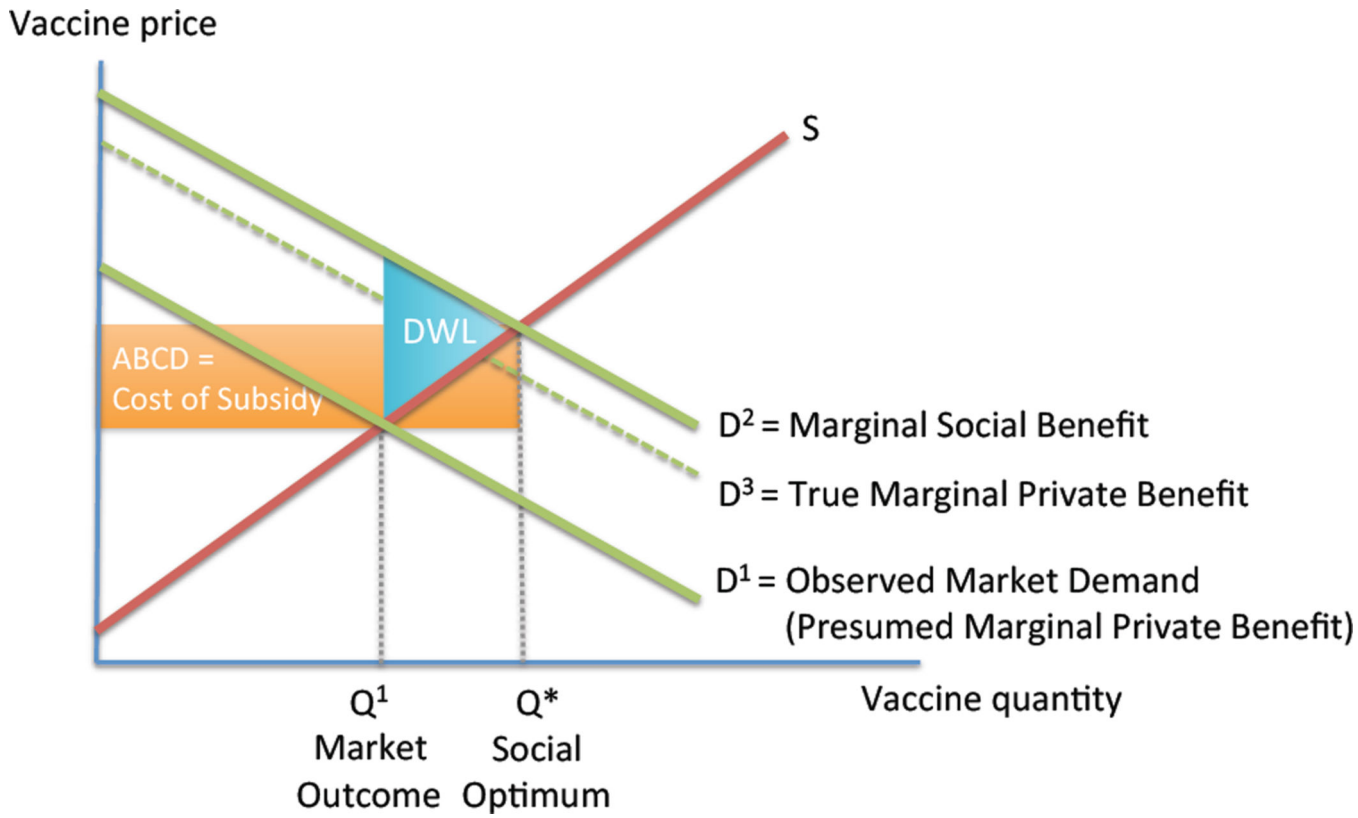

Figure 1.
Market Failure in the Case of a Positive Externality