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# Procedural Burden and Patterns in the Monetization of Regulatory Benefits Across the Federal Regulatory State

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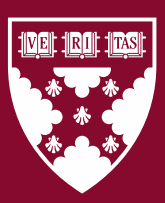

Harvard Business School

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# PROCEDURAL BURDEN AND PATTERNS IN THE MONETIZATION OF REGULATORY BENEFITS ACROSS THE FEDERAL REGULATORY STATE

**Abstract:**
When do federal agencies provide monetized estimates of regulatory benefits during the regulatory development and review process? Using an original dataset with information on nearly all major rules and their respective regulatory impact assessments between 1996–2016 (n = 713), this paper presents the first empirical analysis of the associations between policy issue areas and the monetization and non-monetization of regulatory benefits across the federal regulatory state. The results demonstrate systemic differences in whether or not federal agencies monetize the benefits of major regulatory proposals based on regulatory policy topics. The paper further introduces the concept of procedural burden—defined as the extent of barriers facing interest groups and citizens in wielding power over regulatory policy formation. The empirical findings combined with this theoretical concept suggest that the patterns in the monetization of regulatory benefits can constitute a form of procedural inequality that weakens pluralist democracy in regulatory rulemaking.

Keywords: regulatory impacts assessments, regulatory review, inequality, pluralist democracy

## INTRODUCTION

In the United States, presidential executive orders and the Office of Management and Budget (OMB) direct federal administrative agencies to evaluate the benefits and costs of all major proposed regulations and to provide a draft of these formal regulatory impact assessments (RIAs) to the Office of Information and Regulatory Affairs (OIRA) for review. The stated intent of this cost-benefit analysis (CBA) process is to enhance the quality of federal regulations, constrain arbitrary policies and authority, and provide citizens and socioeconomic groups an opportunity to observe, contest, and influence federal agencies' justifications for regulatory policy proposals (Sunstein 1996). While this legal directive applies to all significant regulations—officially defined by executive order—scholarship demonstrates significant variation in whether federal agencies provide monetized estimates of regulatory benefits in their RIAs (Masur and Posner 2016, Ellig and Fike 2016).

Previous scholarship primarily studies this heterogeneity in the context of trying to explain variation in the *quality* of federal agencies' cost-benefit analyses (Hahn and Dudley 2007, Ellig and Fike 2016). However, the role of this variation in cost-benefit analyses as both a cause and effect of inequality in regulatory rulemaking has not been systematically explored. This omission in scholarship is surprising because previous findings suggest several reasons why federal agencies' approaches to formally assessing regulatory proposals—and in particular whether they monetize the value of regulatory benefits in RIAs—might be intertwined with who wields influence during regulatory rulemaking. For example, both Heinzerling (2014) and Costa et al. (2019) suggest that the methodologies and evidence federal agencies use to evaluate and justify proposed rules may endogenously influence how federal agencies view regulatory issues, appropriate policy solutions, and subsequently draft regulatory policies. Similarly, formally assessing the benefits and costs of regulatory policies in monetary terms requires extensive resources, technocratic expertise, and the existence of context-specific scientific research (Sinden 2015)—and therefore may privilege regulatory policies towards the preferences of groups with greater economic and technical resources who can conduct such analyses of their own (Rahman 2011). Nevertheless, the literature lacks, as a foundational baseline to help evaluate the role of monetization in RIAs in regulatory inequality, an empirical description of if and how federal agencies' assessments of regulatory proposals differ across the regulatory state conditional on the regulatory policy area and the socioeconomic groups affected by the rule.

In order to contribute to this larger research agenda on the relationship between federal agencies' CBA of regulatory proposals and inequality in the rulemaking process, this paper asks: How do monetization and non-monetization of regulatory benefits in federal agencies' RIAs vary by policy issue area across the regulatory state? Based on a novel dataset containing information

on nearly all major rules and their respective RIAs between 1996–2016 (n = 713), this paper demonstrates systematic differences in how federal agencies evaluate the benefits of regulations depending on the regulatory policy issue area. The findings, which are based on a permutation test methodology (Hayes 1996, Collingridge 2013), not only suggest higher-level policy categories associated with monetization and non-monetization, respectively—such as air pollution and health care—but also identify granular policy issues such as "small businesses," "research," and "ozone," on one hand, and "health facilities," "rural areas," and "privacy," on the other, in which monetization and non-monetization of regulatory benefits are firmly established procedural norms. The paper hypothesizes that different evaluative norms across policy issue areas—for example, between "imports" and "employment"—have contributed to which groups of citizens have been able to drive and benefit from regulatory policies. The paper also presents descriptive statistics about variation within agencies in monetization of regulatory benefits in RIAs. Overall, 62% of all major RIAs between 1996–2016 did not provide monetized estimates of regulatory benefits. This dataset, which is available online accompanying the article, provides the most extensive description of monetization and non-monetization of regulatory benefits in federal agencies' RIAs to date.

Intertwined with these empirical analyses—and building from scholarship on administrative burden (Herd and Moynihan 2019)—this paper introduces the concept of procedural burden, defined as the extent of barriers facing interest groups and citizens in wielding power over regulatory policy formation. I argue that monetizing regulatory benefits is a type of procedural norm that constructs an onerous barrier both for interest groups and individual citizens to presenting information seen as persuasive and, subsequently, to wielding influence during the rulemaking process. While procedural burden is a neutral concept—it fundamentally

reflects procedures for maintaining democratic control over the regulatory state—I argue that its relative distribution across policy issue areas and stakeholders matters for normative questions regarding democratic power and inequality in the administrative process. The paper's results suggest the need for future research that explores how different dimensions of procedural burden—including monetization of regulatory impacts but also the technical and legal complexity of regulatory analyses (Wagner 2009, Shapiro 2018)—are distributed across the regulatory state and consequently shape policy outcomes and the quality of pluralist democracy in regulatory politics.

## ROLE OF MONETIZATION AND RIAS IN THE REGULATORY DEVELOPMENT PROCESS

Formal requirements for cost-benefit analyses during regulatory review are intertwined with conceptions of quantitative accountability—the expectation that quantification can be used to "evaluate performances, facilitate decision making, or constrain discretion" (Espeland and Vannebo 2007, p. 24). Quantification is a social process of producing and communicating numbers (Espeland and Stevens 2008). In contrast, monetization is a form of quantification that uses money to make quantitative amounts of different categories comparable based on a common metric (Espeland and Stevens 1998) and most commonly refers to the process of ascribing monetary values to non-market goods that are not directly bought and sold (Schlaudt 2021). Monetization therefore provides a partial and ostensibly less political tool for assessing whether the advantages of a policy outweigh its disadvantages. Historians of the proliferation of quantitative tools note that the production of numbers often appears objective and apolitical, and thus helps bestow legitimacy on contested political authority (Porter 1995).

In 1993, President Bill Clinton created the framework for regulatory review with Executive Order 12866 that has largely persisted across subsequent presidential administrations (Libgober 2020). Executive Order 12866 directs federal agencies to quantitatively assess regulatory costs and benefits as supported by scientific research "and propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs" (Clinton 1993). Meanwhile, OMB Circular A4, a guidance document to federal agencies for regulatory analyses issued in 2003, states "You [federal agencies] should monetize quantitative estimates whenever possible." Within this context, federal agencies must submit RIAs for significant regulatory proposals to OIRA, which has the authority to raise objections to the agency's analyses and return the proposed regulation to the issuing agency if disagreements are not sufficiently addressed (Sunstein 2013, Heinzerling 2014).

Federal agencies subject to Executive Order 12866 subsequently face the dual analytical challenge of projecting the social and economic consequences of regulatory proposals before they are implemented and assessing the value of these regulatory impacts in monetary terms (Sinden 2015). For example, the RIA for the Department of Housing and Urban Development (HUD)'s 2011 regulation *Emergency Homeowners' Loan Program* assessed that the regulation would assist between 22,546 and 34,474 homeowners. The RIA then combined academic research with the agency's own analyses to estimate regulatory benefits based on expected avoided economic costs of mortgage foreclosures for homeowners, lenders, local governments, and neighbors. In particular, the agency assessed that the regulation would produce between $1,238 to $1,609 million in benefits. Figure 1 from the RIA summarizes HUD's monetization of the regulatory benefits.

*Figure 1. "Table 1. Expected Economic Benefits" from Regulatory Impact Analysis: Emergency Homeowners' Loan Program*

| Category of Benefit | Expected Benefits per Foreclosure Prevented ($) | Expected Benefit per EHLP Loan at Program Foreclosure Rate of 15% ($) | Expected Benefit per EHLP Loan at Program Foreclosure Rate of 25% ($) |
|---|---|---|---|
| Homeowner | 10,339 | 8,788 | 7,754 |
| Lender | 24,508 | 20,832 | 18,381 |
| Local government* | 6,200 | 5,270 | 4,650 |
| Neighboring home value | 13,859 | 11,780 | 10,394 |
| **Average Economic Benefits** | **54,906** | **46,670** | **41,180** |
| **Aggregate for 22,546 Households** | **1,237,910,676** | **1,052,224,075** | **928,433,007** |
| **Aggregate for 34,474 Households** | **1,892,829,444** | **1,608,905,027** | **1,419,622,083** |

* Does not include lost or unpaid property taxes or utility bills, or property maintenance costs.

Outside of the executive branch, the courts treat the production and content of RIAs as evidence as to whether federal agencies are abiding by their statutory authority and procedural requirements. In particular, RIAs help federal agencies demonstrate compliance with the Administrative Procedure Act (APA), which prohibits arbitrary or capricious rulemaking and requires that agencies respond to material comments from the public on draft versions of the regulation (Garvey 2017). While the courts have established a level of deference to agencies in interpreting their own statutory authority deriving from ambiguous legislation under the Chevron doctrine (Elliott 2005), the courts have also established a precedent for invalidating federal regulations based on perceived inadequacies in how federal agencies assess and compare regulatory benefits and costs (Kraus and Raso 2013). Notably, in 2015, the Supreme Court's decision in Michigan vs. EPA held that the agency was required to take into account regulatory costs in order to meet the "appropriate and necessary" standard in the Clean Air Act authorizing the regulation of hazardous pollutants (Masur and Posner 2016). Writing for the majority, Justice Antonin Scalia wrote, "One would not say that it is even rational, never mind 'appropriate,' to impose billions of dollars in economic costs in return for a few dollars in health or environmental benefits" (576 U.S. 743, 752).

**Heterogeneity in Federal Agencies' RIAs**

Nevertheless, in practice, federal agencies often do not provide monetary estimates of regulatory benefits in RIAs. Masur and Posner (2016) manually review 106 major promulgated regulations from fourteen federal agencies between 2010–2013 and find that 47 RIAs did not monetize any benefits. Hahn and Dudley (2007) similarly find that roughly 20% of RIAs from the EPA between 1983–1999 did not provide any quantitative estimates of the regulatory benefits. In practice, RIAs that do not provide monetized estimates of regulatory benefits tend to either exclusively describe the benefits qualitatively or provide quantitative modeling and analyses but shy away from presenting monetized benefits attributable to the regulation. For example, the Department of Labor (DOL)'s 2010 RIA for the regulation *Improved Fee Disclosure for Pension Plans* qualitatively summarizes the regulatory benefits as "information cost savings, discouraging harmful conflicts of interest, service value improvements through improved decisions and value, better enforcement tools to redress abuse, and harmonization with other EBSA rules and programs." In contrast, the RIA for the Food and Drug Administration (FDA)'s 2016 rule *Sanitary Transportation of Human and Animal Food* quantitively analyses the number of affected actors in the food supply chain but states, "We lack sufficient data to quantify the potential benefits of the final rule. The causal chain from inadequate food transportation to human and animal health and welfare can be specified but not quantified." OIRA summarized the benefits from this regulation as "not estimated" (OMB 2017).

The primary approach in previous scholarship is to frame or analyze this heterogeneity in monetization in cost-benefit analyses as an issue of RIA quality, and then seek to explain why the methodologies and approaches in federal agencies' cost-benefit analyses vary. For example, literature analyzing RIA quality—as gauged by welfare economists' best practices for cost-

benefit analyses and guidance documents from OMB—finds that such factors as the independence of economists within government departments (Ellig and Konieczny 2019), political salience of regulations (Shapiro and Morrall 2012), and agency effort during the regulatory development stage (Ellig and Fike 2016) are correlated with more extensive use of quantitative analyses and formal cost-benefit techniques. Scholars also contend that how federal agencies conduct CBA for proposed regulations is associated with the difficulty of ex ante predicting the impacts of the policy proposals (Hahn and Tetlock 2008), the expected magnitude of economic costs created by the regulation (Masur and Posner 2016), and the specifics of the authorizing legislation for the regulation (Sunstein 1996).

Instead, this paper departs from previous scholarship analyzing federal agencies' RIAs in three ways. First, rather than explaining why federal agencies' RIAs vary based on exogenous factors, it seeks to understand how this heterogeneity maps onto policy context. Guided by neo-institutional theory (Meyer and Rowan 1977, Dobbin 1994) and the sociology of valuation (Lamont 2012), this paper views policy issue areas as part of institutional fields that may mediate organizations' conceptions of legitimate evaluative practices. Subsequently, we should expect that regulatory policy issues—rather than simply which agency drafted a regulation—are intertwined with whether federal agencies present monetized values for regulatory benefits in RIAs. As further argued below, examining descriptive patterns in these valuation practices based on policy issue areas may illuminate how interest groups and citizens experience and wield power across the regulatory state.

Second, following the extensive literature criticizing the methodological practices involved in economically valuing nature, humans, and society in the CBAs of federal regulations (see Ackerman and Heinzerling 2004, Kysar 2010 for a review), this study does not treat

monetization of regulatory impacts as a full or partial proxy for RIA quality. It instead argues that monetizing the value of regulatory benefits in RIAs is one type of procedural hurdle—conceptualized as *procedural burden*—that mediates how regulatory stakeholders seek to and can influence regulatory policy proposals.

Third, this study analyzes relationships—if they exist—between monetization of regulatory benefits on one hand and policy domains on the other as procedural *norms* in these respective regulatory spaces. Norms are generally defined as shared expectations about appropriate behavior (Chatman and O'Reilly 2016) that can emerge based on instrumental adaptation for legitimacy and resources (Powell 1991, Dobbin 1994) or through the past socialization processes of organizational members (Carpenter 2010, Tyllström 2021). The benefit of this perspective, which builds from a transactional authority approach to bureaucratic politics, is that it enables us to move beyond focusing on formal mechanisms of institutional control to studying informal organizational variables that are often lacking in the study of administrative politics (Carpenter and Krause 2015).

The paper proceeds as follows. First, it introduces the concept of procedural burden to help contextualize and explore how federal agencies' evaluative practices during the rulemaking process may mediate who wields influence over regulatory policies. Second, the paper argues that monetization of regulatory benefits in federal agencies' RIAs should be studied in the context of policy domains. Third, the paper presents the results from a variance decomposition model conveying how much variation in monetization of regulatory benefits is attributable to clustering of regulations within federal agencies—substantiating an analytic approach focusing on regulatory policy issue areas rather than solely which federal agency drafted a regulation and RIA. Fourth, building on these arguments and relying on quantitative permutation tests, this

paper evaluates if and when federal agencies persistently monetize and do not monetize regulatory benefits based on the issue area and socioeconomic groups affected by a rule. The paper concludes with a discussion of the implications of the findings for pluralist democracy during federal rulemaking and policy recommendations for improving regulatory development and review in the United States.

## PROCEDURAL BURDEN AND MONETIZATION OF REGULATORY BENEFITS

I define *procedural burden* as the extent of barriers facing interest groups and citizens in wielding power over regulatory policy formation. I further maintain that whether or not monetizing regulatory benefits is a procedural norm for particular regulatory policy areas is one type of barrier facing interest groups and citizens seeking to influence regulatory policy formation in that given domain. The primary benefit of conceptualizing federal agencies' processes for assessing regulatory impacts from the point of view of a burden is that it helps empirically describe the costs—even if justified by legislation or democratic political theory—of both formal procedural standards and informal procedural norms for actors outside the state seeking to influence regulatory rulemaking.

This concept of procedural burden fundamentally builds from scholarship on administrative burden (Herd and Moynihan 2019), which Burden et al. (2012) define as "an individual's experience of policy implementation as onerous" (Burden et al. 2012, p. 741) in the context of citizens' attempts to access their rights and services vis-à-vis the state. Procedural burden is an intertwined but distinct concept because, although exercising voice during the rulemaking process is largely enshrined as a right for the public in the Administrative Procedures Act (Garvey 2017), exercising power and influence over regulatory policy proposals is not. Procedural burden seeks to document this latter phenomenon: the burdens and barriers for

exerting power during, rather than simply participating in, the rulemaking process. In addition, procedural burden is relevant to, but distinct from, the concept of ossification in the regulatory process (Yackee and Yackee 2012)—which primarily pertains to the barriers and burdens facing regulatory agencies and public servants, rather than actors outside of the state, in promulgating contentious and high-stakes regulation (McGarity 1992, Pierce 2012). Similarly, procedural burden differs from the concept of compliance burden (Bozeman 1993) because compliance burden pertains to the resources expended by government agencies in complying with a rule.

It is important to note that procedural burden is a democratically necessary mechanism for constraining regulatory policy discretion and subordinating regulatory agencies to Congress and the Office of the President. Barriers to socioeconomic groups wielding power over regulatory policy can also help prevent regulatory capture (Carpenter and Moss 2013) and legitimize regulations to shareholders and the public (Porter 1995). Moreover, this paper does not take a stance on the optimal level and distribution of procedural burden for public welfare and democratic governance. A high level of procedural burden does not necessarily translate into parochial regulatory policy decisions—such as the onerous requirements for influencing nuclear waste disposal standards. Similarly, a low level of procedural burden does not necessarily mean that organizations seeking to influence the regulatory proposal achieve their desired policy outcome. Indeed, low barriers to political influence may produce incoherent regulatory policies in which all effected parties are dissatisfied with the process and result (Coglianese 2004).

However, I argue that scholars of the administrative process should care about the *relative distribution* of procedural burden because high costs associated with influencing administrative rulemaking risk systematically excluding certain affected groups from accessing political power (Wagner 2010). This risk to pluralistic governance is a profound outcome of

interest within itself in a democratic system. Moreover, similar to administrative burden, I posit that procedural burden can be a tool of "hidden politics" for shaping regulatory decisions without "broad political consideration" (Moynihan et al. 2014). Orthogonally, procedural burden may also be an unintentional outcome or unrecognized norm that nevertheless considerably shapes government administration.

To substantiate this posited relationship between monetization of regulatory benefits in RIAs and the extent of procedural barriers to influence—and thus procedural burden—during the rulemaking process, I make the following arguments. First, analyzing, contesting, and justifying regulatory policy options based on monetized estimates of regulatory benefits require extensive resources, data, and a particular form of technocratic expertise. For interest groups, relevant outlays might include directly funding relevant research on an issue area they care about (Yackee 2021), hiring lawyers to draft public comments, which can cost up to $100,000 per regulatory comment (Dash 2011), accessing scientific research that is often published behind paywalls, or hiring staff or consulting firms with expertise in quantitative data analyses. Still, specific data on exactly how much time and resources interest groups and citizens spend on analyses of regulatory policy impacts are difficult to come by—which is an issue within itself and should be the subject of future research.

Second, I define procedural burden as the degree of onerous processes tied to exerting influence on regulatory policies, not as how onerous it is to simply participate in the rulemaking process. Monetization of regulatory benefits conveys one aspect of procedural burden, as defined, because justifications for policy preferences based on numbers tend to be viewed as more authoritative and therefore more politically influential than non-quantitative analyses (Potter 1995). OIRA as the gatekeeper for major regulatory policies tends to prefer monetary

cost-benefit analyses from agencies and at times dissuades agencies from considering or advancing regulations that might fare poorly in a formal comparison between projected costs and monetized benefits (Heinzerling 2014). We also know from previous research that more sophisticated public comments during the notice and comment period are more likely to influence final regulations (Cuellar 2005) and that comments from business interests on draft regulation tend to have more impact on the final regulation than comments from public interest groups (Yackee and Yackee 2006). While neither of these studies directly addresses the comparative influence of monetized estimates of value, it is reasonable to assume that there is a strong link between sophisticated comments and/or comments from businesses, on one hand, and the use of quantitative projections and monetization of regulatory impacts, on the other. Indeed, Rashin (2021) finds in the context of SEC rulemaking that public comments on draft regulation with more figures, tables, and law and banking terms are both more likely to come from organized interests and more likely to induce changes in the final rule. However, these possible relationships need to be further explored. Ultimately, any citizen or socioeconomic group can comment on draft regulation subject to the public and notice comment period. Yet, as Libgober and Rashin (2018) conclude, "the most important dimension of inequality in voice during rulemaking is access to persuasive information."

Nevertheless, one may object to the concept of procedural burden—and to treating monetization as a barrier to influence during regulatory rulemaking—by arguing that federal agencies' monetization and evaluations of regulatory proposals are simply based on the available scientific research. However, scientific research itself does not fully explain how government regulatory agencies apply and reconstruct science to inform and justify policy decisions (Jasanoff 1987), especially for questions about commensurability and monetizing value that science cannot

answer (Ackerman and Heinzerling 2004, Kysar 2010). Moreover, the availability of scientific research for monetizing regulatory impacts is endogenous to the federal agencies' institutional environment. Federal agencies, such as the EPA, invested in developing internal expertise in formal cost-benefit analysis techniques and further funded relevant external research when confronted with economic analyses from external interest groups contesting the agency's policies and authority (Halvorson 2017). Therefore, analyzing patterns in when federal agencies provide monetized estimates of regulatory benefits probably demonstrates which institutional policy contexts engender monetary valuations of policy proposals rather than simply the state of available scientific research. Lastly, focusing on the role of science in how federal agencies analyze regulatory policy proposals is an intertwined but separate issue to studying how interest groups and citizens experience the regulatory state.

In addition, as many proponents of formal cost-benefit analyses for regulatory proposals argue, these procedures may improve the quality and transparency of regulatory policies and enable the Office of the President to better control the regulatory state (Tozzi 2011, Sunstein 2013). While these arguments raise valid concerns, they do not negate the argument being advanced in this paper—that regulatory procedures create benefits and costs for actors participating in the rulemaking process, both of which need to be analyzed and taken into account during regulatory development and review. In addition, the relationship between RIAs and regulatory quality is difficult to demonstrate while case studies on the rulemaking process tend to suggest that RIAs primarily serve as ex post justifications for politically driven decisions (Ellig et al. 2013). At the same time, scholarship suggests that the methodologies and evidence federal agencies use to evaluate and justify proposed rules may influence, in the long term, how federal agencies view regulatory issues and appropriate policy solutions (Heinzerling 2014,

Costa et al. 2019). Therefore, the strong possibility of an endogenous feedback loop between evaluative methodologies, interest group influence, and the construction of policy options (Espeland 1998) should still be explored as a source of inequality in administrative politics.

Policymakers should further care about the distribution of procedural burden across the regulatory state primarily because of the implications for pluralist democracy. Fundamentally, the distribution of procedural burden across the regulatory state suggests the distribution of a type of barrier for various groups in wielding power over regulations that affect them. Although this paper's data do not directly capture or measure policy influence during the rulemaking process—which is notoriously difficult to observe (Carpenter and Moss 2013)—the methodology operationalizes one form of barrier to influence, which is an important contribution in itself. This paper subsequently provides data to help address a normative question for democratic governance: What should be the distribution of barriers to shaping regulatory policies, and what are they now? This question for pluralistic governance involves thorny trade-offs between the power of federal agencies and the power of affected socioeconomic groups as well as normative questions about defining relevant knowledge and expertise for shaping policy decisions (Wagner 2010). Nevertheless, empirically describing the distribution of procedural burden is a necessary step for better aligning the regulatory process with democratically sanctioned procedures and goals. Identifying persistent patterns in the monetization and non-monetization of regulatory impacts in RIAs—as a type of procedural burden—contributes to this research agenda. This paper therefore contributes to the burgeoning literature on inequality in administrative democracy (Yackee and Yackee 2006, Libgober 2020).

**Monetization of Regulatory Benefits and Policy Domains**

As previously mentioned, scholarship addressing heterogeneity in federal agencies' RIAs tends to focus on organizational and political antecedents that might explain the observed variation. Yet there is a lack of scholarship systematically studying associations between policy domains and how federal agencies conduct CBAs on proposed regulation. This limitation in previous scholarship might simply derive from the intertwinement of, or endogeneity between, policy issue areas and federal agencies. For example, regulations addressing veterans tend to originate with the Department of Veterans Affairs (VA) while the Department of Labor (DOL) primarily drafts rules focusing on employment standards.

Nevertheless, focusing on regulatory policy issue areas rather than solely which agency drafted a rule better addresses the rich and often neglected heterogeneity in how federal agencies wield regulatory power and how socioeconomic groups engage with and experience the administrative process. Theories of bureaucratic behavior (Carpenter 2001, Carpenter and Krause 2015), neo-institutional organizational theory (Dobbin 1994), and sociologically driven scholarship on organizations and valuation (Lamont 2012) all suggest that organizations' evaluative practices are based on conceptions of legitimate behavior in their institutional field. Therefore, we should expect that policy issue areas mediate conceptions of legitimate evaluative practices and, subsequently, are intertwined with whether federal agencies present monetized values for regulatory impacts in RIAs. Experimental research, for example, similarly suggests that policy issue areas mediate the effects of transparency into policy decisions on perceived legitimacy (de Fine Licht 2014). This approach focusing on policy issue areas is especially warranted given Golden's (1998) finding that the socioeconomic groups who participate in the notice and comment period vary extensively by individual rules even across regulations drafted

by the same agency—suggesting different configurations of groups participating in, observing, and conferring legitimacy on the rulemaking process at the sub-agency level. While this paper does not causally study why federal agencies' RIAs vary, the strong unexplored possibility of associations between policy issues, configurations of participating and affected interest groups, and monetization in federal agencies' cost-benefit analyses partially motivates this study.

## DATA AND METHODS

This paper has argued that non-monetization and monetization of regulatory benefits in RIAs may be a form of procedural burden that mediates influence during the rulemaking process. It further maintains that these differences in monetization may be systemically intertwined with policy domains. To statistically describe the distribution of one type of procedural burden and empirically test these arguments, this paper relies on a permutation test methodology (Hayes 1996, Collingridge 2013) to analyze non-causal associations between subject tags in the text of major regulatory policies and monetization of regulatory benefits in the regulation's respective RIA. The analyses include nearly all major rules between 1996–2016. Prior to these analyses, the paper also presents the results of a variance decomposition model quantifying the percentage of the variance in monetization of regulatory benefits attributable to the clustering or rules within agencies. The results of this model further justify focusing on the role of policy domains.

This paper addresses regulatory benefits rather than projected regulatory costs for both theoretical and methodological reasons. First, there is significantly less heterogeneity in whether federal agencies provide monetized estimates of regulatory costs than regulatory benefits (Masur and Posner 2016)—even though the extent of these analyses of regulatory costs still varies in RIAs (Sinden 2015). On conceptual grounds, monetization of regulatory benefits better operationalizes procedural burden because regulatory benefits, compared to regulatory costs, are

more likely to invoke non-market goods—such as environmental degradation—and thus require technocratic and elaborate methodologies to analyze in monetary terms (Ackerman and Heinzerling 2004).

The research relies on two sources of intertwined data. First, I compiled the appendix tables "Summary of Agency Estimates for Final Rules" in OIRA's annual reports to Congress for each year between 1997–2017—excluding 1999 due to data availability limitations.[1] These tables list all major regulations from the previous year, the issuing agency's estimates of respective cost and benefits, and an "other information" column with supplemental details OIRA deems relevant. Collectively, the OIRA report appendices contain information on 713 major regulations from twenty-one distinct executive branch agencies between 1996 and 2016. OIRA broadly defines a major rule as any regulation from an executive branch agency that has more than a $100 million annual effect on the U.S. economy, has a significant adverse impact on prices for consumers, or significantly hinders competition, productivity, or investment (OMB 2017).[2] In addition, these appendix tables in the OIRA reports only include major regulations originating from federal agencies subject to Executive Order 12866 and OIRA review, which excludes "independent regulatory agencies" such as the Securities and Exchange Commission. Figure 2 provides an excerpt of an appendix table from the 2009 OIRA Report. The data provide a population-level account, rather than a sample, of the federal regulatory states' major RIAs during the given timeframe of analysis.

[1] The OIRA report to Congress for 1999 is not available online: https://obamawhitehouse.archives.gov/omb/inforeg_regpol_reports_congress. In addition, the titles of the appendix tables slightly change between the years 1997–2005.

[2] "Major" is a more inclusive term than "economically significant." See Office of Management and Budget—Office of Information and Regulatory Affairs. 2017. Draft Report to Congress on the Benefits and Costs of Federal Regulations and Agency Compliance with the Unfunded Mandates Reform Act.

*Figure 2. Excerpt from 2008 OIRA Appendix Table: "Table A-1: Summary of Agency Estimates for Final Rules. October 1, 2007–September 30, 2008 (As of Date of Completion of OMB Review)"*

| Rule [FR Cite] | Agency | Benefits | Costs | Other Information |
|---|---|---|---|---|
| Right Whale Ship Strike Reduction [73 FR 60173] | DOC/ NOAA | Not estimated | $105 million per year | Benefits: Reduction of right whale mortality which reduces the likelihood of extinction of this endangered species.<br><br>Costs: Total costs include both direct and secondary economic effects.<br><br>The RIA is available online at: http://www.nmfs.noaa.gov/pr/pdfs/shipstrike/feis_economic_analysis.pdf |
| Energy Efficiency Standards for Residential Furnaces and Boilers [72 FR 65136] | DOE/ EERE | $120 - 182 million per year | $33 - 38 million per year | Energy savings of 0.011 quadrillion BTUs of energy from 2015 to 2038.<br><br>The RIA is available online at: http://www1.eere.energy.gov/buildings/appliance_standards/residential/pdfs/fb_fr_tsd/ria.pdf |

Second, for each RIA I identified and obtained the full text of its final regulation. I relied on federalregister.gov for this information and combined automatic web-scraping with manual searches and review to ensure that I identified the correct rule.

Together these two sources of data—the OIRA summary information on 713 RIAs and the corpus of all major regulations between 1996–2016—provide unique information on the extent of monetization in federal agencies' formal cost-benefit analyses and the characteristics of each respective regulation. The dataset is both novel and extensive in its ability to provide a description of monetization of regulatory impacts across the federal regulatory state.

**Interest Groups and Regulatory Issue Areas**

In order to identify regulatory issue areas and social groups associated with each federal regulation, I relied on each rule's "List of Subjects" section in the text of the final rule. This section, mandatory for federal regulations, categorizes the content areas of the rule based on terms provided in a formal document called the *Federal Register Thesaurus of Indexing Terms*

(Office of the Federal Register 2019).[3] For example, the Department of Energy's regulation *Energy Efficiency Standards for General Service Fluorescent Lamps* in 2009 contains the following information under the List of Subjects:

> administrative practice and procedure, confidential business information, energy conservation, household appliances, imports, incorporation by reference, intergovernmental relations, small businesses.

These subject tags under the List of Subjects convey federal agencies' formal classifications for each rule. There are 1042 different raw subject tags in the data on federal regulations, ranging from "peanuts" to "health insurance" to "coal miners." However, data cleaning steps detailed in Appendix III to address occasional discrepancies in spelling between subject tags, similarities in content, and missing data translated into a refined total of 912 unique subject tags across the entire dataset on major federal regulations. Over 85% of the subject tags occur three or fewer times in the dataset, while subject tags such as "reporting and recordkeeping requirements" are present in over 72% of the regulations.

**Dependent Variables: Monetized and Non-Monetized Benefits**

First, for each RIA, I constructed a binary variable for whether the agency monetized any benefits according to the OIRA Report appendix tables. I relied on algorithmic analysis of the text[4] to code regulations with any dollar value in the Benefits column as having monetized benefits of the regulation. This measurement does not include monetization or non-monetization of regulatory costs nor does it capture varying extents of monetization *within* an RIA. It simply

[3] Nevertheless, 34 rules in the dataset do not contain a List of Subjects. The primary analyses in this paper keep these rules in the dataset. As a robustness check, dropping these rules with no subject tags from the analyses does not substantively change the results. All robustness checks are available upon request from the author.
[4] This algorithmic coding was conducted in Python and supplemented with manual correction and review. A small number of regulations included such statements as "see Other Information" under benefits and were subsequently evaluated by the author. These rules were coded as monetized when "Other Information" stated that the benefits were monetized and subtracted from the amount in the costs column.

captures whether an RIA claimed *any* monetary benefits for the regulation according to OIRA. Table 1 provides the overall distribution of this monetization measurement.

Second, for each of the 912 regulatory subject tags, I identified all federal regulations containing the tag that monetized and non-monetized regulatory benefits, respectively, based on a keyword search across the List of Subjects. This approach produced 6,358 subject tag-regulation pairs. I then constructed variables for each subject tag counting the number of associated RIAs that monetized and did not monetize regulatory benefits, respectively. For example, of 20 regulations addressing "food labeling," 13 did not monetize any benefits in their accompanying RIA, while seven monetized projected regulatory benefits. These observed counts of monetization and non-monetization for each subject tag—13 and seven in the previous examples—are the primary dependent variables of interest.

*Table 1. Summary Table of Variables*

| **Variable** | **RIAs** |
|---|---|
| Monetized Regulatory Benefits | False: 442 (62.0%)<br>True: 271 (38.0%)<br>n = 713 RIAs |
| Subject-Regulation Pairs | Non-Monetized: 4134 (65.0%)<br>Monetized: 2224 (35.0%)<br>n = 6358 |

## Analytical Approach

First, I present the intraclass-correlation coefficient (ICC) from an unconditional mean model, which is a form of a variance decomposition model. In this model, monetization of regulatory benefits is the dependent variable, but there are no other predictor variables besides the federal agencies in which the rule-level observations are clustered. The subsequent ICC from

this unconditional mean model conveys how much of the total variance in the dependent variable is attributable to the clustering of the observations (Wu et. al 2012). The model therefore disentangles variation attributable to agency effects from variation attributable to characteristics that vary *within agencies*, such as, but not exclusively limited to, regulatory subject tags.

Second, motivated by the results of the variance decomposition model, I rely on a permutation test methodology (Hayes 1996, Collingridge 2013) to identify statistically significant associations between regulatory subject tags and the monetization of regulatory benefits in federal agencies' RIAs. The null hypothesis for the permutation test analyses is that observed patterns—or conditional probabilities—between respective regulatory subject tags and non-monetization of regulatory benefits in federal agencies' RIAs are attributable to chance. In practice, a permutation test repeatedly randomizes assignment of the dependent variable values to the independent variables and thereby creates data in which any association between the outcome variable and the explanatory variables is completely spurious. For each subject tag, the permutation test therefore provides an observed p-value, or the expected probability, of observing a value as extreme as the actual monetization value if the null hypothesis is true (Hayes 1996, Collingridge 2013). Evaluating the observed data against simulated expected data under this null hypothesis enables inferences about which, if any, regulatory issue areas and affected social groups are associated with monetization and non-monetization of regulatory benefits in RIAs across the federal regulatory state. I implemented a Monte Carlo version of a permutation test with 10,000 simulations—each randomizing whether all RIAs in the dataset monetize regulatory benefits at the observed 62% probability while maintaining each regulation's observed list of subjects.

For example, seven of the 12 regulations addressing "airports" in the data did not monetize regulatory benefits. Simulating random monetization across the dataset 10,000 times produces 6,647 instances in which seven or more of the 12 regulations tagged with "airports" presented non-monetized regulatory benefits. The p-value for "airports" is therefore 6,647/10,000 = 0.665, and we fail to reject the null hypothesis of no association between regulations addressing "airports" and non-monetization in federal agencies' RIAs at the standard 95% confidence level.

In contrast, the subject tag "emergency medical services" was present in 29 different regulations, 27 of which did not monetize any regulatory benefits in their respective RIA. The permutation test suggests that the likelihood of observing 27 or more RIAs tagged with "emergency medical services" which did not monetize benefits by chance is 0.0001. The simulation produced a single instance out of 10,000 random possibilities in which non-monetization was as extreme for "emergency medical services" as its actual observed value. As a result, we can reject the null hypothesis that the subject tag "emergency medical services" is not associated with non-monetization in federal agencies' RIAs at an extremely high degree of statistical confidence.

Nevertheless, this permutation test is a form of multiple hypothesis testing because it evaluates the null hypothesis of no association for 912 separate subject tags. I subsequently relied on the Benjamini–Yekutieli procedure to correct for the false discovery rate and address potential correlations between the subject tags. The Benjamini–Yekutieli procedure creates an adjusted p-value based on the probability of a false discovery rate rather than on the family-wise error rate, as in the Bonferroni correction (Benjamini and Yekutieli 2001). It therefore provides greater statistical power than common alternative approaches (Thissen et al. 2002). The approach

also addresses potential dependencies between the multiple hypotheses (Benjamini and Yekutieli 2001)—in this case, the dependencies between the highly correlated regulatory subject tags. In addition, I dropped all subject tags that occurred too infrequently to provide sufficient statistical power for the analyses. Given the probability of monetization and non-monetization, respectively, across the dataset, subject tags required a minimum total *n* of 7 for identifying associations with non-monetization and a minimum total *n* of 4 for analyzing associations with monetization. The power analyses justifying these thresholds are detailed in the appendix.

Lastly, to further address the variation in RIAs *within* agencies, I ran a permutation test for each agency. These additional permutation tests randomized monetization using the agency's observed conditional probability of monetization. Agencies that exclusively monetized or non-monetized regulatory benefits in RIAs for regulations in the dataset, as reported in Table 2, were excluded from these analyses. While the smaller *n* in these agency-level permutation tests make statistical inferences more difficult, they still provide a means to evaluate the observed patterns against the null hypothesis of no association.

A permutation test approach is strongly preferable to regression analyses in this context given the inductive research question and extreme multicollinearity in the data. The subject tags are extensively correlated with each other while 668 subject tags out of the 912 total perfectly predict monetization or non-monetization—every single regulation tagged with one of these subjects either monetizes or does not monetize regulatory benefits, respectively, across the entire dataset. Moreover, there are 912 unique subject tags in the data and 713 observations. Normal regression models do not support having more explanatory variables than observations. Lastly, several attempts to reduce the dimensionality of the subject tags through standard clustering

techniques, such as k-modes (Chaturvedi et al. 2001), produced multiple incoherent clusters and thus would not provide readily interpretable results in a regression analysis.

Ultimately, this permutation test methodology combined with the Benjamini–Yekutieli procedure for simultaneous hypothesis testing enables identification of all subject tags associated with non-monetization and monetization, respectively, across the dataset of federal agencies' RIAs at a high degree of statistical confidence. The agency-level permutation tests provide additional insight into when monetization of regulatory benefits conditional on the regulatory policy topic varies within agencies.

**Agency Descriptive Statistics**

Table 2 presents descriptive statistics about the number of major rules and RIAs produced by agency and year, as well as the percent of RIAs that monetized regulatory benefits during the period of analysis 1996–2016. Several agencies, such as Veterans Affairs and the Department of Commerce, never produced RIAs that monetized estimates of regulatory benefits, while agencies such as the Department of Energy and the Department of Transportation monetized regulatory benefits in over 70% of their major RIAs.[5]

[5] Federal regulations produced through joint-agency rulemaking were coded based on the first agency listed in the OIRA appendix tables.

*Table 2. Monetization and Non-Monetization of Regulatory Benefits in Major RIAs by Agency and Year*

| | 1997 | 1998 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Board of Directors of the HOPE for Homeowners Program** | | | | | | | | | | | | | | | | | | | | | |
| Monetized Benefits | | | | | | | | | | | | | 0 | | | | | | | | 0 |
| Non-Monetized Benefits | | | | | | | | | | | | | 1 | | | | | | | | 1 |
| **Department of Agriculture** | | | | | | | | | | | | | | | | | | | | | |
| Monetized Benefits | 2 | 2 | 0 | 0 | 1 | | 1 | 0 | 2 | | 1 | | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 12 |
| Non-Monetized Benefits | 2 | 3 | 2 | 1 | 2 | | 1 | 1 | 0 | | 1 | | 9 | 4 | 7 | 6 | 6 | 7 | 5 | 6 | 63 |
| **Department of Commerce** | | | | | | | | | | | | | | | | | | | | | |
| Monetized Benefits | 0 | | 0 | 0 | 0 | | | 0 | 0 | | | 0 | 0 | 0 | | | 0 | 0 | | | 0 |
| Non-Monetized Benefits | 1 | | 1 | 1 | 3 | | | 1 | 2 | | | 1 | 2 | 1 | | | 1 | 1 | | | 15 |
| **Department of Defense** | | | | | | | | | | | | | | | | | | | | | |
| Monetized Benefits | | | | | | | | | | | | | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Non-Monetized Benefits | | | | | | | | | | | | | 2 | 2 | 2 | | 2 | 2 | 1 | 1 | 12 |
| **Department of Education** | | | | | | | | | | | | | | | | | | | | | |
| Monetized Benefits | | | 1 | | | | | | | | | | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 1 |
| Non-Monetized Benefits | | | 0 | | | | | | | | | | 2 | 8 | 2 | | 6 | 2 | 3 | 1 | 24 |
| **Department of Energy** | | | | | | | | | | | | | | | | | | | | | |
| Monetized Benefits | | 2 | | | 3 | 1 | | | | | 1 | 1 | 2 | 3 | 3 | 2 | 2 | 6 | 3 | 3 | 32 |
| Non-Monetized Benefits | | 0 | | | 0 | 0 | | | | | 0 | 0 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| **Department of Health and Human Services** | | | | | | | | | | | | | | | | | | | | | |
| Monetized Benefits | 3 | 1 | 3 | | 4 | | 2 | 4 | 3 | 1 | 2 | 1 | 4 | 0 | 1 | 3 | 1 | 0 | 4 | 3 | 40 |
| Non-Monetized Benefits | 0 | 10 | 1 | | 1 | | 1 | 2 | 1 | 0 | 0 | 2 | 12 | 19 | 16 | 18 | 20 | 20 | 14 | 31 | 168 |
| **Department of Homeland Security** | | | | | | | | | | | | | | | | | | | | | |
| Monetized Benefits | | | | | | | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | | 1 | 0 | 1 | 1 | 1 | 6 |
| Non-Monetized Benefits | | | | | | | 3 | 5 | 1 | 1 | 3 | 2 | 4 | 3 | | 0 | 1 | 1 | 2 | 2 | 28 |
| **Department of Housing and Urban Development** | | | | | | | | | | | | | | | | | | | | | |
| Monetized Benefits | | | | 1 | | | | | 0 | | | | 1 | | 1 | | | | 0 | | 3 |
| Non-Monetized Benefits | | | | 0 | | | | | 1 | | | | 1 | | 1 | | | | 1 | | 4 |
| **Department of Justice** | | | | | | | | | | | | | | | | | | | | | |
| Monetized Benefits | | 0 | | | 0 | | | | 1 | | | | | 3 | 0 | 0 | | | | 0 | 4 |
| Non-Monetized Benefits | | 1 | | | 1 | | | | 0 | | | | | 0 | 1 | 1 | | | | 1 | 5 |
| **Department of Labor** | | | | | | | | | | | | | | | | | | | | | |
| Monetized Benefits | 0 | 0 | 1 | | 1 | | | 0 | | 1 | 1 | 1 | 0 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 14 |
| Non-Monetized Benefits | 1 | 1 | 0 | | 3 | | | 1 | | 0 | 1 | 1 | 2 | 1 | 1 | 2 | 3 | 1 | 2 | 5 | 25 |

*Table 2. Monetization and Non-Monetization of Regulatory Benefits in Major RIAs by Agency and Year (Continued)*

| | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Department of State** | | | | | | | | | | | | | | | | | | | | | | |
| Monetized Benefits | | | | | | | | | | | | | | 0 | | | | | | | | 0 |
| Non-Monetized Benefits | | | | | | | | | | | | | | 1 | | | | | | | | 1 |
| **Department of the Interior** | | | | | | | | | | | | | | | | | | | | | | |
| Monetized Benefits | 0 | 0 | 2 | 2 | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 37 | |
| Non-Monetized Benefits | 2 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 1 | 1 | 0 | 0 | 0 | 2 | 12 | |
| **Department of the Treasury** | | | | | | | | | | | | | | | | | | | | | | |
| Monetized Benefits | | | | | | | | | | | | 0 | 0 | 0 | 1 | 0 | 0 | 0 | | 0 | 1 | |
| Non-Monetized Benefits | | | | | | | | | | | | 1 | 2 | 1 | 2 | 1 | 1 | 1 | | 2 | 11 | |
| **Department of Transportation** | | | | | | | | | | | | | | | | | | | | | | |
| Monetized Benefits | 1 | 0 | 1 | 0 | 1 | 1 | 2 | 2 | 4 | 2 | 2 | 3 | 8 | 5 | 3 | 4 | 2 | 1 | 2 | 3 | 47 | |
| Non-Monetized Benefits | 2 | 1 | 2 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 1 | 1 | 2 | 16 | |
| **Environmental Protection Agency** | | | | | | | | | | | | | | | | | | | | | | |
| Monetized Benefits | 2 | 6 | 5 | 5 | 5 | 1 | 1 | 5 | 4 | 3 | 2 | 6 | 1 | 5 | 2 | 4 | 3 | 2 | 8 | 4 | 74 | |
| Non-Monetized Benefits | 5 | 3 | 3 | 1 | 2 | 0 | 1 | 2 | 0 | 0 | 1 | 0 | 1 | 4 | 1 | 1 | 0 | 0 | 2 | 2 | 29 | |
| **Equal Employment Opportunity Commission** | | | | | | | | | | | | | | | | | | | | | | |
| Monetized Benefits | | | | | | | | | | | | | | | 0 | | | | | | | 0 |
| Non-Monetized Benefits | | | | | | | | | | | | | | | 1 | | | | | | | 1 |
| **Federal Acquisitions Regulation Council** | | | | | | | | | | | | | | | | | | | | | | |
| Monetized Benefits | | | | | | | | | | | | | 0 | | | | | | | 0 | 0 | |
| Non-Monetized Benefits | | | | | | | | | | | | | 1 | | | | | | | 1 | 2 | |
| **Office of Personnel Management** | | | | | | | | | | | | | | | | | | | | | | |
| Monetized Benefits | | | | | | | | | | | | | | | | | 0 | | 0 | | 0 | |
| Non-Monetized Benefits | | | | | | | | | | | | | | | | | 1 | | 1 | | 2 | |
| **Pension Benefit Guaranty Corporation** | | | | | | | | | | | | | | | | | | | | | | |
| Monetized Benefits | | | | | | | | | | | | | | | | | | 0 | | | 0 | |
| Non-Monetized Benefits | | | | | | | | | | | | | | | | | | 1 | | | 1 | |
| **United States Access Board** | | | | | | | | | | | | | | | | | | | | | | |
| Monetized Benefits | | | | | 0 | | | | | | | | | | | | | | | | 0 | |
| Non-Monetized Benefits | | | | | 1 | | | | | | | | | | | | | | | | 1 | |
| **Veterans Affairs** | | | | | | | | | | | | | | | | | | | | | | |
| Monetized Benefits | | 0 | | | | | | | | | | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | |
| Non-Monetized Benefits | | 1 | | | | | | | | | | | 1 | 1 | 3 | 1 | | 2 | 5 | 2 | 16 | |
| **Total Monetized Benefits** | **8** | **11** | **13** | **8** | **19** | **5** | **8** | **13** | **16** | **9** | **12** | **14** | **19** | **19** | **15** | **17** | **11** | **14** | **23** | **17** | **271** | |
| **Total Non-Monetized Benefits** | **13** | **22** | **9** | **4** | **15** | **1** | **6** | **13** | **5** | **1** | **6** | **7** | **47** | **47** | **38** | **31** | **43** | **39** | **37** | **58** | **442** | |

### Variance Decomposition Model

The variance decomposition model produced an intraclass-correlation coefficient (ICC) of 0.53, which suggests that 53% of variance in monetization of regulatory benefits is attributable to the clustering of regulations by agencies. This finding partially supports previous research emphasizing associations between federal agencies and variation in RIA methodologies (Ellig and Fike 2016). Nevertheless, this result also suggests that 47% of the total variance in monetization of regulatory benefits is unexplained by the clustering of rules in agencies and is instead attributable to characteristics that vary *within agencies*—which could include rule-level variables such as authorizing legislation or higher-level groupings such as presidential administration that still vary across the rules within a given agency. This finding from the variance decomposition model is noteworthy in itself because it quantifies the percentage of total variance in monetization of regulatory benefits attributable to federal agencies and suggests that the variance is not simply a matter of agency effects as previous scholarship and common sense suggest. The ICC further justifies the permutation test approach to explore which subject tags are associated with monetization and non-monetization of regulatory benefits because focusing on agencies only accounts for about half of the total variation.

## RESULTS

The Monte Carlo permutation test for the full dataset suggests that 26 subject tags are associated with monetization of regulatory benefits in federal agencies' RIAs, while 22 subject tags are associated with non-monetization. For these 48 total regulatory issue areas, we reject the null hypotheses of no association with monetization or non-monetization at the 95% confidence level after correcting for multiple and correlated hypotheses testing with the Benjamini–Yekutieli procedure. In contrast, we fail to reject the null hypothesis of a spurious association for

163 subject tags with non-monetization and 278 subject tags with monetization. Meanwhile, 609 subject tags occur too infrequently in the data to assess their relationship with monetization of regulatory benefits while 727 subject tags similarly lack the statistical power to assess their association with non-monetization.

The 26 subject tags associated with monetization of regulatory benefits, listed in Table 3, range from "household appliances" to "exports" and "ozone." Regulations tagged with these statistically significant subject tags have an extremely high probability of presenting monetized estimates of regulatory benefits in their respective RIAs—especially compared to the statistical expectation under the null hypothesis. While individuals familiar with the regulatory rulemaking process may predict certain subject tags listed in Table 3—such as "particulate matter" or "motor vehicle pollution"—the subject tags do not exclusively align with issue areas commonly perceived as high-cost (Masur and Posner 2016), politically contentious (Shapiro and Morrall 2012), or the regulatory domain of federal agencies with extensive quantitative analytical capabilities (Ellig and Konieczny 2019). For example, the probability of the observed patterns in monetization for RIAs tagged with "intergovernmental relations" or "research" occurring by chance approaches zero even after correcting for multiple hypothesis testing. These specific regulatory subjects given as examples are conceptually broad and are not the purview of any individual federal agency. Other statistically significant subject tags associated with monetization of regulatory benefits, however, appear to cluster into higher-level groups manually labeled as *Pollution*, *Trade and Business*, *Transportation*, and *Energy Efficiency* that more closely align with individual agencies. These higher-level clusters provide a heuristic simplification for broadly describing the results. However, caution is warranted in drawing associations between these higher-level clusters and monetization of regulatory impacts because

the grouping was done only on the statistically significant individual subjects tags, not on all the subject tags in the data prior to the analyses (Morgan and Winship 2015).

The 22 subject tags associated with non-monetization include such policy domains as "veterans," "rural areas," and "government contracts." While these results demonstrate heterogeneity in the policy issue areas associated with non-monetization of regulatory benefits, the subject tags primarily relate to *Health Care* as a higher-level category. Table 4 presents all subject tags associated with non-monetization based on the results of the permutation test, as well as these thematic clusters. Tables 3 and 4 also include for each subject tag: the total number of RIAs tagged with each subject tag; the observed count of RIAs providing non-monetized estimates of regulatory benefits; the simulated p-value, which is the probability of observing as many or more RIAs with non-monetized benefits tagged with the given subject under the null hypothesis of no association; and the corrected p-value based on the Benjamini–Yekutieli procedure.

*Table 3. Permutation Test Results—Monetization*

| Subject | Cluster | Total RIAs | Monetized Benefits: Non-Monetized Benefits | P-Value (Corrected P-Value) |
|---|---|---|---|---|
| Energy conservation | Energy Efficiency | 39 | 32: 7 | 0.0000 (0.0000) |
| Household appliances | Energy Efficiency | 23 | 23: 0 | 0.0000 (0.0000) |
| Environmental protection | Environmental Protection | 102 | 75: 27 | 0.0000 (0.0000) |
| Incorporation by reference | Incorporation by Reference | 128 | 97: 31 | 0.0000 (0.0000) |
| Intergovernmental relations | Intergovernmental Relations | 78 | 57: 21 | 0.0000 (0.0000) |
| Labeling | Labeling | 47 | 33: 14 | 0.0000 (0.0000) |
| Hazardous substances | Pollution | 36 | 30: 6 | 0.0000 (0.0000) |
| Ozone | Pollution | 16 | 15: 1 | 0.0000 (0.0000) |
| Air pollution control | Pollution | 69 | 58: 11 | 0.0000 (0.0000) |
| Particulate matter | Pollution | 18 | 17: 1 | 0.0000 (0.0000) |
| Waste treatment and disposal | Pollution | 11 | 11: 0 | 0.0001 (0.0091) |
| Nitrogen dioxide | Pollution | 14 | 13: 1 | 0.0002 (0.0153) |
| Sulfur oxides | Pollution | 13 | 12: 1 | 0.0002 (0.0153) |
| Research | Research | 24 | 20: 4 | 0.0000 (0.0000) |
| Exports | Trade & Business | 58 | 37: 21 | 0.0002 (0.0153) |
| Warranties | Trade & Business | 22 | 20: 2 | 0.0000 (0.0000) |
| Small businesses | Trade & Business | 18 | 16: 2 | 0.0000 (0.0000) |
| Imports | Trade & Business | 123 | 95: 28 | 0.0000 (0.0000) |
| Confidential business information | Trade & Business | 66 | 53: 13 | 0.0000 (0.0000) |
| Highway safety | Transportation | 12 | 11: 1 | 0.0000 (0.0000) |
| Motor vehicle safety | Transportation | 26 | 23: 3 | 0.0000 (0.0000) |
| Transportation | Transportation | 71 | 45: 26 | 0.0002 (0.0153) |
| Tires | Transportation | 10 | 10: 0 | 0.0003 (0.0220) |
| Motor vehicle pollution | Transportation/Pollution | 26 | 22: 4 | 0.0000 (0.0000) |
| Wildlife | Wildlife & Hunting | 45 | 34: 11 | 0.0000 (0.0000) |
| Hunting | Wildlife & Hunting | 41 | 34: 7 | 0.0000 (0.0000) |

*Table 4. Permutation Test Results—Non-Monetization*

| Subject | Cluster | Total RIAs | Monetized Benefits: Non-Monetized Benefits | P-Value (Corrected P-Value) |
|---|---|---|---|---|
| Colleges and universities | Colleges and Universities | 20 | 0: 20 | 0.0001 (0.0063) |
| Consumer protection | Consumer Protection | 21 | 1: 20 | 0.0003 (0.0169) |
| Government contracts | Government Contracts | 21 | 1: 20 | 0.0005 (0.0244) |
| Grants administration | Grants Administration | 14 | 0: 14 | 0.0004 (0.0204) |
| Health professions | Health Care | 94 | 8: 86 | 0.0000 (0.0000) |
| Health maintenance organizations (HMO) | Health Care | 36 | 1: 35 | 0.0000 (0.0000) |
| Health care | Health Care | 76 | 7: 69 | 0.0000 (0.0000) |
| X-rays | Health Care | 31 | 2: 29 | 0.0000 (0.0000) |
| Grant programs—Health | Health Care | 83 | 5: 78 | 0.0000 (0.0000) |
| Health facilities | Health Care | 126 | 17: 109 | 0.0000 (0.0000) |
| Kidney diseases | Health Care | 44 | 0: 44 | 0.0000 (0.0000) |
| Medicare | Health Care | 102 | 15: 87 | 0.0000 (0.0000) |
| Health insurance | Health Care | 75 | 12: 63 | 0.0000 (0.0000) |
| Privacy | Health Care | 43 | 4: 39 | 0.0000 (0.0000) |
| Claims | Health Care | 32 | 1: 31 | 0.0000 (0.0000) |
| Medicaid | Health Care | 73 | 12: 61 | 0.0000 (0.0000) |
| Loan programs—health | Health Care | 18 | 0: 18 | 0.0001 (0.0063) |
| Emergency medical services | Health Care | 29 | 2: 27 | 0.0001 (0.0063) |
| Puerto Rico | Puerto Rico | 29 | 1: 28 | 0.0000 (0.0000) |
| Rural areas | Rural Areas | 43 | 0: 43 | 0.0000 (0.0000) |
| Travel and transportation expenses | Travel and Transportation Expenses | 15 | 0: 15 | 0.0002 (0.0119) |
| Veterans | Veterans | 16 | 0: 16 | 0.0004 (0.0204) |

*Subject tags are sorted by the manually assigned clusters in alphabetic order.*

The primary value of the permutation test results is enabling direct comparisons between how federal agencies assess regulatory benefits based on granular-level policy issues—rather than broad policy clusters—across the regulatory state. For example, 20 out of 21 RIAs addressing "consumer protection" provide non-monetized analyses of the regulatory benefits.

The simulated p-value for consumer protection is 0.000 (corrected value of 0.017) suggesting that it is highly unlikely that this association is attributable to chance or interdependencies with other subject tags. In contrast, 33 out of 47 RIAs addressing "labeling" monetize the value of projected regulatory benefits (simulated p-value: 0.000; corrected p-value: 0.000) even though both regulatory issue areas seem to address the provision of better information to consumers. Such comparisons between patterns in the monetization of regulatory benefits in RIAs could help decision-makers in the federal government and scholars identify related regulatory spaces with divergent evaluative practices.

Similarly, the granular-level comparisons between subject tags provide strong suggestive evidence about the distribution of procedural burden across the regulatory state. For example, 95 out of 123 RIAs tagged with "imports" monetize the projected regulatory benefits according to the OIRA data. The permutation test suggests that this association is highly unlikely—the observed p-value is 0.000 and the corrected p-value is 0.000. In contrast, 17 out of 19 regulations tagged with "employment" provide non-monetized estimates of the regulatory benefits in their respective RIAs. The permutation test suggests that this distribution of non-monetization has a 0.006 probability of occurring by chance prior to correcting for multiple hypothesis testing, although the corrected p-value is 0.132 and therefore not statistically significant at normal confidence interval levels. Nevertheless, these descriptive statistics suggest differing procedural practices for evaluating the policy benefits of regulations addressing imports versus employment—and therefore potentially different experiences for socioeconomic groups seeking to influence and participate in these regulatory spaces. If, as theorized, monetization as a procedural norm entails higher levels of procedural burden, then we would expect more groups and citizens to be excluded from meaningfully influencing regulations addressing imports

compared to regulations addressing employment. This postulate does not necessarily mean that regulations addressing imports or employment are relatively better or worse than each other. Rather, the results help rigorously describe differences in regulatory procedures for democratic influence in these respective policy spaces. The online appendix provides the full results from the permutation test enabling such comparisons in monetization and non-monetization of regulatory benefits across the entire regulatory state in the United States for the first time.

The null results from the permutation test provide additional insights into if and when monetization of regulatory benefits is patterned by policy domains. The permutation test explicitly fails to reject the null hypothesis of no association for 92 subject tags. These results do not prove a lack of association between the respective subject tags and monetization or non-monetization—only that we fail to reject the hypothesis of no association at standard confidence levels. For example, such regulatory subject tags as "lead" and "electric power" are probably associated with monetization of regulatory benefits despite corrected p-values outside of the 95% confidence range. Their simulated p-values from the permutation test—0.001 and 0.003, respectively—suggest a strong association with monetization. The Benjamini–Yekutieli procedure, however, provides a conservative statistical adjustment for multiple hypothesis testing and subsequently deems these subject tags not statistically significant. The collective set of descriptive statistics from the data provides evidence about the direction of the association between the regulatory subjects and monetization of regulatory benefits—such as that 11 out of 14 regulations tagged with "civil rights" provide non-monetized regulatory benefits in their RIAs—even if the permutation test formally fails to reject the null hypothesis of no association. Still, other subject tags, such as "fuel economy" and "animal diseases" appear firmly unassociated with either monetization or non-monetization of regulatory benefits in federal

agencies' RIAs based on the results of the permutation test. These null results suggest—but do not firmly establish—regulatory policy spaces with unsettled or ambiguous organizational norms for evaluating regulatory proposals. Table 5 provides a partial list of the null results from the permutation test—the full results are available in the online appendix.

*Table 5. Permutation Test Null Results—Monetization and Non-Monetization*

| **Subject** | **Total RIAs** | **Monetized Benefits: Non-Monetized Benefits** | **Monetization P-Value (Corrected P-Value)** | **Non-Monetization P-Value (Corrected P-Value)** |
|---|---|---|---|---|
| Lead | 13 | 11: 2 | 0.0014 (0.0989) | 0.9998 (1.000) |
| Electric power | 12 | 10: 2 | 0.0033 (0.2030) | 0.9998 (1.000) |
| Civil rights | 14 | 3: 11 | 0.9617 (1.0000) | 0.1242 (1.000) |
| Fuel economy | 13 | 8: 5 | 0.0978 (1.0000) | 0.9682 (1.0000) |
| Animal diseases | 9 | 5: 4 | 0.2741 (1.0000) | 0.8957 (1.0000) |
| Individuals with disabilities | 29 | 4: 25 | 0.9997 (1.0000) | 0.0017 (0.0629) |
| Air carriers | 20 | 9: 11 | 0.4077 (1.0000) | 0.7507 (1.0000) |
| Cosmetics | 9 | 4: 5 | 0.5201 (1.0000) | 0.7267 (1.0000) |
| Reporting and recordkeeping requirements | 514 | 212: 302 | 0.3104 (1.0000) | 0.7184 (1.0000) |

**Agency-Level Permutation Tests**

The results from the agency-level permutation tests identify a limited number of statistically significant subject tags within agencies and only two federal agencies in which this statistically significant variation occurs: the Department of the Interior (DOI) and the Department of Health and Human Services (DHHS). Within DOI, RIAs addressing "wildlife," "hunting," and "transportation," among others listed in Table 6, tend to monetize regulatory

benefits while subject tags such as “oil and gas exploration” and “environmental protection” are associated with non-monetized regulatory benefits in RIAs. However, delving into the regulations tagged with statistically significant subject tags for monetization within DOI suggests that these subject tags are perfectly correlated with each other and that a single recurring set of regulations, *Migratory Bird Hunting*, primarily explains this persistent monetization of regulatory benefits within DOI. Within the Department of Health and Human Services (DHHS), “rural areas” and “kidney disease” are associated with non-monetization, and “incorporation by reference” is associated with monetization.

These results, however, and the overall limited statistical significance of regulatory subject tags on the agency level, are probably due to the limited agency-level sample size. For example, given the observed probability of monetization of regulatory benefits—0.746—within the Department of Transportation (DOT)’s 63 major regulations in the dataset, a subject tag needed to occur 11 or more times in DOT regulations to provide enough statistical power to evaluate an association with monetization. Only 8 out of 111 subject tags used by DOT meet this criterion and could be evaluated through a permutation test approach. Relatedly, across all agency-level permutation tests, 772 subject tag-agency pairs were dropped from the analyses because they occurred too infrequently to provide statistical power to assess their association with monetization while 1,027 subject tag-agency pairs were dropped because they lacked the statistical power to analyze their relationship with non-monetization. Yet 959 subject tag-agency pairs—out of a total of 1,190 in the data—perfectly predict monetization or non-monetization of regulatory benefits in an agency’s RIAs.

Nevertheless, descriptive statistics about monetization and non-monetization of regulatory benefits conditional on subject tags within agencies still provide comparative insights

into how valuative procedures differ within agencies. For example, within the Department of Agriculture, seven out of 10 RIAs tagged with “poultry and poultry products” monetize regulatory benefits according to OIRA summary reports to Congress, while all 10 RIAs tagged with “nutrition” provide non-monetized estimates of regulatory benefits. These data therefore help identity sites of variation within agencies, even if the permutation test methodology and limited sample sizes prevent inferences about statistical associations. These empirical results further suggest regulatory spaces within agencies in which procedural norms might heterogeneously legitimize and constrain federal regulators in drafting regulations based on their own autonomy and expertise. These data, fully available in the online appendix, provide a tool to explore the distribution of evaluative practices in federal agencies’ RIAs across 1,190 subject tag-agency pairs.

*Table 6. Statistically Significant—Agency-Level Permutation Test Results*

| Agency | Subject | Total RIAs within Agency | Monetized Benefits: Non-Monetized Benefits | P-Value (Corrected P-Value) |
|---|---|---|---|---|
| | | Monetized | | |
| Department of the Interior | Wildlife | 41 | 37: 4 | 0.0152 (0.0447) |
| | Transportation | 41 | 37: 4 | 0.0152 (0.0447) |
| | Hunting | 41 | 37: 4 | 0.0152 (0.0447) |
| | Imports | 41 | 37: 4 | 0.0152 (0.0447) |
| | Exports | 41 | 37: 4 | 0.0152 (0.0447) |
| Department of Health and Human Services | Incorporation by reference | 20 | 13: 7 | 0.0000 (0.0000) |
| | | Non-Monetized | | |
| Department of the Interior | Incorporation by reference | 5 | 0: 5 | 0.0013 (0.0176) |
| | Environmental protection | 6 | 0: 6 | 0.0002 (0.0036) |
| | Administrative practice and procedure | 8 | 0: 8 | 0.0001 (0.0036) |
| | Continental shelf | 6 | 0: 6 | 0.0002 (0.0036) |
| | Public lands—mineral resources | 4 | 0: 4 | 0.0045 (0.0348) |
| | Penalties | 4 | 0: 4 | 0.0039 (0.0348) |
| | Oil and gas exploration | 4 | 0: 4 | 0.0042 (0.0348) |
| Department of Health and Human Services | Rural areas | 36 | 0: 36 | 0.0004 (0.0270) |
| | Kidney diseases | 44 | 0: 44 | 0.0002 (0.0270) |

Ultimately, the results of the permutation test provide a clear and systematic description of patterns in non-monetary and monetary justifications for regulatory decisions across federal government bureaucracies. The permutation test results provide strong evidence of established and persistent procedural norms for how federal agencies evaluate regulatory benefits in these

statistically significant policy issue spaces. As a result, the findings suggest varying levels of procedural burden based on the regulatory issue area across federal executive branch agencies.

## DISCUSSION

The burgeoning literature on inequality in administrative politics (Yackee and Yackee 2006, Libgober 2020) has not engaged with public administration research on the heterogeneity in federal agencies' cost-benefit analyses of regulatory proposals (Masur and Posner 2016, Ellig and Fike 2016). As a result, the relationship between how federal agencies analyze and assess regulatory impacts, on the one hand, and inequality in influence and outcomes in regulatory rulemaking, on the other, is not yet understood. As groundwork for this field of research, this paper provides the first empirical analyses of associations between policy issue areas and monetization of regulatory benefits in federal agencies' RIAs across the federal regulatory state. The results provide evidence that procedural norms for evaluating regulatory policy proposals differ based on the policy issue area for regulatory domains such as, but not limited to, "energy conversation," "hazardous substances," "intergovernmental relations," and "confidential business information"—associated with monetization—and "colleges and universities," "rural areas," and "health insurance"—intertwined with non-monetization. These procedural norms for evaluating and comparing regulatory policy proposals likely mediate what types of information federal regulatory agencies and OIRA deem persuasive during the rulemaking process in these respective regulatory spaces—and therefore the barriers and onerous procedures facing interest groups and citizens seeking to shape federal regulations based on their own preferences and expertise.

These empirical findings demonstrate an overlooked mechanism through which power is wielded in the administrative rulemaking process—procedural norms for projecting and

evaluating regulatory impacts. Federal agencies persistently promulgate major regulations addressing policy issues such as "consumer protection" or "rural areas" without monetizing the regulatory benefits but seemingly clear a separate analytical procedural hurdle to regulate such issues as "small businesses" or "air pollution control." The results further demonstrate that organizational norms for producing RIAs vary within agencies, although these relationships are harder to document and statistically discern given the limited sample sizes. The null results from the permutation test also imply that numerous regulatory policy issues are not associated with established procedural norms for how to legitimately assign value to regulatory impacts and justify regulatory proposals.

In addition, the paper introduces the concept of *procedural burden*—defined as the extent of the barriers facing interest groups and citizens in wielding power over regulatory policy formation. The empirical findings combined with this theoretical concept suggest that variation in monetization of regulatory benefits—as a type of procedural burden—can be a meaningful form of procedural inequality given the resources and costs associated with conducting monetary valuation of regulatory benefits. As Wagner (2010) shows, high barriers to influencing administrative rulemaking risk systematically excluding certain affected groups from accessing political power. Such exclusion of socioeconomic groups from political influence based on technocratic procedures and justifications is at odds with pluralist conceptions of bureaucratic governance (Caramani 2017). This suggested relationship between procedural evaluative norms and inequality in regulatory rulemaking warrants further inquiry even if this form of procedural inequality is sanctioned by Congress, correlates with the magnitude of the projected regulatory costs, is partially a product of which rules are transfer regulations, or reflects methodical best practices for conducting CBA with limited available data.

The concept of procedural burden makes several contributions to theory on the regulatory administrative process. First, following Carpenter and Krause's (2015) call for research to focus informal compliance and resistance in bureaucratic politics, the paper documents informal organization norms that, in all likelihood, shape how federal regulators conceive of policy issues and possible regulatory solutions. While previous scholarship contends that such a relationship exists (Heinzerling 2014, Costa et al. 2019), this paper is the first to inductively identify when procedural norms for regulatory analyses are pronounced, persistent, and distinct between regulatory policy issue areas. Methodologically, the paper does not seek to disentangle the effect of individual regulatory subject tags from the institutional, policy, or scientific context precisely because organizational evaluative norms are embedded in and endogenous to their institutional environment (Espeland 1998, Lamont 2012). 668 subject tags out of the total 912 perfectly predict monetization or non-monetization of regulatory benefits in federal agencies' RIAs while numerous regulatory subject tags are highly associated with which federal agency drafted the regulation. Nevertheless, the permutation test approach (Hayes 1996, Collingridge 2013) combined with the correction for multiple and non-independent hypothesis testing (Benjamini and Yekutieli 2001) enables statically rigorous inferences about when observed conditional probabilities between a subject tag and monetization are too improbable to alternatively attribute to other correlates or chance. The permutation test approach, therefore, helps overcome a methodological barrier to operationalizing and quantitatively studying organizational norms in bureaucratic politics.

Second, the concept of procedural burden builds upon the vast theoretical foundation from scholarship on administrative burden (Burden et al. 2012, Herd and Moynihan 2019) but offers a new conceptual tool to study the burden associated with accessing political power—

rather than services and rights—vis-à-vis the administrative state. Surprisingly, the field lacks a concept for studying the costs and barriers to accessing political power during the regulatory rulemaking process. Procedural burden therefore helps further theorize and study the heterogeneity in how actors experience the administrative state—which is one of the most important correlates predicting popular satisfaction with democratic governance (Dahlberg and Holmberg 2013). While monetizing the value of regulatory proposals is a resource-intensive process for producing persuasive information during the rule-drafting process, it is only one aspect of procedural burden as defined. Future research based on survey, interview, and ethnographic methods could expand our understanding of the types and distributions of burdens and barriers facing interest groups seeking to access and wield power over regulatory policy proposals—and how these procedural burdens shape political influence, regulatory policy outcomes, and quality of democratic procedures for regulatory governance.

Third, the paper contributes to political theory on strengthening democratic control of the regulatory state. The results challenge analytical and theoretical assumptions justifying monetary cost-benefit analyses as a democratic oversight mechanism for all federal agencies and policy issue areas. If federal agencies do not provide monetary estimates of regulatory benefits for 62% of all major regulations between 1996–2016, then in practice the president may not be relying on this mechanism to control and direct the majority of major regulatory actions. If so, openness about underlying political reasons for regulatory policy decisions, rather than monetary analyses providing at times ex post justifications for politically directed regulations, would provide more genuine transparency into federal agencies' regulatory decision-making processes (Watts 2009).

Furthermore, the results and theorizing suggest that evaluative procedures for regulatory proposals are, at times, endogenous to the interests and influence of powerful groups in the

policy space. The Biden administration, as of this paper's drafting and publication, has directed OMB to develop recommendations to better address distributional consequences of regulation and to modernize formal guidance to agencies in ways that "fully accounts for regulatory benefits that are difficult or impossible to quantify" (Biden 2021). The data and results support this effort. Requiring standardized approaches for analyzing proposed regulations in non-standard informational and organizational environments may not be a recipe for strengthening democratic oversight or improving regulatory policy. Instead, such executive guidance to agencies for cost-benefit analyses should be targeted by policy issue area, focus on scenario planning and probabilistic forecasting of regulatory impacts rather than speculation about the value of these impacts in monetary terms, and reflect a formal decision by the president about the desired level of procedural burden for promulgating different types of regulatory policies based on authorizing legislation and the president's political priorities.

Lastly, the full dataset used in this research is available online—which is a new resource both for scholars and practitioners studying the regulatory process. The data contain information on the 713 major regulations identified by and included in OIRA's annual reports to Congress between 1997–2017. Future research using these data could explore how federal agencies' specific methodologies for cost-benefit analyses evolve and diffuse or become associated with the projected economic costs of the regulation.

Nevertheless, the data and analyses in this paper have several limitations. First, the analyses are based on subject tags which federal agencies self-select for each regulation. The data, therefore, do not provide an exhaustive coding of the affected social groups or regulatory issue areas associated with each regulation and RIA. While seven regulations contain the subject tag "women," it is unlikely that these regulations are the only rules in the dataset that directly

affect women. Moreover, this paper relies on data from OIRA's summaries. The permutation test analyses therefore do not distinguish between *degrees* of monetization of the regulatory benefits in federal agencies' RIAs. Monetization is a spectrum of methodologies and outputs rather than a binary occurrence (Hirshman et al. 2016). Future research should address variation in the specific methodologies that federal agencies use to monetize or qualitatively assess regulatory impacts—such as willingness to pay and willingness to accept—as well as document which specific endpoints tend to be identified and monetized in bureaucratic analyses and justifications.

This research also relied on a monetization of regulatory benefits to study procedural burden without observational data on the resources directly expended on monetarily analyzing regulatory proposals. Future mixed-methods research could shed new light on how socioeconomic groups experience the rulemaking process and allocate resources to analyzing and seeking to influence regulatory proposals. Such research should expand this paper's focus on regulatory benefits to also address the resources allocated to monetizing regulatory costs.

## CONCLUSION

Federal agencies assess the benefits and costs of proposed regulations in order to justify rules to multiple external audiences and to advance regulatory proposals through government oversight procedures. This process, in theory, contributes to executive control of the regulatory state, transparency into federal agencies' regulatory decisions, and democratic accountability for federal agencies' rule-making authority (Sunstein 1996). Moreover, monetization of regulatory benefits can provide a mechanism for stakeholders and citizens to contest regulatory policies, substantiate their own claims about preferable policy options, and potentially improve regulatory policies. Yet as previous scholarship has demonstrated, federal agencies inconsistently quantify the value of regulatory benefits in formal RIAs—often providing qualitative descriptions of the

benefits instead or stating that available data and methodologies are insufficient to predict and quantify the impact of the rule (Masur and Posner 2016, Hahn and Dudley 2007, Sinden 2019).

This paper presents the first empirical analysis of the associations between policy issue areas and the monetization of regulatory benefits in RIAs for major rules across the entire federal regulatory state. The results demonstrate systematic heterogeneity in whether federal agencies monetize regulatory benefits depending on regulatory issue areas. I argue that persistent patterns in the monetization and non-monetization of regulatory benefits are best conceptualized as procedural norms—which mediate the forms of information deemed persuasive during the rulemaking process and thus barriers to regulatory influence. The results and data from this paper provide baseline empirical statistics to study and evaluate claims that monetary cost-benefit analysis methodologies bias regulations towards business interests and away from addressing societal-level problems. The paper also introduces procedural burden as a concept to help address the distribution of barriers to exercising power and influence in the rulemaking process—thereby contributing to the larger project of studying and helping better align informal procedural norms across federal government bureaucracies with conceptions of well-functioning pluralist democracy (Carpenter and Krause 2015).

Moving forward, the challenge is to describe a regulatory development and review process that promotes rigorous analyses of regulatory options, democratic transparency and participation, and pluralistic methodologies for describing and operationalizing both causal relationships and the value of regulatory impacts. These issues are imperative for both scholars and practitioners.

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# APPENDIX

## A – Subject Tag Data Cleaning

The data cleaning of the subject tags from the Federal Register was performed in Python with the FuzzyWuzzy package. This package calculates the Levenshtein Distance between two strings—which is "The smallest number of insertions, deletions, and substitutions required to change one string or tree into another" (Black 2008). I relied on the "process.extract" function to compare every subject tag to each other and extract the closest matches. Based on a visual comparison of similarity ratios, I determined that similarity ratios at or above 0.91 denoted substantively the same string. This methodology grouped together such subject tags as, "health professional," "health professions," and "health professionals." The methodology ultimately produced 912 fuzzy-matched subject tags from an initial 1042 raw subject tags in the data.

## B – Power Calculations

The fundamental logic for the power calculations was to determine the minimum *n* (number of occurrences) for a subject tag such that the permutation test methodology *could* establish a statistical relationship with monetization and non-monetization of regulatory benefits, respectively, prior to the correction for multiple hypotheses testing. In practice, this approach required calculating how many times a subject tag had to occur in the dataset such that observing either monetization every time or non-monetization every time had less than or equal to a 5% of occurring by chance.

Non-Monetization: 0.6199^x = <0.05: x> = 6.267
Monetization: 0.38^y = <0.05: y> = 3.09

For example, the probability of observing non-monetization of regulatory benefits in six RIAs for a given subject tag when the subject tag occurs a total of six times in the dataset is: 0.599^6 = 0.0462, which is below the standard .05% threshold that the association could have occurred by chance. In contrast, if the subject tag only occurred five times in the dataset, then the probability of observing five non-quantified RIAs would have a 0.599^5 = 0.0771. Therefore, an *n* of 5 does not produce the possibility of rejecting the null hypothesis of no association between the subject tag and non-monetization at the 95% confidence level.