Measuring the Costs and Benefits of Regulation

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Draft: September 2024

Abstract: This article discusses recent methodological innovations in the area of cost and benefit assessment of government regulation, in both a prospective and retrospective sense. Much of the extant progress is presented on the front of private costs of compliance. Private benefits, social costs, and social benefits remain much less systematically organized and more arduous to quantitatively assess, mostly due to the difficulty of standardizing partial and general equilibrium counterfactuals. We offer a discussion of potential future methodological improvements in cost-benefit analysis.

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When citing this paper, please use the following:
Bombardini, Matilde, Francesco Trebbi, Miao Ben Zhang. 2025. "Measuring the Costs and Benefits of Regulation". Annu. Rev. Econ. 17: Submitted. DOI: 10.1146/annurev-economics-081224-104518

1. Introduction

In virtually every high-income country in the world today, regulatory action on the part of national governments is vast, heterogeneous, and expanding. Regulatory intervention spans areas from professional licensing and certification, to the safety and soundness of national banks, to clean drinking water, to the protection of homeland security, to cryptocurrencies, and much more. In the United States, the Office of Management and Budget (OMB) Circular A-4 broadly asserts that: "*Common needs for regulation include, but are not limited to:*

- *correcting market failure, which may implicate externalities, common property resources, public goods, club goods, market power, and imperfect or asymmetric information;*
- *addressing behavioral biases;*
- *improving government operations and service delivery;*
- *promoting distributional fairness and advancing equity; and*
- *protecting civil rights and civil liberties or advancing democratic values."*

Given such a large footprint, spanning economic and social goals, economists have long lamented the lack of a rational assessment of such a broad spectrum of interventions (Litan and Nordhaus, 1983; Joskow and Rose, 1989). These interventions are often designed and implemented without the possibility for citizens to vote on these rules or even elected representatives to fully deliberate their details.

This paper focuses on the frontiers of the research on the measurement of costs and benefits of government regulation. It aspires to be neither methodologically novel nor comprehensive. In terms of novelty, we are far from achieving a scientific consensus on the most complex areas of regulation – consider quantifying or monetizing the complex benefits of individual privacy

protection or of future systemic financial stability – and new advances in this area are infrequent. In terms of comprehensiveness, the limits of this article are more functional. The details of the specific cost-benefit methodologies used in the assessment of Phase I of the Title IV SO_2 Trading Program, for example, may not be necessarily of general pertinence to the study of regulation or of interests to specialists in other areas of government intervention, such as banking. For these reasons, we abstract from much detail on specific rules.

The measurement of regulation can take two main directions. The first is an analysis of the costs and benefits of regulatory activity in the aggregate – that is an analysis of the regulatory architecture of an economic system in the whole.[4] This is a useful direction because rules often complement or interact with each other, producing effects different from the combination of each part in isolation. Efforts such as the World Bank's Doing Business report data collection, which ran from 2004 to 2020, are examples of aggregate, multidimensional perspectives designed to capture the entirety of the regulatory architecture for a large panel of countries at yearly frequency. The Organization for Economic Cooperation and Development (OECD) also provides similar data with identical goals.[5] Trade associations may also perform similar studies for advocacy purposes.[6]

The second direction involves the analysis of the costs and benefits of specific rules – that is, an analysis of regulatory policies at the margin, holding the rest of the government architecture as given, and abstracting from the overlap/interactions of the entire structure with the rule under

[4] Classic perspectives of the aggregate type include Stigler (1971), Posner (1974), and Peltzman (1976), who argue their conceptual approach base on case studies and anecdotal evidence. This tradition is followed in Shleifer (2005) more recently. See also Dal Bo' (2006) for a discussion of regulatory capture.
[5] See World Bank Doing Business (2020), Djankov (2009) or the OECD Indicators of Product Market Regulation (Vitale, Moiso, Wanner, 2020).
[6] See Crain and Crain (2023) for the National Association of Manufacturers.

analysis.[7] This is the case, for instance, of what is required under regulatory impact analyses (RIA's) performed by the OMB in the United States, designed to assess the effect of new regulations under President Ronald Reagan's Executive Orders 12291 and President Bill Clinton's 12866 and an important input for a full-fledged cost-benefit analysis (CBA). Currently, independent agencies are not required to perform CBA on new rules, and of the rules for which CBA is performed, few have a truly complete quantitative analysis of both costs and benefits.[8]

This article tries to touch the literature on both aggregate and specific regulations: the aggregate form because it is an ambitious and comprehensive perspective of regulation; the specific one, because it often delivers the most precise empirical evidence, and it is inherently closer to a scientific view of CBA as a "controlled experiment": present/absent a regulation.

Each perspective comes with its own particular set of complications as well. From an aggregate regulatory perspective, one needs to find a way to homogenize and integrate the costs and benefits of a plethora of disparate policy dimensions, from environmental regulation to privacy protection to labor discrimination. This will be the approach to which the article will dedicate most of its attention. In the rule-specific perspective, one needs to evaluate the extent of overlap/interaction with other rules within the system. Complementarities or redundancies with extant rules can take the form of reduced (due to scale economies) or enhanced (due to duplication) compliance costs relative to the baseline, for example. Indeed, examples of successful empirical analysis of the benefits and/or costs of specific rules on industries abound.

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[7] For an early discussion, see Arrow et al. (1996) and for more recent ones Cochrane (2014) and Sunstein (2021).
[8] For instance, of the over 200 rules analyzed by Office of Information and Regulatory Affairs (OIRA) for the fiscal years 2020, 2021, and 2022 reports: *"For 31 rules, we report agency estimates of both benefits and costs. For 3 rules, we report agency estimates of benefits, but costs are not reported. For 58 rules, we report agency estimates of costs, but benefits are not reported. For 115 rules, we report agency estimates of transfers (either Federal budget transfers or non-budget transfers)."* See OIRA (2023, p.3)

For example, in the context of the Clean Air Act of 1963 alone, one of the most successful pieces of regulatory intervention in the United States post-war period (Greenstone, 2002; Walker, 2013), Currie and Walker (2019) review tens of papers on effects varying from lowered pollution, better health outcomes, increased earnings, increased productivity, lower crime rates, higher home values, et cetera. This review will not attempt to incorporate a comprehensive summary of the myriads of papers focusing on the benefits or unintended consequences of regulatory intervention. This would not be useful to the reader interested in the big picture view, which is an objective of this article. Indeed, even when possible to offer a comprehensive review of a sliver of empirical microeconomic papers on a specific regulation like the Clean Air Act, one may still conclude that "*it is simply not possible on the basis of the currently available evidence to add up the total benefits and/or the total costs, although the Environmental Protection Agency has tried (EPA, 2011)*" Currie and Walker (2019, p.22).

In concentrating on the methodological advances in measurement, we differ from more conceptual and broad papers, like Sunstein (2017, 2021), Posner and Weyl (2013), Cochrane (2014), or Coates (2015), which tend to focus on CBA as a concept.[9] While such conceptual pieces are obviously important to the intellectual debate, the reader is often left pondering about the practical implementations of CBA – CBA is rational and useful, only were it possible to perform systematically. These articles are less focused on operational suggestions than we are. On the contrary, this is a paper focused on what is the frontier of what is feasible, and it presents some new ideas for potential progress in this area.

[9] See also Rose-Ackerman (2010), Gordon (2015) for dissenting voices among the others.

Indeed, it is fair to say that economists lack a comprehensive approach to assessing the role of regulation in the process of economic policymaking. This is mostly due to the incredible complexity of addressing within a single unified quantitative framework the disparate areas of oversight that fall under the umbrella of regulation. It may seem hard, even impossible, to define a common metric spanning safety and soundness of bank holding companies as well as limits to freshwater pollutants in paper pulp production, or professional licensing of veterinarians. Goff (1996, p.87) puts it starkly when he writes: "*the measurement problems present such a large barrier that one could flatly assert the total amount of regulation to be unmeasurable by direct observation."* For these reasons, most of the research on regulation has focused on measuring the costs and benefits of narrow, individual micro-domains, limiting the general relevance of its quantitative results. Yet novel work is emerging (with more coming online recently). A new class of methods for generating aggregate measures of regulatory costs and benefits includes the ones presented Al-Ubaydli and McLaughlin (2017), Davis (2017), Kalmenovitz (2019), McLaughlin and Sherouse (2019), Calomiris et al. (2020), and Trebbi, Zhang, and Simkovic (2023), which we discuss below.

Some further limitations of this review are worth mentioning. Regulation assumes fundamentally two forms: Economic regulation, which aims at correcting market failures (e.g., in banking), accounting for externalities (e.g., environmental regulation), and correcting for informational asymmetries (e.g., occupational licensing).[10] Social regulation instead focused on shaping market transactions and economic activity to achieve political or national security goals (e.g., in the case of redistribution and equality, social insurance, trade policy, or defense restrictions), without necessarily aiming at economic efficiency. We will touch on both economic and social

[10] See Joskow and Rose (1989) for an early definition.

regulation, but we will abstract from the role of transfers, which are especially relevant for social regulation and a source of additional measurement complexity (Hahn and Hird, 1991).[11]

Finally, we also emphasize that this review will be limited, for the most part, to a specific regulatory environment, that of the United States. This is a severe limitation. However, as much as we would like to present a more general overview, the idiosyncrasies of different regulatory environments, such as the one of the European Union, the United Kingdom, or China, prevent us from taking a more global perspective within the confines of a single article. We hope that the lessons we draw from the US system may be applied to these other environments with due adjustment.[12]

The article proceeds as follows. We begin by focusing on the private costs of regulation and compliance, which are typically the lower-hanging fruits in the discussion on measurement. We then move on to social costs, which are considerably more complex to assess due to externalities and spillovers. We will then review work on benefits, both private and social, with the social benefits of regulation being often the least amenable to systematic quantification. We will then present a brief policy discussion on how the tools reviewed would need to find application with the regulatory review process in the United States. The last section concludes.

2. Measuring the private costs of regulation

[11] Transfers are important components of many forms of government intervention in the economy and regulation. In the United States, OMB Circular No. A-4 defines transfers as *"...monetary payments from one group to another that do not affect total resources available to society"*, but they can still produce inefficiency through misallocation. Nonetheless, they will not be part of our analysis due to space constraints.

[12] For example, one may find strong analogies between what advocated below concerning the US Regulatory Impact Analysis and a direct correspondent, the Impact Assessment performed by the European Commission, in the EU. See also Renda (2006).

The question of what the aggregate consequences of regulation for economic progress are dates back to Pigou (1920), the father of the public interest view of government regulation. However, only with the more empirical and data-driven macroeconomics of the 1980s and 1990s did economists systematically begin approaching the aggregate analysis of regulation beyond the anecdotal. Initial attempts at the aggregate measurement and analysis of regulation may appear rudimentary from the econometric and measurement perspectives, perceived by modern readers as overclaiming, relative to the strength of the empirical evidence and identification strategies employed. Eventually this evolved into a second research wave, more focused on innovative methodologies in assessing regulation itself. We review the main contributions along this trajectory here.

2.1 Early assessments

Litan and Nordhaus (1983), Morrall (1986) and Goff (1996) are among the first empirical contributions focused on the macro costs of regulation. In one of the first comprehensive analyses, Litan and Nordhaus estimates a loss of about 0.33 percentage points in annual productivity growth over the period 1974-1983 from federal regulation in the US (p.32) and for the first time advocates for a "regulatory budget". Goff (1996) follows a factor analysis method designed to recover a latent (unmeasured) Effective Regulatory Index for the United States. This index is constructed as a weighted aggregate of several postwar time series, such as the number of pages in the Federal Register, the number of employees of the Environmental Protection Agency, lawyers as a percentage of the population, etc. Although innovative at the time, this latent factor model suffers from the usual criticisms of such approaches, that is relegating too much of the analysis to the black box of what a "factor" may truly capture in terms of costs for businesses and economic agents. Almost in parallel, Blanchard and Wolfers (2000) show the

negative effects of coarse labor market regulations on employment in OECD countries, although using more standard econometric techniques and adopting a narrower scope.

The first substantial empirical innovation in the aggregate study of regulation appears in Djankov et al. (2002). The paper extends the insight of De Soto (2000) and forms the conceptual basis for the cost of "Doing Business" data collection effort developed subsequently by the World Bank. The contribution here is in the production of new measures of regulatory burden by direct empirical measurement: opening new small businesses in each country. That is, the authors and their collaborators go through the physical bureaucratic process just as a small entrepreneur would need to perform. Djankov and coauthors develop a simple index designed to aggregate the number of government restrictions in starting a new business for a cross-section of 85 countries (the World Bank later extended the sample). In terms of its main findings, the article then compares developing countries with more consolidated economies and finds a negative conditional correlation between the level of aggregate output and the number of regulatory entry procedures required. The authors further report a positive correlation between measures of corruption and government regulation, arguing for a role for regulation in increasing corruption.

Although innovative in terms of measurement, Djankov et al. (2002) presents statistical results with limited ability to control for omitted variable bias within its linear regression framework, limiting the contribution of the paper to illustrating intriguing cross-sectional correlations (see also Djankov, 2009).[13]

[13] As an example of the pitfalls of this approach, by regressing the level of real GDP per capita on the number of procedures required to open a business as the authors do, one estimates a negative coefficient that cannot be interpreted as the causal effect of regulation on economic performance. This is because countries with more burdensome regulatory environments typically also have lower state capacity, which is both excluded from the regression specification and arguably a direct drag on the level of economic performance. Omissions of this type induce an upward bias in the size of the estimated coefficient on regulation due to combining a direct effect and the spurious indirect effect via state capacity.

After Djankov et al., research on the regulation of entry moves towards better statistically identified frameworks or at least employs more credible panel data variation, which allows to control for country time-invariant unobservables. For instance, Nicoletti and Scarpetta (2003), using a panel of OECD countries, shows that product market regulation lowers productivity growth. Alesina, Ardagna, Nicoletti, and Schiantarelli (2005) in research on the negative economic consequences of regulation posits that "*[…] stricter regulation of markets has prevented faster growth in many European countries especially in a period, the 1990s, of rapid technological innovation. Is this true? This paper suggests that the answer is 'yes'.*"[14]

It seems fair to say that this phase of the literature is ambitious, but tentative. The starkness of the exposition of the findings often contrasts with the fragility of the methodology, particularly when it comes to accurately decoupling measures of regulation from other underlying drivers of the economic and social outcomes considered.

2.2 A textual approach to the measurement of regulation

With the introduction of computational linguistics methods in Economics and Finance in the early 2000s new approaches to the measurement of regulatory costs emerged. Among early examples, Dawson and Seater (2013) studies in a time series setting the effects of the aggregate regulatory burden on output and total factor productivity using the total Code of Federal Regulations (CFR) word count as a proxy for regulatory pressure and finds negative and sizeable elasticities. This approach, as already anticipated in Goff (1996), may seem simplistic, possibly

[14] The Alesina et al. article investigates the (positive) effects of market liberalizations as deregulation, but suffers, like Djankov et al., from issues of statistical identification and of "pooling" vastly heterogeneous regulatory environments within the same regression framework, a potential source of misspecification. This is not to say that the direction of the results is incorrect. Other studies point in similar directions. Bertrand and Kramarz (2002) finds effects that are qualitatively similar to Djankov et al., but quantitatively different (see also Barseghyan, 2008).

naïve. It asserts that because the CFR was 22,877 pages in 1960 and is more than 200,000 pages today – an average twelve percent growth rate per year – the U.S. regulatory burden must be higher and may even be excessive from a welfare standpoint. Intuitively, even just in terms of its financial and technological features, the United States economy has become orders of magnitude more highly dimensional and more sophisticated than its 1960s self, with, for instance, entire new markets emerging (the internet, index funds, MRNA vaccines, and cryptocurrencies, just to name a few examples). One would rationally expect economic and technological complexity to be met by more precise and well-defined government intervention, all of which requires additional regulatory detail and precision in separating complex contingencies. With the computational power of an average smartphone today substantially larger than any supercomputer available in the 1960s and performing tasks that no telecommunication equipment was able to perform in 1960, one would expect its functions, privacy features, and accessibility to sensitive populations (e.g. minors) to require careful assessment.

Given the general dissatisfaction with the empirical measures adopted in this phase of the research process and the increasing availability of more modern computational linguistic and machine learning methods in the Economics discipline, a second wave of research on regulatory measures develops around the mid-2010s.

To this phase belongs Al-Ubaydli and McLaughlin (2017). The authors are known for their creation of RegData, a data repository maintained by the Mercatus Center at George Mason University, built using QuantGov, a library of machine learning algorithms and Natural Language Processing (NLP) tools designed to collect information about the number of restrictions, rule complexity, and industry incidence costs from the text in the Code of Federal Regulations. Al-Ubaydli and McLaughlin (2017) focus on the linguistic structure of the rule and

statute text (average sentence length, number of restrictive words, etc.), rather than on any direct economic consequence of regulation. Similarly, using more sophisticated transformations of CFR data within an endogenous growth model, Coffey et al. (2020) estimate yearly GDP growth rates 0.8 percentage points lower for the US as a result of regulatory costs.

While certainly an improvement relative to the simple word count of Goff (1996) and Dawson and Seater (2013), several studies have shown that the linguistic RegData and its industry-specific subcomponents (requiring an additional layer of NLP to match government rules to specific sectors) fail to pick up major industry regulatory changes in event studies. This is observed even on occasions when the direction of policy changes is rather unambiguous to the expert observed. Let us take for example the deregulation of the oil and gas extraction industry by the Energy Policy Act of 2005, which exempted oil and gas facilities from environmental regulations to boost production under President George W. Bush, and the subsequent re-regulation of the industry by President Barak Obama's executive orders, following the British Petroleum Deepwater Horizon oil spill in 2010. While observers of the oil and gas sector concur in interpreting the 2005 policy as lowering regulatory pressure on the sector and the 2010 policy as dialing up government oversight, using RegData shows a very different picture. For the oil and gas industry, RegData shows an increasing trend between 2004 and 2014, indicating essentially increasing regulatory costs over the time period. The reason for this failure is, indeed, rather simple. Linguistic methods such as the ones used in RegData fail to capture when restrictions to the CFR are added or when they are removed. RegData generally captures well the presence of some form of regulatory discussion, but it has a much harder time pinning down the direction, intensity, sentiment, compliance level, or target of the regulation that is discussed. This is relevant, for example, to assess the robustness of studies like Coffey et al. (2020), which relies

on variation in RegData at the industry-year level, or Romano (2023), which investigates overshooting in financial regulation in the aftermath of US banking crises.

In another application, Kalmenovitz (2021) employs text data from Forms 83-I filed to the Office of Information and Regulatory Affairs at The White House (OIRA) to measure the expectations of regulators about the cost of compliance with each regulation. The 83-I forms include estimates of how many responses the regulator will receive per year, how many work hours firms will be required to dedicate to comply with the regulation, and the estimated dollar costs of paperwork. As this information is regulation-specific, the author needs to match each regulation to industries via an NLP phase and then, through information on the set of industries in which each firm operates, ultimately trace regulatory costs back to individual firms. Relative to Al-Ubaydli and McLaughlin (2017), the methodology in Kalmenovitz (2021) has the major benefit of aggregating the expectations of agency experts, rather than just looking at the text of the rule. It is, however, a text-based measure of regulatory burden as expected by regulators – potentially different from the rules' actual results – and it is not ex-post verified.[15]

Relatedly, but using different expectations of regulators relative to Kalmenovitz, Singla (2023) shows that RIA regulatory text related measures may have predictive power on sectorial sales, employment, wages, and can also partially predict market power and industry concentration in the US for the period 1970-2018. The author employs machine learning and data extraction techniques applied to RIA documents provided by the US government for certain social regulations. Due to unavailable cost figures for economic regulations, the paper only focuses on

[15] Forms 83-I are also a source that cannot be traced to establishments and firms in a direct way. For example, a rule may unexpectedly affect multiple sectors and may affect different firms within the same sector differently. This is a major disadvantage of the approach, as anecdotal evidence suggests that the extent of within-industry regulatory exposure may be substantial, and that this heterogeneity may induce distortions on the firm size distribution within a sector.

the costs of social regulations as prospectively assessed by OIRA, thus substantially limiting the scope of the costs considered. Nonetheless, Singla estimates in 2018 the total costs of new social regulations amount to 5% of the US GDP, which appear substantial.

In yet another attempt, Davis (2017) and Calomiris et al. (2020) employ different, more targeted linguistic approaches to measuring regulatory exposure, focusing on large publicly traded companies. Davis (2017) levers Part 1A of corporate disclosure forms 10-K to gauge firms' exposure to regulatory and policy risk in the future. Forms 10-K contain explicit assessments of risk that listed firms are required to disclose to market participants by federal regulators. Calomiris et al. (2020) instead focus on the transcripts of corporate earnings calls made by publicly traded corporations and show that their measure of increasing regulation is predictive of sales growth, asset growth, leverage, and other measures of firm performance. An important advantage of the Davis (2017) and Calomiris et al. (2020) approaches is that they are apt at capturing future regulatory risk as perceived by firms, both in terms of discretionary enforcement and of expectations about new rules potentially affecting business interests. It bears highlighting that these are, however, not actual measures of cost born by firms. Much of the appeal of these methods is in their ability to quantify corporate officials' expectations as (strategically) communicated to relevant stakeholders, rather than providing a measurable lower bound for firms' private costs.

2.3 Survey Methods

An alternative to textual approaches is using firm surveys of regulatory costs. Self-selection and measurement error biases are known pitfalls of surveys in this context, and this has reduced the empirical appeal of these methods in measuring the level of the regulatory burden on businesses. Remedial corrections through incentivization are often difficult in this context and therefore

estimates should be taken as upper bounds of cost. Securities Industry Association (2006) and National Association of Manufacturers (2014) are examples of such surveys, and these efforts present some value in identifying cross-firms and within sector differences in the incidence of regulatory costs.

In an example of integration of survey data with a general equilibrium model with capital factor distortions, Pellegrino and Zheng (2024) employ the European Firms In a Global Economy survey. The survey includes firm balance sheet data with information about obstacles to business operations stemming from legislative and bureaucratic impediments for a representative sample of 14,759 firms from Austria, France, Germany, Hungary, Italy, Spain, and the UK. The authors compute average cost of 0.8% of annual GDP associated with red tape by modeling the capital wedges due to regulatory compliance and imposing parametric distributions to their problem. Unfortunately for this application, there is very limited information on regulatory burden in the survey (one component of one survey question), requiring the researchers to integrate the data with somewhat restrictive theoretical assumptions, limiting the general appeal of the approach. Future applications may benefit from more bespoke survey instruments, ex ante designed to inform structural models. This could allow, for example, for the relaxation of burdensome parametric assumptions on distortions and counterfactual symmetry conditions across countries or sectors.

2.4 Labor and Equipment Compliance Costs

The textual analysis of rules has not been the only recent fruitful direction of evolution of the literature on the costs of regulation. In a different take, Trebbi, Zhang, and Simkovic (2023)

focuses on labor and capital costs of regulatory compliance for US establishments by direct measurement based on large confidential surveys.[16]

The methodology that Trebbi, Zhang, and Simkovic propose for the estimation of the implementation costs of regulation relies on the availability of extremely detailed employment and occupation data available from the Bureau of Labor Statistics. Their RegIndex measure is made possible by merging occupational task data from the O*NET(V23.0) database, a standard reference in the labor economics literature, to the Occupational Employment and Wage Statistics (OEWS) establishment occupation level microdata from the U.S. Bureau of Labor Statistics (BLS), a large stratified survey covering about 1,200,000 establishments from all industries of the United States from 2002 to 2014. In a nutshell, Trebbi and coauthors' idea is to recover the share of an establishment or firm's payroll spent on regulatory compliance. Using a combination of keyword matching, manual assignment by multiple research assistants, and natural language processing methods, the procedure assesses the regulation relatedness of each of the 19,636 tasks in O*NET. O*NET also provides an importance rating of each task for each occupation, which in turn is used by the authors to aggregate the regulation-relatedness of tasks at the occupation level. One then obtains a key measure of regulation intensity for each establishment by aggregating occupations' regulation-relatedness weighted by the establishment's labor spending on each occupation (modifying this weighting allows to relax/tighten the stringency of their

[16] The focus on labor and capital, rather than corporate officials' expectations, is justified based on evidence. According to survey estimates from the Securities Industry Association (2006) in the US financial sector 93.9 percent of regulatory compliance costs are labor related and 3.3 percent are physical capital related. According to survey estimates from the National Association of Manufacturers (2014) pertinent to the U.S. manufacturing sector, 68.4 percent of regulatory compliance costs are labor related, 13.4 percent capital related. In addition, Trebbi, Zhang, and Simkovic report that over 60 percent of federal regulations approved after 1980 are "information collection regulations", for which labor costs are the main form of direct regulatory compliance costs. Examples of information collection regulations include annual reports to shareholders, confirmation of electronic transactions, product labeling, labor regulations, etc.

measure). This final establishment-level measure is called RegIndex, a cost variable that indicates the percentage of an establishment's total labor spending ascribed to performing regulation-related tasks. Adding information on tools and equipment capital for occupations, also available in O*NET, and following the approach of Canuedo, Jaume, and Keller (2023), the authors augment the analysis of labor costs with capital costs of regulation.

It is a simple, but informative approach. In terms of magnitudes, the most conservative version of RegIndex accounts for 49% of OIRA total compliance estimated hours, with a time-series correlation of 66% with the OIRA estimated hours over the 2002-2014 period. A medium version of RegIndex accounts for 106% of total OIRA hours, with a time-series correlation of 71%. The authors' broadest measure of RegIndex (that includes a higher weight for tax compliance), accounts for 121% of OIRA hours, with a time-series correlation of 71%. The method further implies an average cost of regulatory compliance for firms between 1.34 and 3.7 percent of their total wage bill, or between $105 and $289 billion per year. For small businesses, the National Small Business Association estimated in 2017 (NSBA 2017) a cost of $12,000 per year per small business owner in 2017 dollars, roughly 3% of total average labor costs for a business spending $400,000 in labor. Regulatory compliance costs also vary by sector. For a 500-employee firm in the retail industry, regulatory compliance costs account for only 0.8 percent of its total wage bill, while for one in the more heavily regulated finance and utility sectors, regulatory compliance costs account for over 2.5 percent of total labor costs, using the authors' most conservative estimates.

Validation of the regulatory cost measures can be performed. For instance, going back to the example discussed above of the Energy Policy Act of 2005, which exempted oil and gas facilities from EPA regulations, and the re-regulation following the BP Deepwater Horizon spill in 2010,

one observes a very different behavior of RegIndex relative to the earlier RegData example. The oil and gas industry RegIndex decreases around the 2005 policy change, indicating a reduction in compliance costs, as it is intuitive it should happen. Then, RegIndex increases in 2010, when the executive orders reinstating EPA compliance come into effect. Not only is this reassuring, but if one compares the behavior of the RegIndex in the closely related, but unaffected sectors of coal products manufacturing, natural gas distribution, and basic chemical manufacturing, no change in regulatory pressure is registered there. This comparison is useful to gauge the accuracy of the approach in pinpointing exactly which sectors are affected by the regulatory policy change and which are not.[17]

3. Measuring the private benefits of regulation

The calculation of the private benefits arising from regulation (that is, the benefits accruing to agents directly targeted by the rule) appears a much more complex endeavor than that of private costs. This is often implicitly revealed by government agencies, that frequently omit a full quantification, and even more often a full monetization[18] of benefits in their assessment of rule impact (Hahn and Dudley, 2007). As an example of this complexity, Nichols (1997) describes the steps taken in measuring benefits for the case of phasing out/eliminating lead from gasoline finalized in the 1980s. These include the careful assessments of the effects of lead on blood pressure for adults, a factor increasing mortality, medical costs and lost wages for individuals

[17] While this is obviously one example (albeit covering multiple sectors and two opposing policy changes), more case studies are offered in Trebbi et al. (2023) in order to stress-test the methodology. Using detailed industry disaggregates, RegIndex performs well in identifying both timing and direction of regulatory changes in the health care sector, tertiary education, and the credit card industry.

[18] The difference between quantification and monetization is relevant. For cost benefit analysis a monetization of both costs and benefits is necessary. For cost effectiveness analysis, a usually less rigorous approach to impact analysis of regulation monetization of costs and quantification of benefits suffice.

($18 billion in 1983 dollars); remedial education and medical treatments for children, as developmentally more sensitive to lead ($2 billion); saving in total car maintenance due to lower wear-and-tear when eliminating lead in carburants ($3 billion); and reduction in misfuelling emissions ($0.6 billion). Hanh and Hird (1991), who offer one of the first comprehensive and careful assessments of benefits and cost of regulation for the United States, present several, more complex instances, and so do multiple recent OMB reports (OIRA 2021, 2023).

What makes the analysis complex is that, while the benefits of clean drinking water to individuals may be easy to assess, some other dimensions of benefit are not. For example, think of the complexity of monetizing the benefits of reduced uncertainty and information asymmetry for market participants. This reduces information asymmetry between buyers and sellers, with customers gaining confidence, leading to increased demand for regulated services and goods. Regulations that establish clear standards for product quality, safety, and labeling play a similar role, but also allow firms to invest in quality improvements without fear of being undercut by competitors offering substandard products. Regulations can promote standardization of technologies, products, or processes and this may foster interoperability, reducing costs for firms. Established standards also simplify international trade, by ensuring goods and services meet certain criteria. Regulations often set clear safety and quality benchmarks, and, even more indirectly, by adhering to these standards, businesses can mitigate the risk of costly lawsuits and product liability claims. This translates into lower insurance premia and a more predictable legal environment for firms. While intuitive, all these examples show instances of substantial intricacy in accurately measuring benefits that do not have an immediate monetary counterpart.

Detailed studies that explore the private benefits of regulation for businesses and individuals, abound, but quantification remains elusive. La Porta et al. (1997), using a sample of 49 countries,

for example, reports that systems with higher investor protection regulations, in terms of the character of the legal rules and the quality of the government enforcement, exhibit substantially larger and broader equity and debt markets. La Porta et al. (1998) similarly shows that higher investor protection regulation correlates with lower concentration of ownership of shares. While the benefits of strong investor protection appear to strengthen capital markets, their full quantification requires more than correlational evidence, and it involves elaborate counterfactuals. In fact, Cochrane (2014) presents a compelling discussion of the difficulty of such counterfactuals for a large part of financial and banking regulation.

Besides financial regulation, instances of regulations where private benefits are particularly hard to measure belong to disparate domains. Regulations on data privacy and cybersecurity, for example, aim to protect consumers from data breaches and misuse of their personal information. Yet, in this case, the private benefits for individuals can be difficult to pin down. Instances of willingness to accept (WTA) for giving away one's entire browsing history for $10 dollars may severely underestimate the extent of the benefits (Ablon et al. 2016; Mayer et al. 2021). It is also unclear how to assign a monetary value to the peace of mind/lower risk that comes from knowing one's data is secure. The full costs of identity theft or data fraud may be also unknown to individuals. Regulations around Corporate Social Responsibility (CSR) are also another case that is hard to evaluate. While these regulations may require companies to disclose information about their environmental, political, and social impact, through engaging in philanthropic activities or adopting fair labor practices, the benefits in terms of enhancing a company's reputation and brand image, can be difficult to isolate, as they often interact with other management practices that also affect reputation. Regulations of professional licensing and certification aim to ensure the quality and competence of professionals in various fields, such as

healthcare, accounting, education, and engineering. While licensed professionals may benefit from increased consumer trust and potentially higher earnings (Kleiner and Kruger, 2001), it is difficult to disentangle the effects of licensing from other factors, such as experience and education (Federman et al. 2006). Additionally, the impact of licensing on consumer welfare is hard to assess, as it can both increase quality and constraint access to services and raise prices (Kleiner and Kudrle, 2000). Another opaque area is the regulation around cultural and historical preservation, which aims to protect historic buildings, cultural artifacts, and traditional practices. While these regulations can have significant cultural and social value, their economic benefits are often intangible and hard to measure. For instance, it is hard to quantify the exact value of preserving an architectural landmark such as the Empire State Building for future generations.

Other regulatory domains are more straightforward. An application to environmental policy and productivity benefits for firms is Berman and Bui (2001), which follows an earlier discussion by Porter and van der Linde (1995). Berman and Bui analyze the impact of stricter environmental regulations on the productivity of oil refineries in the Los Angeles air basin at the end of the 1990s. They find that while regulations initially impose costs, they can also stimulate innovation and lead to long-term efficiency gains for regulated entities. This seems to be a fairly robust assessment. Ambec and Lanoie (2008) more systematically assess gains from adhesion to stricter environmental regulations in terms of revenues increases due to *"(a) better access to certain markets; (b) differentiating products; and (c) selling pollution-control technology.*" They also assess benefits on the front of cost reductions via lowering "*(a) risk management and relations with external stakeholders; (b) cost of material, energy, and services; (c) cost of capital; and (d) cost of labor"* and find benefits along some of these dimensions

Given such heterogeneity, one may wonder how a systematic approach to benefit calculations may be available at all. We are not aware at the time of writing of general aggregate methodologies for the measurement of benefits comparable to the RegData or the RegIndex approaches that we documented for private costs in the previous section. This does not mean, however, that the problem is completely unsolvable. The answer to the question of the existence of a systematic approach is probably yes, but only if one is willing to drastically narrow down the problem of what voices of benefit we should draw attention to.

A suggestion could be to focus on human lives. A careful reading of Hahn, Lutter and Viscusi (2000), Hahn and Dudley (2007), and Hahn and Tetlock (2008) highlights that a key factor driving benefit calculations is the quantification of the number of human lives saved, mortality reduction, or years of life equivalent saved. These features often quantitatively dominate. It may appear simplistic, if not pleonastic, that a rule that saves human lives may have high benefits, but the argument is even clearer when an explicit monetization is presented.

To illustrate this argument in the starkest way possible, consider the current threshold employed by OMB to examine "*Significant rules*" as in Section 3(f) of Executive Order 12866 (September 30, 1993), as amended by Executive Order 14094 (April 2023), defined as: "*any regulatory action that is likely to result in a rule that may have an annual effect on the economy of $200 million or more...*" Taking the value of a statistical life[19] at a conservative level of $10 million (in 2024 dollars) immediately makes salient that regulation accruing the benefit of saving 20 lives per year in the United States elevates the regulation as *significant* for cost-benefit analysis. For the period 1993-2023 the threshold was an inflation adjusted $100 million, corresponding to

[19] See Viscusi and Aldy (2003) and Kochi et al. (2006).

about 10 lives saved. Logical inference from above suggests a very coarse, yet intuitive, first-order approximation. To the practitioner necessitating a fast quantification of private benefits, the number of lives saved is, to a first degree, the central voice of benefit to focus on, and one that also benefits from an established approach to monetization (Viscusi and Aldy, 2003).

With all the limitations of forcing a complex multidimensional problem into a simple unidimensional metric (seldom an accurate exercise, other than in fortuitous circumstances), this approach offers an option. Consider a rule such as the 1996 one implemented by the Department of Health and Human Services restricting the sale and distribution of cigarettes and smokeless tobacco to protect children and adolescents saving over 5,000 lives annually. Just based on this figure alone, the rule induces benefits in the $50 billion range, half the total revenue of the US tobacco industry in 2024 (about $107.5 billion). That such a rule almost surely may pass muster on CBA grounds appears reasonable (it does). Or consider seat belts regulation, which made this safety equipment a requirement as a consequence of two statutes passed in 1966 (the Highway Safety Act and the National Traffic and Motor Vehicle Safety Act). The National Highway Traffic Safety Administration (2009) estimated that seat belts saved about 7,290 lives per year between 1975 and 2006, with yearly private benefits estimated at upwards of $70 billion. For reference the entire U.S. car and auto manufacturing market was valued at $104.1 billion in 2023. Again, this is a CBA clearing rule. Similarly to tobacco and seat belts, several EPA regulations concerning air and water pollution clear the bar simply thanks to the number of life years/human lives saved, a key entry of monetizable benefits.

Indeed, requiring regulators to at least specify an estimate of the total lives saved for each rule may be a step in the direction of a more complete CBA. Even in environments that may not strike as potentially threatening to human life directly, indirect life consequences are assessable

benefits, such as in the general case of the association between loss of income and higher mortality risk (Hahn, Lutter, and Viscusi, 2000)).

4. Social costs and social benefits of regulation

4.1. Social costs of regulation

Social costs of regulation encompass the total economic impact of regulation on society as a whole. Differently from private costs, which account for expenses borne directly by individuals or businesses due to regulatory compliance, social costs account for administrative costs from the regulators and also any externalities or indirect costs due to the regulation. Such indirect costs arise from the impact of the regulation on the well-being of entities other than the regulated entities. Examples of such indirect costs include regulations' distortion to the product market resulting in reduced competition, negative effects on public health and the environment, and lowering the incentive for technology innovation and long-term economic growth. More subtly, social costs and benefits may be the indirect outcomes of economic regulation, which typically focuses on instances of market failure (Litan and Nordhaus, 1983), but the deliberate outcomes of social regulations – in fact, the goals of such form of regulation.

Below, we summarize the efforts researchers made toward measuring the administrative costs and the indirect costs of regulation.

4.1.1. Measuring the administrative costs of regulation

Comprehensively measuring the administrative cost of regulation is challenging, as it requires the recording-keeping of labor costs paid by various parties towards the making and enforcement

of each rule. Such data is usually not available. However, if one narrows down to measuring the labor costs that certain regulatory agencies pay towards the enforcement of all the regulations they are involved in, a potential data source is the recent disclosure of federal payroll records from the Office of Personnel Management (OPM). On February 11, 2015, in response to the Freedom of Information Act request by the digital media company Buzzfeed, OPM provided a vast trove of federal payroll records for numerous federal agencies. The data includes each individual federal employee's name, employed agency, duty station, occupation, salary, and demographic characteristics such as age and education level at a quarterly frequency from September 1973 to June 2014.[20]

This enormous dataset on federal payroll records offers a promising avenue for researchers to examine the labor costs paid for the enforcement of various federal regulations. Trebbi, Zhang, and Simokovic (2023) use changes in each regulatory agency's employment in this data to proxy for shocks of the regulation agency's enforcement stringency. Based on each NAICS 6-digit industry's exposure to each major regulatory agency, the authors constructed a shift-share instrument for the industry's regulatory enforcement stringency. Yet, it is sensible to imagine researchers using this detailed data to answer various other questions about regulatory administrative costs. For instance, how do regulatory enforcement costs of each agency spread out across states, how effective are regulatory enforcement in reducing regulatory violation, and what are the economies of scale for regulatory enforcement?

Measuring the administrative costs from the making of regulations can be more challenging than measuring enforcement, as the making of regulations involves various parties in each step

[20] The entire database, further extended to September 2016, can be downloaded at the Internet Archive: https://archive.org/download/opm-federal-employment-data/data/.

including making the initial proposals by legislatures, providing feedback and comments by the public to the initial rule proposals, passing of the acts in the senate and other rule-making agencies, implementing of the acts in the form of detailed regulations by regulatory agencies, etc.

4.1.2. Measuring indirect costs of regulation

Indirect social costs concern the costs from the impact of regulation on other entities' economic and social outcomes. Hence, most of the research infers the indirect costs from the *association* of other outcomes with the regulation.

There has been a large body of literature studying the economic impact of various individual regulations, such as environmental regulation, financial regulation, and employment regulation. Yet, finding the economic impact of regulation as a whole can be challenging due to the heterogeneous nature of various regulations affecting different industries. With the availability for proxies for industry-level regulation measures, such as the RegData measure, an emerging strand of literature examines the association between economic outcomes with more aggregate regulation to shed light on the indirect costs.

An important indirect cost of regulation is its impact on the market power of large incumbents in the industry (e.g. Singla, 2023). Theories long suspected that regulators are captured by large corporations, resulting in regulations erecting entry barriers, stifling business dynamism, and allowing the large incumbent corporations to make profits without maintaining a high efficiency (for a discussion, Shleifer 2005). Gutierrez and Philippon (2017a) show that industries with increasing regulation have become more concentrated from 1970 to 2014, based on NAICS 3-digit level RegData measure from the Mercatus Center at George Mason University. Bessen (2016) applies the industry-level RegData measure to the U.S. publicly traded firms and shows

that regulation has been the primary driver for increased corporate profitability since 2000. Bailey and Thomas (2017) show that more regulated industries experienced fewer new firm births and slower employment growth between 1998 and 2011. Relatedly, Barone and Cingano (2011) shows that regulation in the supply of a large set of services negatively affects the economic performance of downstream manufacturing sectors by constraining competition. Finally, Gutierrez and Philippon (2017b) provide evidence that industry regulation is associated the lackluster investment in the U.S. since 2000. These studies together paint a picture that industry regulation appears to have hindered business dynamism in the past decades, indicating significant indirect costs of regulation on long-term economic health in the U.S.

4.2 Social benefits of regulation

Social benefits of regulation are much more difficult to quantify than social costs, as the benefits of regulation oftentimes stem from preventing certain negative outcomes from occurring in the first place. As negative outcomes are prevented (if the regulation is successful), quantifying such benefits oftentimes involves assuming the counterfactual social costs had such regulations not been enacted. While such counterfactuals are by definition unobservable, one approach is to consider the reduced enforcement of certain regulations to mimic the counterfactual and gauge the social benefits of regulation. For example, Grullon, Larkin, and Michaely (2019) study the reduced enforcement of antitrust during the Bush and Obama administrations as compared to the Clinton administration (e.g., Spitzer, 2011; Harty, Shelanski, and Solomon, 2012; Crane, 2012).[21]

[21] Grullon, Larkin, and Michaely (2019) highlight additional evidence for declining antitrust enforcement by arguing that the number of cases filed by the Department of Justice under Section 2 of the Sherman Act has weakened since early 2000. See also Lancieri, Posner, Zingales (2023).

The study shows that reduced antitrust enforcement is associated with increased completion rates for mergers and acquisitions by corporations, resulting in increased industry concentration.

Another approach to understanding the social benefits of regulation is to consider alternative approaches for society to resolve conflicts. Shleifer (2012) and Glaeser and Shleifer (2003) offer an original comparative perspective relative to the value of judicial resolution (an "*Enforcement Theory of Regulation").* In essence, the rise of regulation over the 20th century vis-à-vis the courts is seen by the authors as the result of regulation being a relatively more efficient, cheaper, and more predictable form of agency intervention than resolution through the legal process. Achieving a high-quality legal system is harder than achieving a functioning regulatory structure. According to this perspective, the predictability of the regulatory process and specialization of government agencies in producing complex and fine-tuned rules relative to a system solely based on ex-post legal resolution produce social benefits that are substantial, yet hard to quantify.

Posner (2010) compares regulation versus litigation from four different aspects, where (a) regulation tends to use ex-ante control means and litigation tends to use ex-post deterrent means; (b) regulation tends to use clear rules and litigation tends to use standards that require interpretation; (c) regulation tends to use industry experts to design and implement rules and litigation mostly rely on generalists (judges, juries, trial lawyers) with the input of experts as witnesses; and (d) regulation tends to use public enforcement mechanisms via agencies while litigation tends to use private enforcement mechanisms. Posner highlights that as technological complexity has grown in many industries over time, the gains from expertise increase, and so does the comparative advantage of specialized regulation relative to generalist courts. Analyzing the social benefits of regulation conditional on industry technological complexity remains fruitful for research.

5. Further considerations: The case for retrospective measurement of costs and benefits

The study of the costs and benefits of regulation produced by the United States government is unsystematic. Dispersed, heterogeneous, and broadly speaking not comparable quantitative studies abound, from the analysis of EPA's water pollutant monitoring regulations to OSHA rules for workplace safety, yet their number pales relative to the number of rules left without any careful quantitative assessment, including economically significant rules. For instance, in 2020 the OIRA reported that only 9.1 percent of all "significant" regulations finalized in 2019 had clearly quantified costs and benefits. Frequently, some of these rules present "unquantifiable" benefits, partial assessments of counterfactuals, or explicitly omit social or private dimensions of costs – leaving the job unfinished. The words of Hahn and Tetlock (2008, p. 69) still ring true: "*Indeed, we do not even have answers to basic questions like whether benefit–cost analyses tend to overstate benefits, perhaps out of regulatory zeal, or whether they overstate costs, perhaps because they fail to recognize how innovation will reduce the costs after regulations are imposed."*

Trebbi et al. (2023) present a cost-based, granular and robust approach to the study and quantification of compliance costs of regulation by looking at labor and capital equipment expenditures of firms. This makes costs homogeneous and comparable across industries, comparable over time within industry, and easy to produce from the perspective of regulatory agencies. Approaches similar to this could be readily implemented by government agencies at this time and complement the more laborious and less accurate perspective estimates, such as the ones produced by OIRA.

Three considerations are in order. The first consideration is that retrospective cost analysis of regulation should be systematically used to explicitly validate projections proposed by OIRA and government agencies and correct them when faulty. Typically, RIA projections are presented, but never revised nor ex-post validated for accuracy, which, in turn, would be also important for future assessments. Retrospective CBA seems key to the perspective of progress in rational regulatory analysis and to avoid regulatory capture. The empirical case for retrospective analysis is indeed strong, as discussed in Greenstone (2009), and there is substantial evidence of both costs and benefits appearing to be overestimated in multiple instances (e.g. Morgenstern, 2018) or miscalculated (e.g. Hanh 1998, p.206, Harrington 2000, 2006, and Pew 2015).

Secondly, establishing stylized facts, such as trends over time, in the aggregate and within industry, would be an important task in informing the public debate on policy regulation, in government and in the media. Is regulation really growing at a rate faster than that of growth of the U.S. economy as a whole? Is the regulatory burden in certain industries indeed unsustainable and stifling firm dynamism? Case studies of deregulation and re-regulation (e.g. banking deregulation in the 1990s and 2000s and Dodd-Frank for small v. large banks. EPA regulation for certain chemicals) over time will be useful in this sense. Imprecise, ideological, and unscientific narratives may continue to percolate, as unfortunately common in political debates, otherwise.

The third consideration relates to the dynamics of regulation. Having quantitative and monetized costs and benefits computed retrospectively at multiple points in time would be useful for regulatory sunsetting and reassessment of policy based on evidence. This seems especially important for regulations enacted in the aftermath of negative shocks or crises, when information used for the prediction of regulatory impact may be incomplete or missing (Romano, 2013). A rule that may pass CBA muster in 2000 may no longer do so in 2025. Without a dynamic

assessment of both the main voices of costs, such a compliance costs, or benefits, such as a number of lives saved or mortality risk reduction, appropriate assessment of the regulatory environment seems impossible, and this obviously cannot be done employing exclusively prospective estimates.

6. Conclusions

This article presents a partial review of recent attempts at the quantitative analysis of the costs and benefits of regulation. As can be seen in the discussion presented in this paper, the level of accuracy in terms of extant methodologies is substantially heterogeneous. Between private and social costs and benefits, private and social benefits of regulation remain the hardest to accurately assess and validate. Nonetheless, methodological advances are happening at a healthy pace within Economics, both through the application of novel NLP and Machine Learning tools to regulatory and firm information and through new creative surveys and structural approaches. The paper presents a brief discussion of several promising approaches from the quantitative perspective.

The main goal for government agencies in applying these methodologies should be a more accurate cost and benefit assessment of regulations, and a less ideological approach to government intervention. We remain hopeful that the use of quantitative and targeted tools like some of the methods presented in this article may in fact contribute to a smarter approach to designing regulation and systematically tracking its net benefits over time once implemented. In particular, the absence of a retrospective assessment of rules is a glaring deficiency in current regulatory policy analysis.

7. Bibliography

Ablon, Lillian, Paul Heaton, Diana Catherine Lavery, Sasha Romanosky. “Consumer Attitudes Toward Data Breach Notifications and Loss of Personal Information” RAND Report (2016)

Agarwal, Sumit, David Lucca, Amit Seru, and Francesco Trebbi. "Inconsistent regulators: Evidence from banking." The Quarterly Journal of Economics 129, no. 2 (2014): 889-938.

Alesina, Alberto, Silvia Ardagna, Giuseppe Nicoletti, and Fabio Schiantarelli. “Regulation and investment.” Journal of the European Economic Association 3, no. 4 (2005): 791-825.

Al-Ubaydli, Omar, and Patrick A. McLaughlin. “RegData: A numerical database on industry-specific regulations for all United States industries and federal regulations, 1997–2012.” Regulation & Governance 11, no. 1 (2017): 109-123.

Ambec, Stefan, and Paul Lanoie. "Does it pay to be green? A systematic overview." The Academy of Management Perspectives (2008): 45-62.

Arrow, Kenneth J., Maureen L. Cropper, George C. Eads, Robert W. Hahn, Lester B. Lave, Roger G. Noll, Paul R. Portney, Milton Russell, Richard Schmalensee, V. Kerry Smith, and Robert N. Stavins. 1996. Is there a role for benefit-cost analysis in environmental, health, and safety regulation? Science 272: 221–22.

Bailey, James B., and Diana W. Thomas. "Regulating away competition: The effect of regulation on entrepreneurship and employment." Journal of Regulatory Economics 52 (2017): 237-254.

Barone G, Cingano F (2011) Service regulation and growth: evidence from OECD countries. Economic Journal 121(555): 931–957.

Barseghyan Levon. 2008. Entry costs and cross-country differences in productivity and output. Journal of Economic Growth 13:2, 145-167.

Berman, Eli, and Linda TM Bui. "Environmental regulation and productivity: evidence from oil refineries." Review of economics and statistics 83, no. 3 (2001): 498-510.

Bertrand, Marianne and Francis Kramarz (2002). “Does Entry Regulation Hinder Job Creation? Evidence From the French Retail Industry.” Quarterly Journal of Economics, 117, 1369–1413.

Bertrand, M., Bombardini, M., Fisman, R., Hackinen, B., Trebbi, F., “Hall of mirrors: Corporate philanthropy and strategic advocacy” The Quarterly Journal of Economics 136, 2413–2465. (2021)

Bessen, James E. "Accounting for rising corporate profits: Intangibles or regulatory rents?." Boston Univ. School of Law, Law and Economics Research Paper 16-18 (2016).

Blanchard, Olivier J. and Justin Wolfers (2000). “The Role of Shocks and Institutions in the Rise of European Unemployment: The Aggregate Evidence.” Economic Journal, 110, 1–33.

Calomiris, Charles W., Harry Mamaysky, and Ruoke Yang. “Measuring the cost of regulation: A text-based approach”. No. w26856. National Bureau of Economic Research, 2020.

Caunedo, Julieta, David Jaume, and Elisa Keller. "Occupational exposure to capital-embodied technical change." American Economic Review 113, no. 6 (2023): 1642-1685.

Cass R. Sunstein, “Cost-Benefit Analysis and Arbitrariness Review”, 41 Harvard Environmental Law Review (2017).

Cass R. Sunstein, “Some Costs and Benefits of Cost-Benefit Analysis”, Dedalus,150 (3), Summer, (2021)

Coates IV, John C. "Towards better cost-benefit analysis: An essay on regulatory management." Law & Contemp. Probs. 78 (2015): 1.

Cochrane, John (2014) “Challenges for Cost-Benefit Analysis of Financial Regulation” Journal of Legal Studies, vol. 43, June.

Coffey, Bentley, Patrick A. McLaughlin, and Pietro Peretto. "The cumulative cost of regulations." Review of Economic Dynamics 38 (2020): 1-21.

Crain, Nicole V. and W. Mark Crain, “The Cost of Federal Regulation to the U.S. Economy, Manufacturing and Small Business” National Association of Manufacturers Study (2023)

Crane, D. A. “Has the Obama Justice Department reinvigorated antitrust enforcement?”

Stanford Law Review Online 65, 13–20 (2012).

Currie, Janet, and Reed Walker. “What do Economists Have to Say About the Clean Air Act 50 Years After the Establishment of the Environmental Protection Agency?” Journal of Economic Perspectives 33(4): 3-26. 2019.

Dal Bó, Ernesto. "Regulatory capture: A review." Oxford review of economic policy 22, no. 2 (2006): 203-225.

Davis, Steven J. “Regulatory complexity and policy uncertainty: headwinds of our own making.” Becker Friedman Institute for Research in economics working paper 2723980 (2017).

Dawson, John W., and John J. Seater. “Federal regulation and aggregate economic growth.” Journal of Economic Growth 18, no. 2 (2013): 137-177.

De Soto, Hernando. The Other Path. Basic Books, (1990).

Djankov, Simeon (2009). “The Regulation of Entry: A Survey,” The World Bank Research Observer, Vol. 24(2), pages 183-203, Sept.

Djankov, Simeon, Rafael La Porta, Florencio Lopez-De-Silanes, and Andrei Shleifer (2002). “The Regulation of Entry.” Quarterly Journal of Economics, 117(1), 1–37.

Environmental Protection Agency (EPA). 2011. “Benefits and Costs of the Clean Air Act from 1990 to 2020.” Final Report, Rev. A, April 2011. https://www.epa.gov/sites/production/files/2015-07/documents/ fullreport_rev_a.pdf.

Federman, Maya & David E. Harrington & Kathy J. Krynski, 2006. "The Impact of State Licensing Regulations on Low-Skilled Immigrants: The Case of Vietnamese Manicurists," American Economic Review, American Economic Association, vol. 96(2), pages 237-241, May.

Glaeser, Edward L., and Andrei Shleifer. "The rise of the regulatory state." Journal of economic literature 41, no. 2 (2003): 401-425.

Goff, B.L., 1996. Regulation and macroeconomic performance (Vol. 21). Springer Science & Business Media.

Gordon, Jeffrey N. "The empty call for benefit-cost analysis in financial regulation." The Journal of Legal Studies 43, no. S2 (2014): S351-S378.

Greenstone, Michael. 2002. “The Impacts of Environmental Regulations on Industrial Activity: Evidence from the 1970 and 1977 Clean Air Act Amendments and the Census of Manufacturers.” Journal of Political Economy 110 (6): 1175–219.

Greenstone, Michael. 2009. “Toward a Culture of Persistent Regulatory Experimentation and Evaluation.” In New Perspectives on Regulation, David Moss and John Cisternino (Eds.). Cambridge, MA: The Tobin Project, Inc.

Gutiérrez, Germán, and Thomas Philippon. “Declining Competition and Investment in the US.” No. w23583. National Bureau of Economic Research, (2017a).

Gutiérrez, Germán, and Thomas Philippon. "Investmentless Growth: An Empirical Investigation." *Brookings Papers on Economic Activity* (2017b).

Hahn, Robert and John Hird, “The Costs and Benefits of Regulation: Review and Synthesis,” Yale Journal on Regulation 8 (1991), pp. 233-278.

Hahn, Robert, “Government Analysis of the Benefits and Costs of Regulation,” Journal of Economic Perspectives-Volume 12, Number 4-Fall (1998), pp.201-210

Hahn, Robert W., Randall W. Lutter, and W. Kip Viscusi. 2000. Do Federal Regulations Reduce Mortality. Washington, DC: AEI–Brookings Joint Center for Regulatory Studies.

Hahn, Robert W., and Patrick Dudley. 2007. “How Well Does the Government Do Cost–Benefit Analysis?” Review of Environmental Economics and Policy, 1(2): 192–211.

Hahn, Robert and Paul C. Tetlock “Has Economic Analysis Improved Regulatory Decisions?” Journal of Economic Perspectives—Volume 22, Number 1, Winter (2008), pp.67–84

Harrington Winston et al., On the Accuracy of Regulatory Cost Estimates, 19 J. Pol’y Analysis & Mgmt. 297 (2000)

Harrington, Winston “Grading Estimates of the Benefits and Costs of Federal Regulation: A Review of Reviews”, Res. for the Future Discussion Paper 06-39 (Sept. 1, 2006)

Harty, R. P., Shelanski, H. A., and Solomon, J. “Merger enforcement across political administrations in the United States” Concurrences—Competition Law Journal 2, 1–9 (2012).

Joskow, Paul L., and Nancy L. Rose. "The effects of economic regulation." Handbook of industrial organization 2 (1989): 1449-1506.

Kalmenovitz, Joseph. “Incentivizing financial regulators.” The Review of Financial Studies 34, no. 10 (2021): 4745-4784.

Kleiner, Morris M., and Robert T. Kudrle. “Does Regulation Affect Economic Outcomes? The Case of Dentistry.” The Journal of Law & Economics 43, no. 2 (2000): 547–82. https://doi.org/10.1086/467465.

Kleiner, Morris M., and Alan B. Krueger. “Analyzing the Extent and Influence of Occupational Licensing on the Labor Market.” Journal of Labor Economics 31, no. 2 (2013): S173–202. https://doi.org/10.1086/669060.

Kochi, Ikuho; Bryan Hubbell and Randall Kramer. 2006. "An Empirical Bayes Approach to Combining and Comparing Estimates of the Value of a Statistical Life for Environmental Policy Analysis," Environmental and Resource Economics, 34: 385-406.

Lancieri, Filippo, Eric Posner, and Luigi Zingales, “The Political Economy of the Decline of Antitrust Enforcement in the United States” Antitrust Law Journal 2:441 (2023)

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, Robert Vishny. “Law and Finance” Journal of Political Economy, Vol. 106, No. 6 (December 1998), pp. 1113-1155

La Porta Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, Robert Vishny. (1997) Legal determinants of external finance. Journal of Finance 52(3): 1131–1150.

Litan, Robert E., William Nordhaus, Reforming Federal Regulation, Yale University Press, (1983).

Lucca, David, Amit Seru, and Francesco Trebbi. "The revolving door and worker flows in banking regulation." Journal of Monetary Economics 65 (2014): 17-32.

Mayer, Peter, Yixin Zou, Florian Schaub, and Adam J. Aviv. "" Now I'm a bit angry:" Individuals' Awareness, Perception, and Responses to Data Breaches that Affected Them." In 30th USENIX Security Symposium (USENIX Security 21), pp. 393-410. (2021)

McLaughlin, Patrick A., Sherouse, Oliver, 2019. RegData 2.2: a panel dataset on US federal regulations. Public Choice, 180, 43–55

Morgenstern, Richard. 2018. “Retrospective Analysis of U.S. Federal Environmental Regulation.” Journal of Benefit-Cost Analysis 9 (2): 285–304.

Morrall III, John F. “A Review of the Record.” Regulation 10 (1986): 25.

National Association of Manufacturers (NAM), 2014. “The cost of federal regulation to the U.S. economy, manufacturing and small business”.

National Highway Traffic Safety Administration, “Traffic Safety Facts” (May 2009), http://www-nrd.nhtsa.dot.gov/Pubs/811140.PDF.

National Small Business Association (NSBA), 2017 “Small Business Regulations Survey 2017”.

Nicoletti, Giuseppe and Stefano Scarpetta (2003). “Regulation, Productivity, and Growth: OECD Evidence.” Economic Policy, 18(36), 11–72.

Nichols, Albert L. 1997. “Lead in Gasoline.” In Economic Analysis at EPA: Assessing Regulatory Impact, ed. Richard D. Morgenstern, 49–86. Washington, DC: Resources for the Future.

OIRA (Office of Information and Regulatory Affairs) (2021) “2018, 2019, and 2020 Report to Congress on the Benefits and Costs of Federal Regulations and Agency Compliance with the Unfunded Mandates Reform Act” Washington, Office of Management and Budget.

OIRA (Office of Information and Regulatory Affairs) (2023) “Report to Congress on the Benefits and Costs of Federal Regulations and Agency Compliance with the Unfunded Mandates Reform Act for 2020-21-22.” Washington, Office of Management and Budget.

Pellegrino, Bruno, and Geoffery Zheng. "Quantifying the impact of red tape on investment: A survey data approach." Journal of Financial Economics 152 (2024): 103763.

Peltzman, Sam (1976). “Toward a More General Theory of Regulation” 19 Journal of Law & Economics

Pew Charitable Trust “Government Regulation: Costs Lower, Benefits Greater Than Industry Estimates” Fact Sheet (2015) Available at https://www.pewtrusts.org/en/research-and-analysis/fact-sheets/2015/05/government-regulation-costs-lower-benefits-greater-than-industry-estimates

Pigou, Arthur C. The Economics of Welfare. (1920) Oxford.

Porter, Michael E., and Claas van der Linde. “Toward a New Conception of the Environment-Competitiveness Relationship.” The Journal of Economic Perspectives 9, no. 4 (1995): 97–118.

Posner, Richard A. Theories of economic regulation. No. w0041. National Bureau of Economic Research, 1974.

Posner, Richard A. "Regulation (agencies) versus litigation (courts): an analytical framework." In Regulation vs. litigation: Perspectives from economics and law, pp. 11-26. University of Chicago Press, 2010.

Posner, Eric, and E. Glen Weyl. "Benefit-cost analysis for financial regulation." American Economic Review 103, no. 3 (2013): 393-397.

Renda, Andrea. “Impact Assessment in the EU: The State of the Art and the Art of the State” Brussels: Center for European Policy Studies (2006)

Romano, Roberta. “Regulating in the Dark” Journal of Financial Perspectives, Vol. 1, No. 1, (2013)

Romano, Roberta. “Are there empirical foundations for the iron law of financial regulation?” Yale Law & Economics Research Papers (2023)

Rose-Ackerman, Susan. "Putting cost-benefit analysis in its place: rethinking regulatory review." U. Miami L. Rev. 65 (2010): 335.

Securities Industry Association, 2006. “The costs of compliance in the U.S. securities industry: Survey Report”.

Shleifer, Andrei. "Understanding regulation." European Financial Management 11, no. 4 (2005): 439-451.

Shleifer, Andrei. "The Failure of Judges and the Rise of Regulators." Walras-Pareto Lectures MIT Press Books 1 (2012).

Singla, Shikhar. “Regulatory Costs and Market Power” LawFin Working Paper no.47 (2023).

Spitzer, E. “Government’s Place in the Market” The MIT Press, Cambridge, Massachusetts (2011).

Stigler, George J. (1971) “The Theory of Economic Regulation” The Bell Journal of Economics and Management Science, Vol. 2, No. 1 (Spring), pp. 3-21

Trebbi, Francesco, Kairong Xiao, “Regulation and Market Liquidity” Management Science, May (2019), 65(5): pp.1949-1968.

Trebbi, Francesco, Ben Miao Zhang, Mike Simkovic, “The Cost of Regulatory Compliance in the United States” National bureau of Economic Research w30691 (2023).

Viscusi, W. Kip and Aldy, Joseph E. 2003. "The Value of a Statistical Life: A Critical Review of Market Estimates throughout the World," Journal of Risk and Uncertainty, Springer, vol. 27(1), pages 5-76, August.

Vitale, Cristiana, Carlotta Moiso, Isabelle Wanner (2020) “Product Market Regulation: A detailed explanation of the Methodology used to build the OECD PMR Indicators”, OECD mimeo.

Walker, W. Reed. 2013. “The Transitional Costs of Sectoral Reallocation: Evidence from the Clean Air Act and the Workforce.” Quarterly Journal of Economics 128 (4): 1787–835.