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Nudging the Nudger: Toward a Choice Architecture for Regulators

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ABSTRACT

Behavioral research has shown that individuals do not always behave in ways that match textbook definitions of rationality. Recognizing that "bounded rationality" also occurs in the regulatory process and building on public choice insights that focus on how institutional incentives affect behavior, this article explores the interaction between the institutions in which regulators operate and their cognitive biases. It attempts to understand the extent to which the "choice architecture" regulators face reinforces or counteracts predictable cognitive biases. Just as behavioral insights are increasingly used to design choice architecture to frame individual decisions in ways that encourage welfare-enhancing choices, consciously designing the institutions that influence regulators' policy decisions with behavioral insights in mind could lead to more public-welfare-enhancing policies. The article concludes with some modest ideas for improving regulators' choice architecture and suggestions for further research.

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[3] This working paper reflects the views of the author, and does not represent an official position of the GW Regulatory Studies Center or the George Washington University. The Center's policy on research integrity is available at http://regulatorystudies.columbian.gwu.edu/policy-research-integrity.

Introduction

Economists have long recognized that the model of individuals as "homo-economicus," while useful, oversimplifies human behavior. A large and growing behavioral economics literature, building on psychology insights, has identified cognitive biases that may cause people to make systematic errors in judgments and decisions (Tversky & Kahneman 1974). These insights have mainly been applied to individuals acting on their own behalf as consumers, investors, voters, etc. (Grimmelikhuijsen et al. 2017). Policymakers are increasingly called on to recognize predictable cognitive biases when regulating individual behaviors or market transactions (Allcott & Sunstein 2015) and to design the "choice architecture" that frames individual decisions to "nudge" people toward choices that make them better off, according to their own judgment (Thaler & Sunstein 2008).

The focus of the behavioral economics literature is largely on correcting biases in the individuals to be regulated, without acknowledging that public officials responsible for writing regulations will face cognitive limitations and biases themselves (Tasić 2009, 2011). One review of leading studies in behavioral economics finds that, of those that recommend "paternalistic policies," 95.5% do not address the potential biases of the policymakers who are going to design or implement them (Berggren 2012; see also Schnellenbach & Schubert 2014). Implicit in much of the literature is that public decision makers' greater expertise, experience, and data allow them to avoid some of the cognitive irrationalities to which individuals may be subject (Allcott & Sunstein 2015).

Regulators, the career civil servants writing and enforcing regulations, are typically subject matter experts, economists, policy analysts, and attorneys in government agencies (Carrigan & Mills 2019). However, they are humans rather than robots and subject to "bounded rationality" (Simon 1945) just as individuals engaged in private interactions are. A growing literature explicitly recognizes this and attempts to challenge the assumption of objective rationality in regulators (e.g. BIT 2018; Cooper & Kovacic 2012; Hirshleifer 2008; Tasić 2009, 2011).

A stream of this scholarship is "behavioral public choice," which attempts to utilize behavioral insights as an alternative or complement to well-established public choice explanations for governmental decisions (for a survey, see Berggren 2012; Schnellenbach & Schubert 2014; see also Rachlinski & Farina 2002; Thomas 2019; Zamir & Sulitzeanu-Kenan 2017). The premise of the public choice school of economics is that individuals operating in the public sphere are driven by self-interest, similar to individuals in other circumstances. Applying behavioral theories to public decision makers adds another dimension to the theory by removing the assumption of rationality (Zamir & Sulitzeanu-Kenan 2017) and offers

useful insights regarding regulators' behavior (Lucas & Tasić 2015; Smith 2017; Viscusi & Gayer 2015).

The institutions within which regulators operate provide a choice architecture different from that which individuals face when making decisions for themselves. The interaction between the incentives those institutions provide and predictable behavioral biases has not achieved significant scholarly attention, yet could be very important. Regulators are human beings who face incentives and operate within constraints set by administrative practices, legislative authority, executive orders, and institutional norms. The decisions they make affect not only themselves but bind others. These and other institutional factors mean that regulators face a choice architecture that is undeniably different from that which individuals operating as consumers, workers, business owners, and voters face. Regulators' choice architecture also may differ from those of other public officials, such as politicians, legislators, and judges.

Recognizing that regulators are not immune from cognitive biases, this article attempts to understand how the institutions in which they operate interact with those biases. To what extent does the choice architecture in which regulators make decisions reinforce or counteract predictable behavioral biases? Just as behavioral insights can help design a choice architecture that frames individual decisions in ways that lead people to make choices that improve individual welfare (Thaler & Sunstein 2008), these insights may help us understand cognitive errors in regulators and design institutions to counter them, leading to public welfare improvements.

The article begins with a review of the emerging literature that delineates regulators' cognitive biases and their implications for public choice theory. It then reviews the implicit choice architecture embodied in the federal analytical and procedural framework for developing regulations and shows why outcomes can deviate from public interest goals. Next, it examines four illustrative cognitive biases that may be prevalent among regulators and how current institutions and procedures can aggravate or ameliorate them. Finally, it considers some possible institutional approaches to alter the choice architecture regulators face to improve regulatory procedures and outcomes and then concludes with some suggestions for future research.

1. An Emerging Behavioral Public Choice Literature

Modern behavioral economics largely originates from Herbert Simon's work on bounded rationality and Daniel Kahneman and Amos Tversky's research on cognitive biases. Simon (1945) observed that, even when making decisions for oneself, objective rationality is not always realistic due to the limits on human knowledge and reasoning. Instead, people focus on one or a few problems or alternatives at a time and rely on simple rules of thumb to make a satisficing (rather than optimal) decision—something he called bounded rationality (Simon 1945). Tversky and Kahneman (1974) extend this concept, demonstrating that reliance on a limited number of heuristic principles can lead to severe and systematic errors that deviate from rational decision making. Kahneman (2011) calls this intuitive reliance on simplifying shortcuts "System 1" thinking; it is automatic, unconscious, and fast. He differentiates it from "System 2" thinking, which relies on logic and evidence, and is effortful, conscious, and slow (Kahneman 2011). Although System 1 thinking is useful in many circumstances, it depends on heuristics that can lead to biases and suboptimal decisions (Kahneman 2011). Tversky and Kahneman (1974) identify a variety of cognitive biases in judgment and decision making.

Simon's and Kahneman and Tversky's work has not only paved the way for later studies in behavioral economics and subsequent calls for governments to consider behavioral biases when setting policy, but also served as a foundation for the emerging scholarship in behavioral public choice. In this field, early research focusing on regulation examines regulators' bounded rationality in risk regulation (Jolls et al. 1998; Kuran & Sunstein 1999; Viscusi & Hamilton 1999). In particular, the studies demonstrate the presence of the *availability heuristic* in regulatory decisions, showing that policymakers tend to assess the probability of certain harmful activities based on how easily such events are brought to mind, which can lead to over- or under-regulation of risks (Jolls et al. 1998; Kuran & Sunstein 1999).

Tasić (2009, 2011) expands the discussion by looking into more sources of regulatory errors, including *action bias, motivated reasoning, focusing illusion,* and *affect heuristic*, especially highlighting that regulators tend to suffer from *overconfidence* and a belief that they understand all the causes and consequences of the regulatory action they undertake. Although not referring to specific cognitive biases, Viscusi and Gayer (2015) provide more policy examples that suggest regulators are subject to bounded rationality in perceiving risks and losses and maintaining consistency in decisions across different policy domains.

Other studies provide evidence for regulators' cognitive biases in more specific policy contexts. For example, Gayer and Viscusi (2013) investigate fuel- and energy-efficiency regulations and argue that regulators might be *myopic* in exploiting behavioral economics to justify these regulations. Korobkin and Ulen (2000) observe that *hindsight bias* makes

accident regulation (e.g., air safety regulation) more easily justified after a fatal disaster has occurred. Several studies also analyze regulators' cognitive failures in financial regulation and monetary policy (Calabria 2018; Fligstein et al. 2017; Hirshleifer 2008).

Still, the discussions in the literature about regulators' behavioral anomalies are mostly conceptual, and the evidence is anecdotal. An exception may be Belle et al. (2018), who conducted ten randomized controlled trials showing that public workers responsible for designing policy interventions, management systems, and procedures are affected by *framing*, *anchoring*, *proportion dominance*, *status quo*, and *asymmetric dominance*. A growing body of scholarship has recognized cognitive limitations in regulators and policymakers in general. Although not exhaustive, Table 1 summarizes the major biases discussed in this literature with specific applications to regulators.

Recent research focuses on the implications of behavioral economics for public choice predictions of government policy outcomes. Some argue that the cognitive psychological theory can serve as an alternative to public choice and facilitate "an understanding of why some governmental structures are generally successful while others persistently fail" (Rachlinski & Farina 2002, p. 554). Others claim that cognitive biases compound policymakers' self-interested behavior (Cooper & Kovacic 2012; Zamir & Sulitzeanu-Kenan 2017).

Despite these advances, the interaction between behavioral and public choice theories is insufficiently examined. How cognitive biases interact with regulators' motivations and institutional constraints is not clear. This paper attempts to contribute to filling this gap in the literature. Applying the work of Thaler and Sunstein (2008), it considers the institutional structures that comprise regulators' choice architecture and how cognitive biases may affect regulatory decision making. The next section reviews the current U.S. regulatory process and argues that it is limited in constraining bounded rationality even in a well-intentioned regulator.

Table 1: A Taxonomy of Regulators' Cognitive Biases

Bias	Related Phenomena	Description	Private Examples	Regulatory Examples	Regulatory Consequences
Availability heuristic	▪ Action bias ▪ Salient effects ▪ Egocentric bias	People assess the frequency or probability of an event based on how easily it can be brought to mind.	Managers increase corporate cash holdings and express more concerns about hurricane risks following hurricane events, even though the actual risk remains unchanged (Dessaint and Matray 2017).	The EPA overestimated the risk levels in a number of Superfund cases under the Comprehensive Environmental Response, Compensation, and Liability Act (Viscusi and Hamilton 1999).	▪ Focusing on the effects of salient events while underestimating the undesirable side effects of a regulation (Hirshleifer 2008). ▪ Over- or under-estimating the likelihood of uncertain events (Jolls et al. 1998).
Myopia	▪ Time-variant preferences ▪ Hyperbolic discounting ▪ Present bias ▪ Narrow framing ▪ Focusing illusion ▪ Institutionalized myopia	People assess future benefits or costs using a much higher discount rate than the market interest rate, leading to a choice that overvalues present benefits or costs.	Vehicle purchasers appear to undervalue fuel efficiency, trading off $1.00 in discounted future gasoline cost savings for $0.76 in vehicle purchase price (Allcott and Wozny 2014).	Regulators myopically focus on fuel efficiency but ignore other consumer effects when setting Corporate Average Fuel Economy standards for heavy-duty vehicles (Gayer and Viscusi 2013).	▪ Focusing on certain aspects of a regulation while ignoring the wider context (Rizzo and Whitman 2009; Tasić 2011). ▪ Focusing on a single mission while excluding others (Gayer and Viscusi 2013).
Confirmation bias	▪ Motivated reasoning	People seek or interpret evidence in a way that supports existing beliefs or hypotheses while ignoring the contradictory evidence.	Supervisors tend to judge an employee as either good or bad and then to seek out evidence supporting that earlier established opinion (Müller and Weinschenk 2015).	Regulators responsible for setting ambient air quality standards tend to discount evidence that does not support their prior beliefs, while emphasizing studies that do (Dudley and Peacock 2016).	▪ Ignoring or misreading evidence contradictory to prior beliefs (Cooper and Kovacic 2012).

Bias	Related Phenomena	Description	Private Examples	Regulatory Examples	Regulatory Consequences
Overconfidence	▪ The illusion of explanatory depth ▪ Optimism bias	People are overconfident in their own abilities to comprehend problems and make judgments.	Individuals overestimate their relative performance in tournaments, even when they have information about the ability of the competition (Park and Santos-Pinto 2010)	The introduction of seatbelt mandates results in unintended "Peltzman effects"—drivers take greater risks when belted, leading to more accidents (Tasić 2009; Peltzman 1975).	▪ Undue confidence that they fully understand the problem and all the consequences of a regulation (Tasić 2009, 2011). ▪ Being overly optimistic about the effectiveness of policy proposals, leading to the adoption of too many interventions (Hirshleifer 2008; Cooper and Kovacic 2012).
Status quo bias	▪ Endowment effects ▪ Inertia ▪ Passive framing	People are reluctant to deviate from the status quo.	Offering automatic enrollment in retirement savings significantly increased employees' enrollment rates and average saving rates (Thaler and Benartzi 2004).	FDA is slow to approve new drugs, while imposing less stringent requirements on existing drugs (Viscusi and Gayer 2015).	▪ Being "sticky" to the previously adopted policies (Cooper and Kovacic 2012).
Representativeness heuristic	▪ Stereotype	People make a judgment on something based on their knowledge about something else that seems to be "similar."	Investors appear to believe that past returns are indicative of future returns (Chen et al. 2007).	Regulators will make assumptions based on observations in other contexts; for example, the "benefit transfer" method applies existing estimates of regulatory benefits to new contexts (OMB 2003).	▪ Affecting assessments of the correlation between two models or events. ▪ Focusing on the wrong set of problems and solutions (Cooper and Kovacic 2012).

Bias	Related Phenomena	Description	Private Examples	Regulatory Examples	Regulatory Consequences
Framing effects	▪ Loss aversion/ salience ▪ Risk aversion ▪ Extremeness aversion ▪ Ambiguity aversion	People make inconsistent decisions depending on how the choice problem is framed. If the choice is framed as a potential loss, people are more likely to be loss or risk averse.	Individuals demonstrated inconsistent behavior and varied levels of risk aversion in lottery choices when the lottery pairs appeared in different orders (Lévy-Garboua et al. 2012).	The FDA fails to approve drugs that can actually enhance health due to loss/risk aversion (Viscusi and Gayer 2015). The smoking regulations on airplanes became increasingly stringent due to extremeness aversion (Rizzo and Whitman 2009).	▪ Difficulty estimating low probabilities (Viscusi and Gayer 2015). ▪ Overestimating risks and forgoing social benefits (Hirshleifer 2008).
Affect heuristic	▪ Intention heuristic ▪ Prototype heuristic	People make judgments relying on their affective impression.	Individuals evaluate human hazards more negatively than natural hazards, due to the affect associated with the hazard per se (Siegrist and Sutterlin 2014).	Regulators adopt, with substantial public support, certain regulations that actually have adverse consequences, such as minimum wage and health care regulations, because it is perceived to be well-intentioned (Tasić 2011).	▪ Ignoring the real effects and unintended consequences of a regulation (Tasić 2011).

2. An Existing Regulatory Choice Architecture and Its Limitations

Unlike individuals acting on their own, regulators' decisions bind not only themselves but also the public. While, in an ideal world, policymakers would serve as selfless agents of the public interest, the public choice and political economy literature persuasively show that perfectly rational regulators respond to the incentives they face in ways that do not always align with public interest goals (Buchanan 1984; Glaeser 2004, 2006). This section briefly examines how the U.S. regulatory process attempts to align regulatory decisions with public interest goals and where it falls short.

Thaler and Sunstein (2008) introduce the concept of choice architecture, which consists of many features, noticed or unnoticed, that can influence decisions. For example, they suggest that the order in which food is displayed in a cafeteria may affect our lunch selection, and whether we are given a choice to opt in or opt out of plans setting earnings aside for retirement can have a large impact on how much we save (Thaler & Sunstein 2008). They argue that poor choice architecture can lead to suboptimal choices, while thoughtful choice architecture can counteract (or even exploit) cognitive biases and help people make better choices "as judged by themselves" (Thaler & Sunstein 2008, p. 5).

Though not explicitly described as such, regulators operate within a choice architecture that includes procedural and analytical requirements, statutory constraints, and organizational settings. In the U.S., the *prima facie* public interest rationale for government regulation has generally been to address market failures, such as the presence of market power, negative externalities, asymmetric information, or the suboptimal provision of public goods (Clinton 1993; OMB 2003). Behavioral economists have introduced an additional "behavioral market failure" rationale in the form of "internalities," or "costs we impose on ourselves by taking actions that are not in our own best interest" (Allcott & Sunstein 2015, p. 698).

In developing a regulation, Executive Order 12866 requires federal agencies first to identify a "compelling public need, such as material failures of private markets," and then to examine a set of meaningful alternative approaches, estimate the benefits and costs of each alternative, and choose the regulatory action that maximizes net benefits (Clinton 1993, p. 51735; OMB 2003). Since 1981, the Office of Information and Regulatory Affairs (OIRA) in the Office of Management and Budget evaluates significant draft executive branch regulations according to these principles and coordinates interagency review before they are published (Reagan 1981; Clinton 1993). Authorizing legislation and relevant judicial decisions are also important elements of the choice architecture agencies face when writing and enforcing regulations.

This regulatory analysis process has parallels to what Herbert Simon (1945) called "objective rationality," which would arrive at a solution "for maximizing given values in a given situation" (p. 85). In a precursor to modern behavioral economics, Simon observed that, even when making decisions for oneself, objective rationality is not always realistic due to the limits on human knowledge and reasoning. He asserted that individual behavior deviates from objective rationality in three ways:

- limited recognition of available alternatives,
- incomplete knowledge of possible consequences, and
- imperfect anticipation of the values associated with future consequences.

Regulators intent on serving the public interest can deviate from the ideal in the same ways. First, they may not appreciate that competition in markets can sometimes resolve inefficiencies without intervention when identifying available alternative approaches (Winston 2006). A study of 130 prescriptive regulations proposed between 2008 and 2013 finds that regulators often adopt costly regulations without justifying what significant problem they aim to address (Ellig 2016).

Second, regulators may not appreciate the unintended consequences of their actions. For example, vehicle safety regulations led (rational) drivers to take greater risks, which somewhat offset the risk reductions predicted during rulemaking (Peltzman 1975). While the minimum drinking age reduced alcohol consumption, it had the unintended consequence of increasing the prevalence of marijuana use (DiNardo & Lemieux 2001).

Third, when developing *ex-ante* estimates of regulatory benefits and costs, regulators never have complete information and must rely on assumptions and models to estimate the consequences that would follow from alternative policies (Dudley & Peacock 2016). Psychological research has shown that, with fragmentary information, people are more likely to make subjective judgments using System 1 rather than logical System 2 reasoning (Kahneman 2011). As a result, regulators might rely on unrealistic assumptions, draw on unreliable data and studies, overlook certain aspects of the regulation, or over- or under-estimate certain benefits or costs.

As such, boundedly rational regulators, even if they were purely motivated to serve the public interest, may not produce optimal policies. Lifting the assumption that regulators are selfless actors, as the public choice literature encourages us to do, contributes additional insights to explain why regulators take the actions they do. In fact, institutional incentives and constraints may create a regulatory choice architecture that in some ways makes the consequences of cognitive biases more pronounced for regulators than for individuals acting

on their own behalf. The next section explores four key cognitive biases and demonstrates how the existing regulatory choice architecture may influence them.

3. Cognitive Biases and Institutions

This section focuses on four widespread cognitive biases and related phenomenon in the regulatory context to explore how they interact with the unique institutions regulators face. These four—the availability heuristic, confirmation bias, myopia, and overconfidence—are by no means the only biases that can affect regulators, but they are among the most frequently identified in the literature and illustrate possible interactions between cognitive errors and institutional incentives.

3.1. The Availability Heuristic

The availability heuristic refers to a mental shortcut in which people assess the probability or frequency of an outcome based on "the ease with which instances or occurrences can be brought to mind" (Tversky & Kahneman 1974, p. 1127). For example, an individual may choose not to fly after a highly publicized airplane crash, while underestimating the greater, yet less salient, risk of death on the road. The availability heuristic can lead to action bias where people overreact to reduce the likelihood or consequences of a salient event, despite its low probability of occurrence (Sunstein & Zeckhauser 2011).

Some researchers observe that regulators are affected by the availability heuristic (Jolls et al. 1998; Kuran & Sunstein 1999). Instead of "material failures of private markets" or other "compelling public need" (Clinton 1993, p. 51735), regulatory agendas and policy shifts are often driven by salient social events and prevalent public attention (Hirshleifer 2008; Parrado 2018).

Kuran and Sunstein (1999) describe two channels through which the availability heuristic can affect risk perception associated with the promulgation of laws and policies. One is "information cascades" where people with incomplete information form their own beliefs based on the apparent beliefs of others, and the other is "reputational cascades" where people take positions to earn social approval and avoid disapproval (Kuran & Sunstein 1999).

Some research suggests that the characteristics of regulators and the environments in which they make decisions make them less susceptible to the availability heuristic. For example, using Kuran and Sunstein's (1999) categorization, information cascades occur when individuals have insufficient information or knowledge to make an informed judgment. However, compared to lay individuals, regulators possess expertise in their subject matter

and access to better data, which can make them less prone to information cascades. Regulators may also be less influenced by availability cascades than Congress or courts because they possess expertise on regulatory matters as well as an overview of the entire regulatory system (Kuran & Sunstein 1999; Rachilinski & Farina 2002). Further, regulators are usually required to develop a factual record to support regulation and to subject that record to OIRA interagency review and public comment before issuing a final rule, which may lessen the influence of the availability heuristic.

On the other hand, perfectly rational responses to institutional incentives may amplify regulators' reliance on the availability heuristic. While expertise and data may mean regulators suffer less from cognitive limitations leading to information cascades, those factors may not spare them from reputation cascades. Government agencies depend on support from political officials and the public, which can make their employees very concerned with the "available" events that interest those stakeholders. The incentive to avoid criticism that might undermine their reputations can make regulators less likely to take advantage of their greater knowledge and, instead, react unduly to public opinion about risk prioritization (Breyer 1995; Viscusi & Gayer 2015). This tendency results in wasteful or even detrimental regulations of salient risks and lack of attention to potentially more significant issues (Kuran & Sunstein 1999).

Moreover, regulatory agendas are generally set by the legislative branch, through legislation authorizing executive branch agencies to take regulatory action. Agency rulemaking is also subject to congressional influences through various informal mechanisms (McCubbins et al. 1987; Wood & Waterman 1991). Hence, if legislators with less subject matter expertise are more likely to rely on information cascades in writing law (Kuran & Sunstein 1999; Rachilinski & Farina 2002), the regulations authorized by the law and constrained by congressional attention (Yackee 2006) will be an indirect response to the salient events that have influenced the legislators.

The Superfund regulations are often used to illustrate regulators' reliance on the available heuristic in response to prevalent public fear about hazardous waste (Lucas & Tasić 2015; Viscusi & Gayer 2015). Viscusi and Hamilton (1999) point out that EPA's regulations overestimated risk levels at many Superfund sites. However, this may be a manifestation of legislators' availability heuristic. The Superfund statute (formally, the Comprehensive Environmental Response, Compensation, and Liability Act) was passed in 1980 largely in response to publicity surrounding the chemical waste leak into Love Canal, New York (Kuran & Sunstein 1999). Retrospectively, critics have suggested that insufficient evidence exists supporting actual health risks of the case or of corresponding benefits of the law (Jolls et al. 1998; Kuran & Sunstein 1999).

In sum, regulators' subject matters expertise and access to better data, as well as the scrutiny by OIRA and the public, can ameliorate the effects of the availability heuristic on their regulatory decisions, whereas their incentives to avoid criticism and protect their reputation, as well as the legislative control on rulemaking, may reinforce the heuristic's influence.

3.2. Myopia

Myopia (time variant preferences, hyperbolic discounting, or present bias) leads people to assess future benefits or costs using a time-inconsistent discount factor, thereby leading to choices that overvalue the present benefits or costs relative to long-term outcomes. The myopia derived from psychological limitations is assumed to be a result of cognitive constraints on processing life-cycle costs or to self-control problems. For example, consumers are considered myopic in their purchasing decisions when they incompletely understand all the lifetime costs of a durable good (Gabaix & Laibson 2006). This assumption serves as a major justification for the need for fuel- or energy-efficiency standards (EPA & NHTSA 2012).[4]

The behavioral public choice literature has focused on a different dimension of myopia in regulators—a horizontal rather than temporal one. Like consumers' inability to process life-cycle costs, regulators may suffer from cognitive limitations in considering effects outside of their policy focus. To distinguish this from the temporal myopia, some scholars refer to it as tunnel vision (Breyer 1995), narrow framing (Rizzo & Whitman 2009), focusing illusion (Tasić 2011), or institutionalized myopia (Viscusi & Gayer 2015). They argue that regulators subject to myopia tend to focus on a single mission while excluding other considerations (Gayer & Viscusi 2013) or fixate on certain aspects of a regulation while ignoring the wider context (Rizzo & Whitman 2009; Tasić 2011).

The choice architecture that regulators face can intensify any cognitive myopia individuals may exhibit and lead to suboptimal policies. For one thing, regulators are organized in agencies that focus on specific missions, such as protecting the environment or workplace

[4] Gayer and Viscusi (2013) find that in the regulatory impact analysis for the fuel-economy standards for 2017 and later model year light-duty vehicles, 87% of the estimated benefits derive from correcting the assumed consumer irrationality, while benefits from reducing externalities (air emissions) are minimal. The Department of Transportation offers little or no evidence to support its hypothesis for why consumers forego the large postulated benefits associated with low fuel-economy vehicles. Mannix and Dudley (2015) posit that regulators might be underestimating the values consumers place on other vehicle attributes, or that they use an "artificially low discount rate that does not account accurately for consumers' opportunity costs" (p. 706).

safety. Further, government agencies are often structured to divide clear roles among staff and set specific goals and tasks for each employee to improve individual focus and efforts (Carrigan 2017). Such organizational settings closely align regulators' mindset and daily work to narrow missions, and regulators are rewarded for focusing on the problems and solutions in line with their agency (or sub-agency) goals.

Further deepening myopic thinking, regulators are trained in a specific area and intrinsically motivated to work in particular regulatory agencies (Georgellis et al. 2011; Wilson 1989). Because they self-select to work on policies they think are the most important, they may tend to pursue certain goals and regulatory approaches to the exclusion of others (Prendergast 2007). Moreover, regulators' behavior is arguably influenced by special interests seeking to maximize their own well-being (Stigler 1971). As a result, regulators may intentionally choose to focus on a problem or policy solution that aligns with well-organized or well-connected interests, at the expense of the broader public interest.

As such, regulators' rational responses to the incentives they face make them more likely to myopically focus on certain issues or policy choices. Dane (2010) observed that the more expertise an individual develops in a domain, the less flexible she becomes in perceiving the source of a problem and identifying solutions. As regulators invest more in an area of policy expertise in response to either organizational goals or special interests, they become more narrowly framed and insensitive to other perspectives. These institutional factors contribute to a regulatory choice architecture that tends to aggravate the cognitive biases scholars have associated with myopia in individuals.

3.3. Confirmation Bias

Confirmation bias refers to the tendency to seek or interpret evidence in a way that supports existing beliefs. It reflects the observation that people do not perceive information objectively but tend to embrace information that confirms a previously held view, while ignoring or rejecting evidence against it (Schulz-Hardt et al. 2000).

In rulemaking, regulators are required to present scientific evidence to support the policy alternatives they adopt (OMB 2003). However, translating science into formats useful for policy decisions involves significant uncertainties (Dudley & Peacock 2016). As Dominici et al. (2014) observe with respect to air pollution, "associational approaches to inferring causal relations can be highly sensitive to the choice of the statistical model and set of available covariates that are used to adjust for confounding" (p. 257). This practice of inferring causal connections from associational data increases regulators' susceptibility to confirmation bias—where they erroneously interpret available data or observations as

supporting their expected conclusions and policies while discounting other plausible scenarios (Cooper & Kovacic 2012; Tasić 2011).

Regulators often face time constraints imposed by statutory or judicial deadlines (Lavertu & Yackee 2014). Under time constraints, regulators cannot thoroughly analyze all the information available, so focusing on the information supporting their preferred proposals is rational. For example, in response to the tight rulemaking timeframes established in the Affordable Care Act, regulators omitted consideration of regulatory impacts and alternatives in the enabling rules (Conover & Ellig 2012). Such a tendency may be especially prominent during Congressional or presidential transitions (Ellig & Conover 2014; O'Connell 2008).

When regulators' prior beliefs or preferences are facilitated by or consistent with those of interest groups, regulators face more incentives to selectively present supporting evidence. Since interest groups can file lawsuits to overturn agency decisions that contradict their recommendations (Dudley & Peacock 2016), regulators are motivated to present evidence that downplays uncertainty and conflict and presents the strongest case for their preferred policies (Wagner 1995).

Another fact that may increase regulators' susceptibility to confirmation bias is that agency rulemaking often involves teamwork of experts in similar fields (Carrigan & Mills 2019; McGarity 1991). The reinforcing interaction in groups will increase the degree to which members prefer and believe in the information supporting their initial preferences (Schulz-Hardt et al. 2000; Seidenfeld 2002). Sunstein warns that, when surrounded by like-minded people, individuals exhibit more extreme behavior, including "close-mindedness, involving a collective effort 'to rationalize' so as to discount warnings or information that might lead to reconsideration, and stereotyped views of enemies, as too evil to warrant efforts at negotiation or 'too weak and stupid to counter' the group's…choices" (2009, p. 86).

Even when some members of a group are aware of information contradictory to the group preference, such information is less likely to be considered to the same extent as the supporting information due to members' desire for group unanimity (Janis 1972; Seidenfeld 2002).[5] As a result, a group of regulators may be more likely to make irrational decisions subject to confirmation bias than an individual decision maker would be.

[5] This is often referred to as groupthink, in which members' desire for unanimity in the group leads to irrational or suboptimal decisions.

3.4. Overconfidence

Overconfidence might reinforce the effects of the biases and heuristics discussed above. Behavioral scientists find that people tend to be overconfident in their own ability to understand problems and make judgments (Kahneman & Tversky 1996) and that experts are likely to be particularly susceptible to overconfidence (Lin & Bier 2008).

As experts in their subject areas, regulators tend to be overconfident that their knowledge and expertise are sufficient for understanding the nature of a problem and proposing appropriate policy interventions (Hafner-Burton et al. 2013; Rachlinski & Farina 2002; Tasić 2009, 2011; Liu et al. 2016). Rachlinski and Farina (2002) observe that overconfident regulators "tend to have great faith that their profession has identified most of the problems they are likely to face and equipped them with the ability to surmount these problems" (p. 560). Regulators necessarily develop simplified models to describe complex real-world problems, and the illusion of explanatory depth occurs when they mistakenly believe that they understand all the causal linkages and possible consequences of proposed regulatory actions (Tasić 2009).

Overconfidence can also cause regulators to be unduly optimistic about the success of their own proposals, often known as optimism bias (Cooper & Kovacic 2012). Mannix (2003) refers to this as "the planner's paradox." Proposed policies appear superior to alternatives because:

> [B]oth the plan and the supporting analysis are prepared with the same set of data, assumptions, biases, and understandings of the way the world works. … All of the unseen difficulties with the planned solution—the data, assumptions, biases, and understandings of the world that turn out to be wrong—are invisible to the analyst because the data he considers are his own. (Mannix 2003, p. 8)

As a result, regulators subject to optimism bias tend to adopt excessive regulatory interventions (Hirshleifer 2008; Cooper & Kovacic 2012).

Hayek (1945) observed that the knowledge required for good decisions "never exists in concentrated or integrated form but solely as the dispersed bits of incomplete and frequently contradictory knowledge which all the separate individuals possess" (p. 519). Yet regulators must make decisions that apply to all the separate individuals and base those decisions on an analytical record. When developing regulations, agencies are required to consider different available alternatives and to assess all their benefits and costs (Clinton 1993). To meet these requirements, regulators face incentives to present their analyses with confidence, rather than acknowledge any uncertainty in causal models, gaps in the available data and information,

or the extent to which different assumptions would alter predicted regulatory outcomes (Wagner 1995; Dudley & Peacock 2016).

While judicial review is intended to ensure the legitimacy of agency actions, it serves as another part of a regulator's choice architecture that may reinforce overconfidence bias. Acknowledging uncertainties would invite legal challenges by groups adversely affected by a policy, so regulators have every incentive to defend their regulatory decision with confidence. They must present evidence to show they sufficiently understand the problem to be addressed and the potential impacts of their policy; their incentives are to avoid admitting to uncertainty and to steer away from anything that might appear to be a conflict in the administrative record (Wagner 1995).

4. Designing a Better Choice Architecture for Regulators

Behavioral scholars have proposed that policymakers act as choice architects to frame individual decisions in ways that nudge them to make choices that they would agree make them better off (Thaler & Sunstein 2008). This section explores what choice architectures might incentivize regulators to make decisions that make the public better off. Existing requirements to base regulatory decisions on evidence and analysis is a form of choice architecture that can alleviate some of the consequences of regulators' bounded rationality (Kuran & Sunstein 1999; Mannix 2016). Yet, as discussed in Section 2, the existing choice architecture is insufficient to eliminate bounded rationality in the human beings who, as regulators, make decisions that bind others. This section offers some preliminary thoughts on altering the regulatory choice architecture by reconsidering institutional frameworks with a focus on encouraging regulators to pursue policies that meet normative public interest goals.

4.1. Require More Accountability and Transparency in the Evidence Supporting Regulation

Accountability is an effective debiasing tool for correcting various cognitive errors (Larrick 2004). Experimental evidence from behavioral sciences has suggested that holding people accountable for their decisions leads to better use of information and improved performance (Huber & Seiser 2001; Lerner & Tetlock 1999).

One way to hold regulators more accountable for their decisions is to require more transparency in their decision-making process. As noted above, current procedures and institutions motivate regulators to focus narrowly on certain policy areas or regulatory aspects, to selectively present evidence that supports a chosen policy, or to downplay uncertainty. Increasing transparency regarding the studies and assumptions they relied on,

and those they did not, could counter problems of myopia, confirmation bias, and overconfidence.

Various bodies have recommended procedures and incentives for increasing transparency regarding the effects different credible inputs and assumptions have on the range of plausible regulatory outcomes (e.g., BPC 2009; Gray & Cohen 2012). For example, the Institute of Medicine recommended that EPA "be transparent in communicating the basis of its decisions, including the extent to which uncertainty may have influenced decisions" (2013, p. 225). The Behavioural Insights Team (BIT) in the UK claims that external scrutiny of the evidence base used to make policy decisions can encourage policymakers to conduct a better evidence review, if the evidence base is released externally at an early stage (BIT 2018).

4.2. Engage Diverse Perspectives at Early Stages of Rulemaking

Increasing access to knowledge that is inconsistent with one's prior belief and invitations to "consider the opposite" (Lord et al. 1984) have proven successful in reducing various biases including confirmation bias and overconfidence (Larrick 2004; Mussweiler et al. 2000). Accordingly, institutional reforms that intentionally engage diverse and competing views could improve regulatory decisions.

The requirement to solicit and consider public comment on proposed rules is a longstanding element of agencies' choice architecture, but it may occur too late in the rulemaking process to counteract biases (Carrigan & Shapiro 2017). Preceding the proposal with an advance notice of proposed rulemaking[6] could be valuable for high-impact rules to solicit input from knowledgeable parties on a range of possible approaches, data, models, etc., before particular policy options have been selected (Dudley & Wegrich 2015). In addition, agencies might share "back of the envelope" analyses that roughly estimate the effects of a range of alternatives (Carrigan & Shapiro 2017) or publish risk assessment information early in the rulemaking process to engage broad public comment on the analysis before policy decisions are framed (Dudley & Mannix 2018).

Regulatory policies would also benefit from interdisciplinary collaboration and review, both within agencies and between agencies. The scholarship in management and organizational behavior has found that increasing diversity in terms of members' expertise and experience in decision-making teams improves information sharing and team performance (Bunderson & Sutcliffe 2002). Recent research shows that such diversity delivers similar benefits in the

[6] An advance notice of proposed rulemaking is a notice published in the Federal Register before an agency develops a detailed proposed rule. It can help the agency gather more information on the issues and options being discussed, but it has not been frequently used so far.

rulemaking process (Carrigan & Mills 2019). Therefore, a structure of agency work processes that engages different perspectives at an early stage is another choice architecture that can mitigate some judgment errors.

Each of the last five presidents has required agencies to submit significant regulatory actions to OIRA for interagency review, reflecting an implicit recognition that mission-oriented regulatory agencies may suffer from the availability heuristic, institutional myopia, and confirmation bias. This centralized review serves a cross-cutting coordination function, forces regulatory agencies to conduct required analysis, and ensures policies are responsive to the elected president (Clinton 1993). Nevertheless, OIRA's limited staff size (fewer than 50 people) and constrained review times can limit its effectiveness (Fraas 2011). Increasing resources for centralized review, either in OIRA or in a congressional office with similar responsibilities, could counter some of the behavioral and institutional incentives in agency rulemaking (President's Council 2011; Hahn & Litan 2003).

4.3. Facilitate More Meaningful Feedback

Regulators face much more muted feedback signals regarding the impacts of their decisions than individuals operating in market and social contexts (Cooper & Kovacic 2012; Glaeser 2006; Viscusi & Gayer 2015). While regulators routinely conduct *ex-ante* analyses to estimate the impacts of new rules, they rarely conduct retrospective review to determine the accuracy of those *ex-ante* assumptions or to evaluate actual regulatory impacts (Dudley 2017). Individuals interacting in market and social contexts can reduce their biases by learning from feedback signals (Beales 2008; List 2003), but regulators do not have an equivalent mechanism for correcting biases and improving decisions.

One remedy for this problem would be to require agencies to design regulations from the outset in ways that allow variation in compliance. This variation would generate quasi-experiments that allow evaluation of data and outcome trends across different populations or different regions of the country (Dominici et al. 2014; Coglianese 2012).

To encourage more robust evaluation of regulations, agencies could be required to test the validity of previous predictions before they begin a new regulation (Dudley & Mannix 2018). Or, legislators might change the "default" so that regulations sunset after a certain period unless affirmatively renewed, as opposed to continuing unless revised (Ranchordás 2015). An independent body might be given responsibility for reviewing the accumulated stock of regulations and making recommendations regarding which rules or sets of rules should be modified or removed (Mandel & Carew 2013). Such an independent third-party review might prove more effective than self-evaluation in counteracting problems associated with overconfidence and confirmation bias (Greenstone 2015).

For decades, scholars and policy officials have debated the idea of a "regulatory budget" to impose discipline on regulatory agencies (Carter 1980; Pierce 2016; Dudley 2016; Gayer et al. 2017; Mannix 2016). President Trump has recently required agencies to offset the costs of new regulations by removing or modifying existing ones and to eliminate two regulations for every new one (Trump 2017). While this has the potential to motivate more rigorous evaluation of the effects of existing regulations, as of this writing its main effect appears to be to slow the pace of new regulations (Dooling 2018).

4.4. Consider Different Regulatory and Non-Regulatory Alternatives

The behavioral public choice literature suggests that overconfidence bias may be a particular problem for regulators (Hafner-Burton et al. 2013; Rachlinski & Farina 2002; Tasić 2009, 2011). Benefit-cost analysis forces them to consider tradeoffs, but it also may reinforce the "planner's paradox" (Mannix 2003). Existing executive orders ask agencies to first identify a compelling public need before commencing such analysis (Clinton 1993). This could be reinforced by executive or legislative requirements to present evidence regarding a material failure of competitive markets or public institutions that requires a federal regulatory solution.

When regulation is appropriate, the choice of regulatory form can have significant effects on both targeted outcomes and productivity (Xie 2019). Therefore, greater emphasis on providing an objective evaluation of alternatives, including the alternative of not regulating, and of the competitive (Dudley 2015) and distributional impacts of different approaches can mitigate regulators' overconfidence in their preferred regulatory solution.

5. Conclusion

Both behavioral economics and public choice have contributed significantly to improving our understanding of human action, government decision making, and how psychology, institutions, and incentives affect individual and group behavior. Behavioral economics research suggests that individuals exhibit bounded rationality and cognitive biases that cause their behavior to deviate from traditional economic assumptions of rationality. Public choice scholarship focuses attention on the institutional incentives and constraints individuals face in the public sphere, suggesting that regulators, like individuals operating in the private sphere, try to maximize their own utility. By combining the insights of public choice and behavioral economics, the emerging behavioral public choice field can yield worthwhile insights for predicting regulator behavior and developing better public policy.

This paper argues that predictable human behaviors can be modified or aggravated by the institutional framework or choice architecture in which regulators operate. To illustrate, we discuss four biases to which regulators may be prone: the availability heuristic, myopia, confirmation bias, and overconfidence. Considering these biases in the context of the institutional environment in which regulators make decisions suggests that observed regulator behaviors that appear contrary to the public interest may reflect the interaction of these cognitive biases and rational regulatory responses to the unique choice architecture they face. Explicitly recognizing this interaction is essential to designing a choice architecture that leads to better regulatory processes and outcomes.

With that premise, the paper presents initial thoughts on improving regulatory choice architecture based on a review of the literature and personal experience with the U.S. regulatory system. Future research could attempt to provide more empirical evidence on the relationship between specific institutional settings and systematic behavioral errors and examine whether changing the regulator's choice architecture reduces those errors. For example, would changing defaults so that regulations automatically sunset unless affirmatively continued, rather than remaining in place unless changed, improve evaluation and outcomes? Would earlier engagement of competing views lead to decisions that consider a wider range of alternatives and are less polarized? Do different organizational structures and responsibilities within agencies affect the tradeoffs considered and yield decisions with fewer unintended consequences? Research combining behavioral and public choice insights is still at an early stage. Scholarship from public administration, public choice, political science, law, economics, and other related fields can bring new dimensions to the fascinating insights from psychology and behavioral sciences.

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