Measuring Regulation

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Abstract

Regulation plays a central role in law and economics, empirical legal studies, and finance. But despite the centrality of regulation to academic inquiry and policy evaluation, there is no universally accepted measurement of change in regulatory complexity, intensity, and burdens faced by private industry at different points in time. This article describes previous efforts to measure regulation and the limitations of those approaches.

We develop a novel approach based on the theory that the burdensomeness of regulations is reflected by the response of regulated firms to those regulations, specifically changes in expenditures on employees whose jobs entail navigating, complying with and shaping regulations—principally legal and compliance employees—scaled by total employment costs.

The new regulation index proposed in this article uses publicly available data to consistently measure change in regulatory burdens for hundreds of detailed industries over the last 30 years. Compared to extant measures, the new Regulation Index better distinguishes changes that are deregulatory from those that increase regulatory burdens. It can more readily distinguish paper tigers—lengthy but low-impact statutes and regulations—from those that are truly burdensome. It can more closely identify which subsectors were burdened by regulations, and when regulations became burdensome—whether because of changes in text, interpretation, or other circumstances. The Regulation Index could therefore become a powerful tool for empirical studies of legal change.

Specific examples of laws evaluated to illustrate the usefulness of the Regulation Index include the Dodd-Frank Act and the Credit Card Act (financial services), the Energy Policy Act and Deepwater Horizon oil spill and related executive orders (oil & gas extraction), the Safe Port Act (transportation), and the Telecommunications Act (communications).

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Introduction

Regulation plays a central role in law and economics, empirical legal studies, and finance. The causes, effects, and even the timing of regulation remain contested.[1]

Many regulations are viewed as helpful because information asymmetries between well-organized, highly-specialized firms and atomized and less knowledgeable consumers or investors could otherwise lead to inefficient and inequitable outcomes. (Akerlof, 1970; Williamson, 1971; Ausubel, 1991; Coffee, 1984; Stout, 1995; Gigerenzer and Selten, 2002; Jin and Leslie, 2003; Bar-Gill, 2003; Stiglitz, 2009; Aghion et al., 2009; Thaler and Sunstein, 2009; Simkovic, 2009a; Bubb and Pildes, 2014). Regulations may also compel firms to internalize negative externalities. (Becker, 1983; Kolstad et al., 1990; Pigou, 2017; Stiglitz, 2009; Shavell, 2007; Simkovic, 2018) However, others contend that regulatory capture or other flaws in regulatory or legislative processes lead to inefficient or ill-conceived regulations that may do more harm than good. (Stigler, 1971; Peltzman, 1976; Buchanan and Tollison, 1984; Laffont and Tirole, 1991; Levine and Forrence, 1990) Administrative law requires regulators to consider both the benefits and costs of proposed regulations.

[1] (See, e.g., La Porta et al., 1998; Mahoney, 2018 (contesting the view that financial deregulation contributed to the 2007-2009 financial crisis); Simkovic, 2013 (noting that more heavily regulated entities tended to have better mortgage performance))

Several financial regulation scholars have recently advanced theories that financial crises trigger periods of more intense regulation while economic growth and asset appreciation may encourage periods of deregulation. (Romano, 2004, 2012; Gerding, 2013; McDonnell, 2013). Others reject this view, arguing that regulations tend to develop more slowly and show little correlation to crises. (Conti-Brown and Ohlrogge, 2018).

But in spite of the centrality of regulation to academic inquiry and policy evaluation, there is no universally accepted measurement of change in regulatory complexity, intensity, and burdens faced by private industry at different points in time. This article describes previous efforts to measure regulation and the limitations of those approaches. The lack of a standard methodological approach to measuring regulatory burdens has limited the extent to which researchers can generalize and compare results of studies that consider particular regulations, industries, or time periods. The multiplicity of possible measures also creates greater risk of researchers selecting the subset of measurements that produce the most dramatic, publishable results on an ad hoc basis, rather than relying on a standard approach that is theoretically and empirically grounded and that is resistant to manipulation. (Gelman and Loken, 2014; Ioannidis, 2005) In addition, many widely-used methods have notable shortcomings which could lead to overestimation or underestimation of regulatory burdens.

We develop a novel approach based on the assumption that the burdensomeness of regulations is reflected in the response of regulated firms to those regulations, specifically changes in expenditures on employees whose jobs entail navigating, complying with and implementing regulations—principally legal and compliance employees—scaled either by total employment costs, revenue or total employee headcount.[2] This approach recognizes that the burdensomeness or complexity of regulation cannot be fully captured by the number of words used to describe it, the size of the budgets allocated to federal regulators with the authority to enforce it, or the frequency with which regulated firms discuss it, but rather is more reliably reflected by regulated industries' expenditures on managing regulatory burdens.

The new Regulation Index proposed in this article uses publicly available data to consistently measure changes in regulatory burdens for hundreds of detailed industries over the last three decades.[3] *Compared to extant measures, the new Regulation Index better distinguishes changes that are deregulatory from those that increase regulatory burdens. It can more readily distinguish paper tigers—lengthy but low-impact statutes and regulations—from those that are truly burdensome. It can more closely identify which subsectors were burdened by regulations, and when regulations became burdensome—whether because of changes in text, interpretation, or other circumstances.* Therefore, this Regulation Index could become a powerful tool for empirical studies of legal change and retrospective policy analysis.

Using this methodology, we find evidence that in the years after the enactment of Dodd-Frank, regulatory burdens in financial services increased substantially more than in the overall economy. Regulatory burdens also increased more in financial services than in the

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[2] Our Regulation Index is intended to operate at the sector or industry level, not the firm level, although BLS OES data is an establishment-level survey.

[3] In theory, it may be possible to extend a slimmed down version of the Regulation Index back many decades using ACS, CPS, and the Decennial Census. However, such household data appears to be noisier than OES data and we therefore focus on OES data and the last three decades.

real estate sector which also contracted during the mortgage crisis of 2007-2009, but was not regulated as heavily as finance after the crisis. In addition, the subsectors of financial services which were targeted most heavily by Dodd-Frank—notably credit intermediation—saw the largest increase in regulatory burdens. Moreover, we find evidence that sectors that were nominally targeted by Dodd-Frank but subsequently received *defacto* relief through judicial victories and generous administrative exemptions, such as insurance and broker-dealers, saw relatively little increase in regulatory burdens. This result contradicts measures of regulation based purely on textual analysis of statutes and regulations, which find large increases in regulation across financial services.

Similarly, we find evidence of significant decreases in regulatory burdens for the Oil & Gas Extraction industry (relative to other mining and extraction industries) after deregulation under the Energy Policy Act of 2005, and significant increases in Oil & Gas regulatory burdens after re-regulation of the industry following the British Petroleum Deepwater Horizon oil spill. This result contradicts measures of regulation based on textual analysis of regulations. Such measures incongruously suggest that the Energy Policy Act—which was intended and widely understood to be deregulatory—increased regulation of Oil & Gas, and that regulation of Oil & Gas increased less after the Deepwater Horizon oil spill than regulation of other mining industries.

Using our new Regulation Index, we find evidence of increased regulation of the credit card industry relative to depository institutions after the enactment of the Card Act of 2009. We also find increased regulation of ports following the SAFE Port Act of 2006 relative to other transportation industries. In addition we find deregulation of communications industries relative to print publishing industries following the Telecommunications Act of 1996, which was intended and understood to be deregulatory.

We interpret these results as validating our response-based Regulation Index. In particular, our index is better suited than other measures to distinguish regulations that are truly burdensome from lengthy regulations with limited impact. Our index is capable of distinguishing policy changes that are deregulatory from those that increase regulation. And our index works across multiple industries and multiple time periods.

Three government surveys could potentially supply the necessary data to construct the response-based Regulation Index within the United States: the Department of Labor, Bureau of Labor Statistics (BLS) Occupational Employment Statistics (OES); the U.S. Census Bureau's American Community Survey (ACS) and the Decennial Census (Census); and the U.S. Census Bureau's Current Population Survey (CPS).

The analysis in this article uses BLS OES data. A major advantage of OES is that data on occupational earnings, employment, and industry/sector is supplied by firms rather than individuals, and therefore suits our interest in measuring businesses' reactions to regulation. Another advantage is that the OES data may be more accurate and consistent over time.[4]

[4] OES data for a given year is constructed using three yearly sampling waves, and therefore public OES effectively represents a three-year moving average. Data can be disaggregated through the use of OES micro-

The other data sources are all household surveys, where individuals supply information about their own occupation, industry, and earnings. Industry and occupation-specific employment information may be less consistent or less reliable in household surveys than OES data.[5]

Part I of this article discusses previous attempts to measure regulatory complexity and burdens and the limitations of those attempts. Part II explains our data and methods. Part III validates the Regulation Index using regulatory and deregulatory shocks from multiple industries and multiple time periods. The conclusion follows.

I. Previous approaches to measuring regulation and their limitations

Four approaches to measuring regulation have historically been used. The first approach involves an automated, quantitative measure of codified text such as statutes or regulations—basically, counting words or larger lexical units that measure the size of the code. The second approach involves an examination of regulatory resources such as headcounts or budgets of regulatory agencies. The third approach involves quantifying regulatory enforcement actions, inspections, or other activities. All three of these approaches rely on relatively crude observations of regulations or regulators, such that similar observations can translate into very different burdens or restrictions on regulated firms. The third approach (quantifying regulatory enforcement activities) has significant advantages over the first two in terms of external validity, but the necessary information can be costly to obtain and may vary dramatically from industry to industry. The fourth approach, which is analogous to the one developed in this article, is to track regulated entities' responses to regulations. However, the last three of the four approaches previously used are often idiosyncratic to particular industries and thus are not generalizable.

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data, but this would reduce the accuracy of estimates and may affect representativeness. ACS and CPS treat each year as separate and strive to create a nationally representative sample on an annual basis. Census data is only available once every 10 years. In practice, we find that estimates from OES are relatively smooth, while those from household surveys appear to be noisy.

[5] Another challenge with household data is that occupation and industry are typically reported for the current year, while earnings are reported for the prior year. When individuals change occupations and industries to accommodate changing demand for regulation, this mismatch can potentially present an inaccurate picture for wage-based regulatory measures (at least in the short run), but should not affect headcount-based measures.

Household surveys such as CPS and the Census available for years prior to the start of OES in the late 1980s. In theory, ACS and CPS should facilitate precise yearly measurements—they are not multi-year moving averages like OES—but in practice we find that annual data in household surveys is relatively noisy. The decennial census is only available once every 10 years and cannot provide annual estimates.

Like BLS OES, ACS and the Census benefit from extremely large sample sizes. However, ACS and Census may have less severe top-coding of earnings. The Census has the advantage of measurements every 10 years going back as far as the 1950s (including earnings and detailed occupational and industry information), while BLS data is limited to the late 1980s forward, with the highest quality data only available starting in the 1990s. Decennial estimates from the Census based on employment shares (but not compensation or earnings) and based on a subset of the occupations in the regular indices are available as far back as 1850. CPS provides annual data back to the 1960s, but the small sample size will limit the accuracy of annual measurements, particularly for small sectors.

A. Measuring the length of statutes or regulations

Several previous studies have relied on variation in word counts, pages, provisions, or other lexical units in a body of codified statutory or regulatory text—most commonly, the code of federal regulations (CFR)—as a proxy for regulatory intensity, complexity, or burdens. Dawson and Seater (2013) examined levels and growth rate of the CFR's page count from 1949 to 2002 to explore the effects of regulation on productivity. (Dawson and Seater, 2013, pp. 137–141) Mahoney has similarly used word counts in the CFR going back to the 1920s and 1930s to analyze the timing of changes in financial regulation around the time of the Great Depression and the financial crisis of 2007-2009.[6] The number of pages of the CFR was among several measures of regulation used by Goff. (Goff, 1996, pp. 89–99) Some have argued that word counts are preferable to page counts because of differences in formatting and density across pages.

However, it is far from clear that more words or more pages translate into a more burdensome regulation or a regulation that is more aggressively enforced. A regulation which says "You may not do A through Z" is both shorter and more burdensome than a regulation that says "You may not do A, unless any of the following exceptions 1 through 20 apply" or a regulation that says "You may not do A. You may not do B. You may not do C." Even during times of *deregulation*, regulatory texts may grow in length as provisions are effectively repealed, but the underlying text is retained.

Growth in the length of regulations may become less burdensome as industries consolidate or learn to cooperate through trade associations or jointly used law, accounting, and consulting firms. Regulatory burdens also may decrease as publishers or law firms prepare memos and other secondary sources to aid regulated entities, as technologies for automatically managing and complying with regulations advance, and as the fixed costs of regulatory compliance can be amortized across more economic activity. A regulation that is overturned by case law, that is porous or deferential to industry practice, or that is simply not enforced may present little, if any, burden. As described in greater detail below, major legislation regulating the financial services sector led to regulatory burdens only after significant delay in agency rule making and implementation, and even then the impact on some financial services industries was minimal.

On the other hand, focusing on a single body of codified federal regulations can be *under-inclusive* of regulatory burdens which arise from private rights of action enforced by firms and other plaintiffs' lawyers,[7] from self-regulatory organizations such as FINRA or securities exchanges,[8] from common law created by the judiciary, and from state or local law and regulations. For example, during periods when federal regulators such as the Securities and Exchange Commission (SEC) were relatively passive, states' attorneys general used Blue Sky laws to investigate, litigate against, and (through deferred prosecution agreements[9])

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[6] (Mahoney, 2018) (working paper presented at NBLSC)

[7] (Coffee, 1986; Garth et al., 1988; Macey and Miller, 1991; c.f. Beisner et al., 2005)

[8] (DeMarzo et al., 2005; Fischer, 2015; Karmel, 2008; Mahoney, 1997; Omarova, 2011a; Stefanadis, 2003; Werner, 1984)

[9] (Greenblum, 2005; Paulsen, 2007)

effectively regulate financial services firms. (Agrawal, 2013; Loss, 1957; Macey, 2004, 2004; Mofsky, 1969; Smith, 1936)

Relatively few of these limitations are overcome by even the most sophisticated version of the "counting words" approach—Al-Ubaydli & McLaughlin's "RegData." Rather than just count words in the CFR, RegData attempts to emphasize words suggesting mandates such as "shall," "must," "may not," "prohibited," and "required." (Al-Ubaydli and McLaughlin, 2017, p. 112) As noted above, greater frequency of these words does not necessarily mean that the activity to which they apply is larger or more important and that thus the regulation is more burdensome. RegData also attempts to assign regulations to industries (2-digit through 6-digit NAICS codes) based on phrases appearing in the regulation such as "insurance" or "banking," even though many regulations without such explicit references likely affect discrete industries differently. Because RegData is based on *federal regulations,* it also suffers from the same problems of under- and over-inclusiveness noted above with respect to private rights of action, case law, and state and local regulations.[10]

An important advantage of RegData and other "counting words" approaches is that they can provide annual estimates going back decades and may therefore be ideal for historical research that predates the late 1980s. In early periods, other data sources may be less reliable. In addition, RegData appears to do a reasonably good job of flattening during periods which are commonly viewed as deregulatory (i.e., RegData does not simply monotonically grow).

Similar to RegData, Gong and Yannelis count words that relate to regulation in annual 10-K disclosures of publicly traded firms. They also run searches for the popular names of specific statutes. By aggregating mentions of regulations by individual publicly traded firms, they attempt to construct an industry level index. (Gong and Yannelis, 2018)

In the specific context of federal banking legislation (Title 12 of the U.S. Code) Conti-Brown and Ohlrogge weighed the importance of new legislation based on how many provisions of Title 12 the legislation changed, and how frequently those provisions were cited in case law. (Conti-Brown and Ohlrogge, 2018, pp. 1, 4, 16)

B. Measuring regulatory resources

Another approach to measuring regulation involves measuring the resources of regulators—usually budgets or personnel headcounts. This approach is typically only used for federal regulators with a very specific mandate. This approach has some advantages over counting words. Regulators with greater resources may be more likely to enforce regulations, and regulations that are enforced are far more burdensome than those that merely appear on the books. However, regulators with more resources are not necessarily more active, aggressive or burdensome to industry—indeed, regulatory resources may be used to clarify, streamline, or limit the scope of regulations

[10] Efforts are underway to extend the RegData approach to state regulations, but thus far there remain substantial gaps in the data.

and thus *reduce* compliance costs and regulatory burdens. Moreover, it may be difficult to categorize regulatory resources correctly onto specific industries—and therefore difficult to scale resources by the size of the target of regulation. The resources of federal regulators also may not correlate with the resources or aggressiveness of state or local agencies or private enforcers such as self-regulatory organizations[11] or plaintiffs' lawyers. Several scholars who have considered regulatory resources have attempted to ameliorate this problem by also considering enforcement actions by federal regulators, although this does not address enforcement actions by states, SROs, or private civil litigants.

Goff considered variables including employment levels at the Environmental Protection Agency (EPA), state government employment excluding those working in education, and Department of Agriculture employment as a percent of total farm employment. (Goff, 1996, p. 93) Howell Jackson has considered staffing levels and budgets at federal financial regulators such as the SEC. (Jackson, 2007a, pp. 402–405, 2007b, pp. 265, 272, 278–79) Both Goff and Jackson also considered some measures of enforcement activity, as described in greater detail below.

Winston used the total number of federal agency employees. He attempted to isolate those assigned to regulatory tasks, although it is unclear whether such employees were clearly distinguishable from other employees.[12] Winston attempted to map some regulatory personnel onto a relatively small number of broad industry-based classifications.[13] Winston used idiosyncratic categories of regulation[14] and excluded some categories of regulation for reasons that appear to be largely subjective.[15] (Winston et al., 1994, p. 5)

C. Counting inspections or enforcement actions

As noted above, Goff and Jackson each considered regulatory resources. They both also considered some specific types of enforcement activity. Goff considered the percent of civil cases in federal district court. (Goff, 1996, p. 93) Civil litigation is a form of enforcement that reflects regulatory burdens on business, but it is unclear why cases in federal court should count more than cases in state court; both federal and state cases are capable of resulting in damages and it is often *defendants* who exercise the option to remove to federal court. Nor is it clear why the relevant

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[11] (Mahoney, 1997)

[12] (Winston et al., 1994, pp. 28–31)

[13] Winston subdivided his data for economic regulation into finance and banking, industry specific, and general business and of social regulatory agencies into energy, environment, job safety, consumer safety, and health, based on categories created by the Center for the Study of American Business. (Winston et al., 1994, p. 22) CSAB was an embedded think tank at Washington University in St. Louis that was funded largely by corporate donations.

[14] Winston attempted to classify and group regulatory activities into high-level categories based on his subjective assessment of whether regulation was likely to be protective or protectionist. Specifically, he defined economic regulation as the control of rates and entry conditions in a market and social regulation as activities of the federal government created to control externalities or threats to human health or safety.

[15] Winston excluded important categories of regulation for reasons that are somewhat unclear. He did not include all activities of government that affected social conditions, like equal employment or the IRS.

metric is the percentage of cases rather than the number of cases or the dollar value of settlements and damages awards.

In the specific context of federal securities regulation, Jackson considered enforcement actions and monetary sanctions. (Jackson, 2007a, pp. 402, 405, 2007b, pp. 265, 279) Jackson struggled to find an appropriate number by which to scale this variable, to obtain comprehensive data (some of the information is private), and to construct international comparisons. Sun, Tam and Young used the number of comment letters issued by the SEC and the percentage of firms subject to litigations related to accounting measure manipulation as proxies for regulatory intensity. (Sun et al., 2014)

In the specific context of EPA regulation of paper, oil, and steel manufacturers, Gray and Shadbegian used compliance status, enforcement actions, and enforcement activity. (Gray and Shadbegian, 1993, p. 2) In the context of product regulation, Nicoletti considered a variety of industry-specific regulatory proxies such as price floors and licensing requirements. (Nicoletti and Scarpetta, 2003, pp. 48, 50, 54–55)

D. Regulated entities' responses to regulation

Gray and Shadbegian also considered the relationship between EPA enforcement activity and compliance expenditures by regulated manufacturers. These costs were scaled to the amount of economic output. Using the Census Bureau's Pollution Abatement Costs and Expenditures survey (PACE), compliance costs were measured as the plant's average annual operating cost for pollution abatement between 1979 and 1985, divided by the plant's average value of shipments over the same period.[16] They found that compliance expenditures tended to have a positive relationship with EPA enforcement activity across plants. (Gray and Shadbegian, 1993, p. 13) They also considered annual measures to facilitate a fixed effects model. (Gray and Shadbegian, 1993, p. 11)

Though highly specific and limited to a particular context where compliance costs are explicitly reported separate from other expenditures, Gray and Shadbegian's approach is analogous to the approach proposed in this article—that firms respond to more aggressive and intrusive regulation by expending more on compliance.

Goff also initially contemplated measuring regulation using ratios of private sector employment, such as employment of lawyers as a percent of employment of scientists and engineers, but ultimately settled on a cruder measure: the number of lawyers as a percent of the total population from the *Historical Statistics of the U.S.* and the *Statistical Abstract*. (Goff, 1996, p. 92) There are a number of potential challenges with this approach. First, employment of higher quality and more expensive workers may be a substitute for employing lower-quality workers—and is at least more burdensome to business per worker because of greater compensation costs. Thus, employment

[16] Averaging across years was done to minimize effects of the business cycle and facilitate cross-sectional variation.

headcounts may be less sensible than compensation-based measures where compensation rates across occupations grow at different rates. Second, the employment population ratio varies over time, and variation in the denominator that is unrelated to regulation or regulated economic activity could change the ratio which is intended as a measure of regulation. Goff did not attempt to provide a breakdown by industry. Third, many occupations besides lawyers—such as other legal occupations and compliance workers—are important to private response to regulation. Goff did not use or even mention BLS OES, CPS, or Census data. BLS OES and Census data have become easier to work with since Goff's time, with more data available online that is more accessible.[17]

Jackson also proposed idiosyncratic approaches based on financial performance and behavior of market participants.[18] (Jackson, 2007a, p. 410) These methods require strong assumptions about the effects of regulation on financial markets and the primacy of regulation on decisions to register with different securities exchanges.

II. Regulation Index construction

We construct an industry Regulation Index based on the concentration of regulatory-related employees in each industry each year. Specifically, we first identify standardized occupations that are related to law or regulatory compliance, and which are employed by the private sector. We call these "*regulatory-related occupations*." Then, we divide employment or payroll for all regulatory-related employees in each industry by total employment or payroll in the same industry in each year.[19]

A. Employment and wage data by industry and occupation

The main data source for our analyses is the Occupational Employment Statistics (OES) data from the Bureau of Labor Statistics.[20] OES data provides information on head counts and hourly wages for each occupation within each industry. This data is constructed based on surveys of 1.2 million establishments in the U.S. over 3-year cycles, covering 62% of total national employment from 1990 to 2016. Every six months, the OES program selects a panel of 200,000 establishments that are nationally representative. Most establishments are

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[17] Prior to the 1990s BLS OES data did not include compensation figures, but only headcounts. ACS was not available until 2001. The IPUMS project, which started in the 1990s, has dramatically improved the usability of the Census, ACS, and CPS, especially for long-term historical analysis.

[18] In the first approach, one would look to the behavior of trading markets—bid-ask spreads, price synchronicity, and evidence of trading on inside information—to draw inferences about regulatory quality. (410). In the second approach, one would use data such as the number of new foreign listings and the spike of foreign firm deregistrations, or vice versa, to measure regulation intensity.

[19] Note that BLS OES reports number of employees and mean hourly wages. Payroll is estimated by assuming that all employees work 2,080 hours, consistent with BLS OES conventions. See U.S. BUREAU OF LABOR STATISTICS, OCCUPATIONAL EMPLOYMENT STATISTICS, https://www.bls.gov/oes/tables.htm. The OES microdata do not have wage information before 1998. Therefore, for years before 1998, we estimate the hourly wages from the Census Current Population Survey Merged Outgoing Rotation Groups (CPS-MORG).

[20] The data can be downloaded at https://www.bls.gov/oes/tables.htm.

surveyed once every three years to reduce respondent burden. Then, the OES program aggregates information from the last three years (six panels) to produce statistics of the occupational composition within each industry.

The OES data use the OES taxonomy occupational classification, with 828 detailed occupation definitions before 1999, and use the Standard Occupational Classification (SOC), with 896 detailed occupation definitions in 1999 and subsequent years. The OES data use the 3-digit Standard Industry Code (SIC), with 378 industry classifications before 2002, and use the 4-digit North American Industry Classification System (NAICS), with 290 industry classifications starting from 2002. There do not appear to have been major classification changes to the regulatory occupations that form the core index, although in the migration from OES to SOC, "compliance" occupations branched into several more specific job categories.

B. Regulatory-related occupations

We identify regulatory-related occupations through textual analysis of the O*Net 23.1 database.[21] O*Net is a dictionary of occupations maintained by the U.S. Department of Labor, currently organized according to SOC2010 occupation codes. For the approximately 800 occupations included in O*Net, we obtain tasks performed by each occupation. Each occupation is associated with between 4 and 40 tasks, with an average of 22 tasks per occupation.

We identify a task to be regulatory-related if O*Net's "statement" (usually a one sentence description) of the task includes one or multiple of the following keywords: *Compliance, Compliances, Complied, Complies, Comply, Complying, Law, Lawed, Lawing, Laws, Lawsuit, Lawsuits, Legal, Legalities, Legality, Legislate, Legislated, Legislates, Legislating, Legislation, Legislations, Ordinance, Ordinances, Regulatory, Regulation, Regulations, Statute, Statutes, Statutory*.

For each occupation-task pair, O*Net assigns a value between 1 and 5 for each task's importance to each occupation. For each occupation, we use these importance values as weights to calculate a weighted percentage of tasks that are related to regulation. We rank occupations by the extent to which associated tasks are related to regulation and include in our index only the top 20 most regulation-related occupations.[22] Because we are interested in private sector response to regulation, we then excluded three occupations that are employed only by the government and not by the private sector.[23] The remaining 17 occupations that comprise the index are listed below along with their respective occupation codes:

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[21] O*Net Resource Center, https://www.onetcenter.org/overview.html.

[22] We exclude Managers, All Other (SOC code "11-9199") since it is unclear what exact type of managers are included in this occupation.

[23] Thus, although Administrative Law Judges, Adjudicators, and Hearing Officers (SOC code 23-1021) and Judges, Magistrate Judges and Magistrates (SOC code 23-1023) are clearly a law-related occupation, we exclude them from our index because judges work only for governmental entities such as courts and administrative agencies. Similarly, we exclude Fish and Game Wardens (SOC code 33-3031), a compliance-related occupation that is employed exclusively by governments, not private employers.

Table 1: Regulation-related Occupations

Title	OES95	SOC2000	SOC2010
Law and Related Occupations:			
Lawyers	28108	23-1011	23-1011
Paralegals and Legal Assistants	28305, 28399	23-2011	23-2011
Law Clerks	28302	23-2092	23-1012
Title Examiners, Abstractors, and Searchers	28311, 28308	23-2093	23-2093
Legal Secretaries	55102	43-6012	43-6012
Compliance and Related Occupations:			
Compliance Officers	21911	13-1041	13-1041
Financial Examiners	21911	13-2061	13-2061
Construction and Building Inspectors	21908	47-4011	47-4011
Food Scientists and Technologists	24305*	19-1012	19-1012
Health and Safety Engineers, Except Mining	21911, 22132	17-2111	17-2111
Urban and Regional Planners	27105	19-3051	19-3051
First-Line Supervisors/Managers of Police and Detectives[24]	61005	33-1012	33-1012
Fire Inspectors and Investigators	63002	33-2021	33-2021
Police and Sheriff's Patrol Officers[24]	63014	33-3051	33-3051
Transit and Railroad Police	63038	33-3052	33-3052
Gaming Surveillance Officers & Gaming Investigators	63035*	33-9031	33-9031

*Note: * indicates that multiple SOC codes are matched to the OES95 code.*

We then construct two versions of industry Regulation Indexes using employment share and payroll share for the regulatory-related occupations.

We specifically exclude industry categories which provide legal or compliance work as their primary source of revenue or function: legal services (i.e., law firms), accounting firms, government administration, courts, and central banking. Consistent with the literature we also exclude educational institutions.[25]

As described in greater detail below, we find that the Regulation Index—a measure of share internal spending on legal and compliance work for an industry—is correlated with the industry's outside spending on legal work. In other words, internal legal and compliance

[24] According to OES data, the private sector employs some police or patrol officers. These private police may provide private security forces for railroads, malls or other locations, or may work for privately owned firms that have won government conracts to provide policing services to the public.

[25] Education is often excluded along with the public sector in studies focused on private firms. (Song et al., 2018, p. 65) The NAICS 4-digit codes and SIC 3-digit codes for legal services are 5411 and 811, for educational institutions are 611X and 82X, for accounting firms are 5412 and 872, for central banking are 5211 and 601, and for government and court include all codes starting with 9 in both NAICS and SIC.

spending are complementary to outside legal work. The Regulation Index will therefore reflect variation in total costs of legal and regulatory compliance even without directly measuring industries' outside legal spending. The Regulation Index has advantages over data on outside legal spending because the Regulation Index is available at a more granular industry level and the Regulation Index exhibits more time variance.

C. Descriptive statistics

Table 2 below shows the industries with the highest Regulation Index values in 2016.

Table 2: Top 15 Industries with Highest Regulation Index in 2016
This table reports the top 15 NAICS 4-digit industries sorted on their employment-based Regulation Index in 2016.

Rank	Industry	RI
1	Securities and Commodity Exchanges	6.36
2	Oil and Gas Extraction	3.93
3	Insurance Carriers	3.64
4	Other Investment Pools and Funds	3.00
5	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)	2.93
6	Architectural, Engineering, and Related Services	2.89
7	Other Financial Investment Activities	2.58
8	Management of Companies and Enterprises	2.32
9	Gambling Industries	2.29
10	Natural Gas Distribution	2.20
11	Scientific Research and Development Services[26]	1.98
12	Nondepository Credit Intermediation	1.80
13	Securities and Commodity Contracts Intermediation and Brokerage	1.79
14	Pharmaceutical and Medicine Manufacturing	1.62
15	Social Advocacy Organizations	1.61

Even though some legal work is farmed out to law firms, companies with more outside legal work typically also have larger in-house legal and compliance groups. (Chayes and Chayes, 1985, pp. 278–81) There are limits on the extent to which responsibility can be delegated and compliance outsourced. (Langevoort, 2006, p. 967) In an analysis of Bureau of Economic Analysis Input-Output tables, we find that industries which are the largest consumers of outside legal services correspond closely to the industries that are the highest on the Regulation Index.

[26] Note that Scientific Research and Development Services consists of private sector firms (not universities) engaged primarily in Research and Development in Physical, Engineering, and Life Sciences and Biotechnology—i.e., pharmaceutical, biotechnology, and aerospace and engineering firms.

To address concerns that some industries might handle more legal and compliance work inhouse while others may outsource more of it to law firms, we compare our industry Regulation Index, which captures the industry's reliance on in house legal and compliance workers, with the industry's demand for outsourced legal service. We obtain the dollar value of legal service intermediate inputs and the total intermediate inputs for 64 BEA industries from the BEA Input-Output Use Table for each year in 2002-2016. For each year, we measure the industry's reliance on outsourced legal service as the ratio between its total spending on outsourced services and its spending on legal services. Because our regulation Index is based on OES surveys which aggregate data through a 3-year moving average, we construct the measure of industry's outsourced reliance on legal services as a 3-year moving average. We construct the employment-based and payroll-based Regulation Index for the 64 BEA industries by cross-walking NAICS 4-digit codes to the BEA industries.

We find a strong positive correlation between outsourced legal services and both versions of our Regulation Index (employment-based (0.43) and payroll-based (0.42)). The following regression results in Table 3 further show the cross-sectional relation and time-series relations between industries regulation indices and their outsourced legal services. These results reinforce our interpretation of our regulation index as an indicator of the total intensity or burden of regulation on private industries.[27]

Table 3 also shows that industries' outside legal services tend to move with a much lesser magnitude than industries' regulation index, which measures the in house use of legal and compliance services. Specifically, a one-standard-deviation increase in an industry's Regulation Index corresponds to an increase of only 4% to 9% of a standard deviation in the industry's outside legal services, as shown in Columns (6) and (3). Thus, the Regulation Index may be more sensitive to industry-specific changes in regulatory burdens than outside legal spending. Note also that over time, inhouse legal and compliance work measured by the Regulation Index has grown relative to outsourced legal services.

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[27] The view that the Regulation Index indicates levels and changes in regulatory intensity or burdens is not meant to suggest that the payroll version of the Regulation Index is a comprehensive and complete measure of all of the costs of regulation. For example, the costs of a regulation that required the purchase and installation of expensive equipment or that prohibited firms from engaging in certain lucrative activities may *correlate* with our index, but the full costs would not be included as a dollar sum. The dollar sum could also *overstate* the costs of regulation because some of the work performed by employees in regulatory-related occupations, such as lawyers, might be performed even in the absence of governmental regulations (for example, some parts of drafting and negotiating contracts).

Our Regulation Index does not capture the society-wide benefits of regulation, which would need to be analyzed separately, and with an eye toward the intended beneficiaries of a particular regulation.

Table 3: A Higher or Increasing Regulation Index Predicts Higher or Increasing Spending on Outside Legal Services

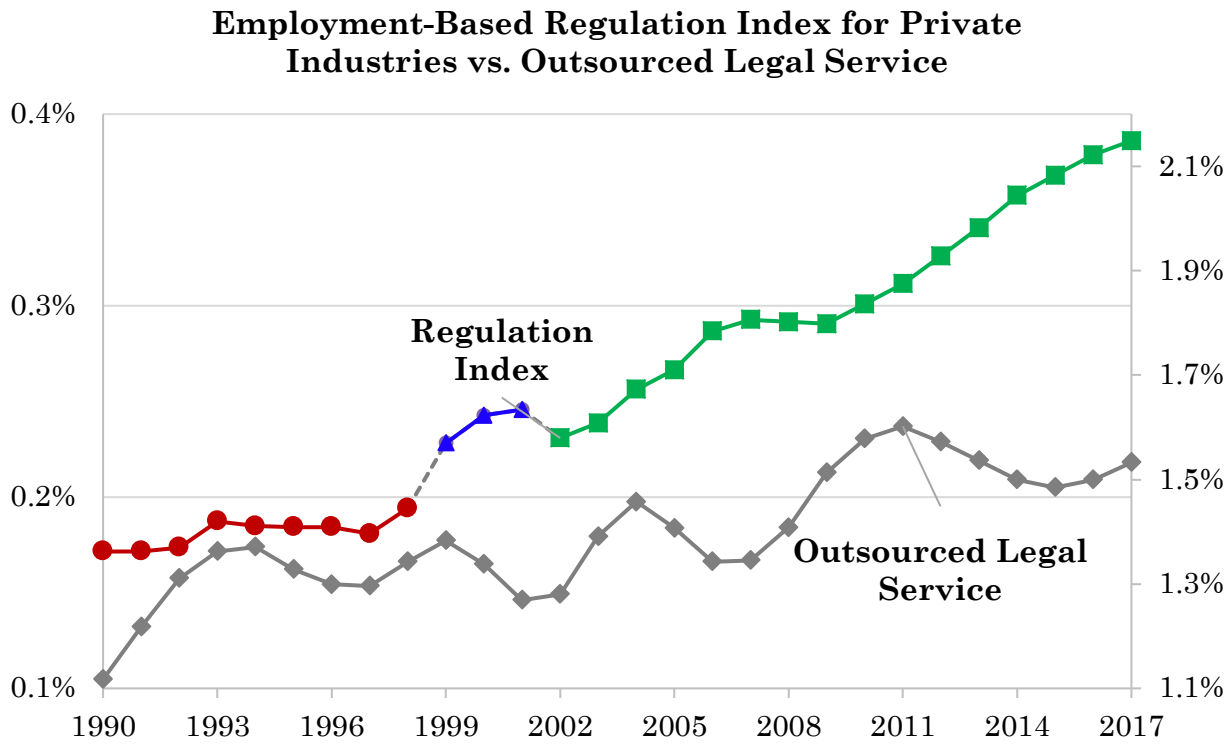
Dependent Variable: Legal Service Input/Total Intermediate Input						
	Employment-Based RI			Payroll-Based RI		
	(1)	(2)	(3)	(4)	(5)	(6)
RI	0.43***	0.42***	0.09***	0.42***	0.42***	0.04*
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)
Fixed Effects		Year	Ind		Year	Ind
Observations	958	958	958	958	958	958
Adj. R2	0.18	0.17	0.94	0.18	0.17	0.94

Note: All variables are standardized to have mean zero and standard deviation of one for inference.

Figure 1 below summarizes the employment-based Regulation Index across industries within each year. Results for the payroll-based version of the Regulation Index are similar. Over time, we see both versions of the Regulation Index increasing. The growth rate accelerates around 2010. Note that although there were minor changes to occupation classification codes in 2010 and 2011, these did not affect index occupations much, and there are no signs of sharp jumps in the index for all industries. Thus, these classification changes should have no significant impact on our differences-in-differences analyses across industries.

Figure 1 below illustrates shifting occupational and industry categorizations with different colored lines and different shaped line markers. Prior to 1999, OES used its own internal occupation codes. In 1999, OES began categorizing workers' occupations using the Standard Occupation Classification (SOC). Standard crosswalks are available. At the aggregate level there are no large jumps during the transition. We exclude detailed industries with year-to-year jumps in reporting or non-reporting of regulation-related occupations, which account for roughly 16 percent of observations. Prior to 2002, OES categorized firms by industry using the Standard Industrial Classification (SIC) system. In 2002, OES began categorizing firms by industry using the North American Industry Classification System (NAICS).

Figure 1: The Regulation Index Increases Over Time



Note: The y-axis to the left corresponds to the Regulation Index and the y-axis to the right corresponds to the Outsourced Legal Service, which is defined as the average percentage of legal service in the private industries' total intermediate inputs over t-2 to t.

Note that in addition to an upward trend, Outsourced Legal Services exhibits pronounced counter-cyclicality, generally declining during economic expansions and increasing during and shortly after recessions. This difference in cyclicality could be because legal services such as bankruptcy/restructuring and litigation which are counter-cyclical (Bachmeier et al., 2004; Donohue and Siegelman, 1993, pp. 710–711, 713–717; Siegelman and Donohue, 1995, pp. 201–202) tend to be outsourced to law firms whereas regulatory compliance tends to be handled inhouse. (Chayes and Chayes, 1985, p. 291) Outside legal services may also appear to be counter-cyclical because outside legal services are more essential to businesses and therefore more difficult to cut-back during recessions than other outsourced business processes. (Engelmann and Cornell, 1988) Compared to Outsourced Legal Services, the Regulation Index is more stable across business cycles.

III. Regulation Index validation based on regulatory shocks

We validate the industry Regulation Index using differences-in-differences analysis of targeted regulatory shocks. Specifically, we identify major federal legislation, regulation or executive orders which regulated or deregulated specific industries identifiable by industry code. We do not consider legislation that merely affected funding or taxation. The

regulatory shock must target an industry for which control industries are available. A control industry must be similar to the target industry, but unaffected by the particular regulatory shock. The regulatory shock must also take place a sufficient number of years after the start of the data series, before the end of the data series, and before and after transitions between industry classification schemes to observe parallel trends for control industries prior to the regulatory shock and to evaluate whether there is divergence after the shock.

We present regulatory shocks from highly regulated industries including financial services, oil & gas extraction, transportation, and telecommunications.

A. Financial regulation under the Dodd-Frank Act post 2010

We validate the industry Regulation Index using an example from financial regulation. We focus on the enactment of the Dodd-Frank Act in 2010 as an exogenous shock that increased regulation in the financial services industry relative to other industries. Using differences in the index before and after this shock, we compare changes in the Regulation Index for finance to changes in the index for other industries. As explained below, the impact of Dodd-Frank on different sectors of the financial services industry was heterogenous, with the largest impact on credit intermediation, clearinghouses, and bank holding companies.

1. Dodd-Frank background and overview of regulation

The Dodd-Frank Act was enacted shortly after the 2007-2009financial crisis. The financial crisis started after unanticipated defaults on subprime and non-prime mortgages caused losses at systemically important financial institutions because of those institutions balance sheet holdings of subprime asset-backed securities, guarantees of off-balance sheet financing vehicles, and under-collateralized swaps and derivatives exposures. (Mian and Sufi, 2009; Simkovic, 2009b, 2013; Wang and Xia, 2014) Shortly before the crisis, asset-backed securities collateralized by non-prime mortgages were highly rated by credit rating agencies and generally perceived to be low-risk because of geographic diversification and overcollateralization.

Many financial institutions were unable to absorb large, sudden losses without either restructuring their debts or obtaining rescue financing and liquidity support because the financial institutions were thinly capitalized and highly leveraged. (Simkovic, 2009b; Yellen, 2011; Beltratti and Stulz, 2012; Ayotte and Skeel, 2013) Fears about the solvency of financial institutions made it challenging for many of them to raise equity privately, or in some cases to even rollover their short-term unsecured debt. (Chernenko and Sunderam, 2014; Gorton and Metrick, 2012; Schmidt et al., 2016) The prevalence of financial institution debt in the commercial paper market caused some money market mutual funds—which had only recently been perceived by investors as cash-like and therefore almost riskless—to "break the buck," creating worries that not even cash was safe. (Gorton et al., 2010; Covitz et al., 2013; Adrian, 2014; Schmidt et al., 2016) Liquidity, which had been plentiful, became scarce, credit spreads widened, and lending volumes dropped. (Bao et al., 2011; Chava and Purnanandam,

2011; Chen et al., 2007; Dick-Nielsen et al., 2012; Friewald et al., 2012; Ivashina and Scharfstein, 2010; Santos, 2011)

Amid these concerns, the Federal Reserve and the Treasury intervened to provide rescue financing and liquidity support to systemically important financial institutions and to backstop mortgage lending, while the FDIC insured money-market mutual funds.

These efforts are generally regarded as successfully ameliorating the severity of the recession that followed. (Yellen, 2011; Duygan-Bump et al., 2013; Chodorow-Reich, 2014; Fischer, 2015; Casey and Posner, 2015) Nevertheless, relatively generous support for financial institutions was perceived by many members of the public as unfair or contributing to moral hazard. (Gordon and Muller, 2011; Hart and Zingales, 2011; Levitin, 2011; Balasubramnian and Cyree, 2014; Casey and Posner, 2015; Schwarcz, 2017)

Dodd-Frank was intended to reduce risk-taking in parts of the financial system that were systemically important and therefore had access to publicly funded safety net programs such as depository insurance and the federal reserve discount window, or implicit guarantees of future government capital injections in times of crisis. (Cooley et al., 2010; Skeel, 2010; Omarova, 2011b; Duffie, 2012; Barr, 2012; Balasubramnian and Cyree, 2014) This reduction in risk taking within systemically important parts of the financial system was intended to both reduce disruptions to the broader economy from future financial crises and to minimize costs to taxpayers of future "bailouts." The architects of Dodd-Frank hoped that risk would either be reduced or would move out of systemically important financial institutions and into other institutions whose failure would have limited spillover effects.

a. Credit intermediation regulation

Because of the origins of the 2007-2009 crisis in high-risk lending—and because losses related to lending are generally a major course of financial crises (Reinhart and Rogoff, 2009; Mian and Sufi, 2009; Duffie, 2012, pp. 24–25; Simkovic, 2013; Schwarcz, 2016)—many of the regulations under Dodd-Frank focused on reducing risk in credit intermediation. This was not confined to FDIC insured depository institutions, but rather encompassed all mortgage origination. Dodd-Frank empowered a new Consumer Financial Protection Bureau of the Federal Reserve to promulgate "qualified mortgage rules" providing a safe harbor from liability under the Truth in Lending Act for lenders who offered only mortgages that were well within borrowers' ability to repay. (Levitin et al., 2012; Floros and White, 2016; Schwarcz, 2012, p. 183) Dodd-Frank also encouraged safer lending practices through QRM definitions, which required originators who made ostensibly riskier non-qualified mortgages to retain 5% of the loans they originated. This risk retention requirement would drive up capital costs and create friction to securitization of riskier mortgages. (Levitin et al., 2012, pp. 8–11; D'Vari and Bernstein, 2016; Schultz, 2014, pp. 183–198; Bubb and Krishnamurthy, 2015)

Risk-taking by credit intermediaries was also limited in the corporate loan market. The Federal Reserve used its authority under Dodd-Frank to limit banks from extending leveraged loans (high yield, high risk loans to corporate borrowers). (Federal Reserve System et al., 2013; Adrian, 2014; Kim et al., 2018; Webb, 2016) The guidance applied to any loans originated by regulated entities, regardless of whether they were distributed through

syndication or held on the balance sheet. Following the issuance of this guidance in 2013 and clarifications in 2014, high-risk loan origination generally migrated from large, highly supervised banks to other less regulated parts of the financial system.

b. Bank Holding Company regulation

Dodd-Frank imposed many new reporting, risk management, and compliance requirements on Bank Holding Companies, entities that owned insured depository institutions as well as other financial affiliates. These included higher capital requirements for Systemically Important Financial Institutions and the obligation to draft and maintain "living wills" or plans for resolving these institutions in the event that they became insolvent. (Balasubramnian and Cyree, 2014, p. 156; Gordon and Muller, 2011, 2011; Merrill and Merrill, 2014) Bank holding companies were also subject to limits on activities that were perceived to be risky through a derivatives push-out rule and restrictions on proprietary trading, popularly known as the Volcker rule. (Board of Governors of the Federal Reserve System, 2013; Omarova, 2011b; Whitehead, 2011, p. 73)

Dodd-Frank may generally increase compliance and legal costs for public companies because it includes anti-retaliation protections for whistleblowers reporting fraud and other violations of the securities laws. (Leifer, 2014)

c. Securities, Commodities, and Derivatives exchanges and clearinghouses regulation

Under the derivatives push-out rule, the clearing of many swaps and derivatives was to be moved from an over-the-counter market operated by systemically important Bank Holding Companies and their affiliates to exchanges or central clearing parties. In turn, these clearinghouses were subject to regulations mandating heightened risk management, transparency, and capitalization requirements. (Bernanke, 2011; Kress, 2011; Omarova, 2011b; Yadav, 2012; Allen, 2012; Duff and Zaring, 2013, pp. 682, 688, 695–99, 705–06; Lubben, 2015, 2017)

d. Broker dealer regulation

As noted above, Dodd-Frank moved the clearing of many swaps and derivatives from broker dealers and other informal OTC intermediaries to centralized clearinghouses and exchanges. Dodd-Frank also imposed restrictions on affiliates of bank holding companies engaging in proprietary trading and on bank holding companies investing in private equity or hedge funds (popularly known as the Volcker rule). (Merkley and Levin, 2011; Omarova, 2011b)

However, Dodd-Frank and related regulations exempted many types of assets such as treasuries and sovereign debt, and included relatively broad exemptions, most notably for "market-making." (Omarova, 2011b; Board of Governors of the Federal Reserve System, 2013) Many commentators have argued that it is extremely difficult to distinguish "market-making" from proprietary trading. (Chatterjee, 2011, pp. 35, 50–51; Duffie, 2012, p. 3; Nabilou, 2017; PricewaterhouseCoopers, 2015)

Because of these exemptions, many argue that the Volcker rule would ultimately have a limited impact on financial institutions because the regulations would effectively be unenforceable. (Chatterjee, 2011; Kroszner and Strahan, 2011; Omarova, 2011b, p. 83; Duffie, 2012; Keppo and Korte, 2018; Gandel, 2018) Alternatively, some have warned that the Volcker rule could adversely affect liquidity if it were aggressively enforced, because this would prevent effective market-making in OTC markets such as corporate bonds and credit default swaps. Studies of changes to bond market liquidity following the passage of Dodd-Frank and the effective date of the Volcker rule have found mixed results, with the exception of evidence of reduced liquidity for distressed bonds following ratings downgrades. (Trebbi and Xiao, 2017; Bao et al., 2018) Independent of limits on proprietary trading, such bonds may be more costly for regulated entities to hold under new capital regulations. (Adrian et al., 2017)

Overall, the literature suggests that the impact of Dodd-Frank and Volcker on broker dealers was likely significantly less than Dodd-Frank's impact on institutions engaged in credit intermediation.

e. Insurance regulation

In practice, Dodd-Frank did very little to increase regulation of the insurance industry, although this did not become apparent until several years after Dodd-Frank's enactment. (Zaring, 2018)

Both proponents and opponents of Dodd-Frank legislation predicted that risk would move from highly-regulated bank holding companies to entities that were not explicitly regulated by Dodd-Frank, such as hedge funds, pensions, and insurance firms. (Kroszner and Strahan, 2011; Omarova, 2011b; Whitehead, 2011; Duffie, 2012; John C., 2014, pp. 1260, 1270) Proponents hoped that this would enable private risk-taking without systemic risk that would compel a publicly-funded backstop. Opponents warned that more lightly regulated entities could become so large, important and interconnected that they would themselves become systemically important. Many noted the prominent role that insurer AIG played in the financial crisis of 2007-2009. (Omarova, 2011a, p. 432; Wilmarth Jr, 2010, p. 978; Coffee, 2014, p. 1262).[28]

To address these concerns, the Dodd-Frank Act empowered regulators to designate financial institutions other than bank holding companies and their affiliates as Systemically Important Financial Institutions (SIFIs). (Duffie, 2012; Schwarz and Zaring, 2017) SIFIs would be subject to macro-prudential regulations and heightened capital requirements. (Levitin, 2011, p. 475; Omarova, 2011a, pp. 414, 439–40; Wilmarth Jr, 2010, p. 954).

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[28] During the Financial Crisis of 2007-2009, the Financial Products division of large insurance conglomerate, AIG, lost billions of dollars selling credit default swap protection on subprime mortgage backed securities to investment banks. AIG also incurred large losses making similar bets through its securities lending operations. Because of fears about the systemic risk if AIG's failed to pay its CDS counterparties in full and on time, AIG was provided billions of rescue financing from the Treasury and the Federal Reserve. (Simkovic, 2009b, pp. 276–77, 2013, pp. 250, 257, 263)

However, in practice, designations of non-Banks as SIFIs proved to be tenuous and short-lived. (Finkle, 2018; "Nonbank Financial Company Designations," n.d.). The Financial Stability Oversight Council's (FSOC) attempt to designate large insurers as SIFIs in 2013 and 2014 was swiftly defeated in court by insurance industry victories in the *MetLife* case in 2016. (Gonzalez, 2018a; Hoffman, 2016). In 2014, Congress relieved Insurance companies of Dodd-Frank regulations which would have held Insurance companies to more stringent capital adequacy and accounting standards that applied to banks. (Webel, 2014, p. 6) In 2017, members of Congress introduced additional bills to reduce federal macro-prudential and consumer-protection regulation of insurers. (Gonzalez, 2018b) Shortly after the introduction these bills, FSOC voluntarily dismissed its appeal of the *MetLife* decision, and removed remaining large insurers such as Prudential and AIG from its list of non-Bank SIFIs.[29] (Gonzalez, 2018a; "Nonbank Financial Company Designations," n.d.; Yagiz, 2017).

The Consumer Financial Protection Bureau (CFPB) created by Dodd-Frank also generally did not regulate insurance except in a few instances when insurance was closely related to the provision of credit or sold by banks as an add-on product. (Furman, 2019)

f. When regulation went into effect

Congress provided a general outline of its intentions in the Dodd-Frank Act, but delegated a great deal of rulemaking and substantive policy decisions to administrative agencies. Because of the time required to draft proposed regulations, provide an opportunity for notice and comment, and revise regulations in response to industry and public interest groups' concerns and legal challenges, many important regulations did not take effect until around 2013 or 2014. For example, the CFPB released Qualified Mortgage rules in January of 2013. QRM rules were proposed in 2013, finalized in October 2014, and took effect in late 2015. The final Volcker rule was not published until December of 2013 and did not take effect until 2014. Leveraged Loan guidance was issued in 2013 and may not have had much of an impact until it was clarified in 2014.

2. Applying the Regulation Index to Financial Services

We define the financial services industry as NAICS codes with first two digits 52 (Finance and Insurance) or first four digits 5511 (Offices of Bank Holding Companies), excluding the Federal Reserve System (central banking), which effectively functions as a quasi-governmental provider of regulation (NAICS code 5211). We then aggregate all industries into either financial industries or other industries. We weight each industry by employment or payrolls (i.e., larger industries count more).

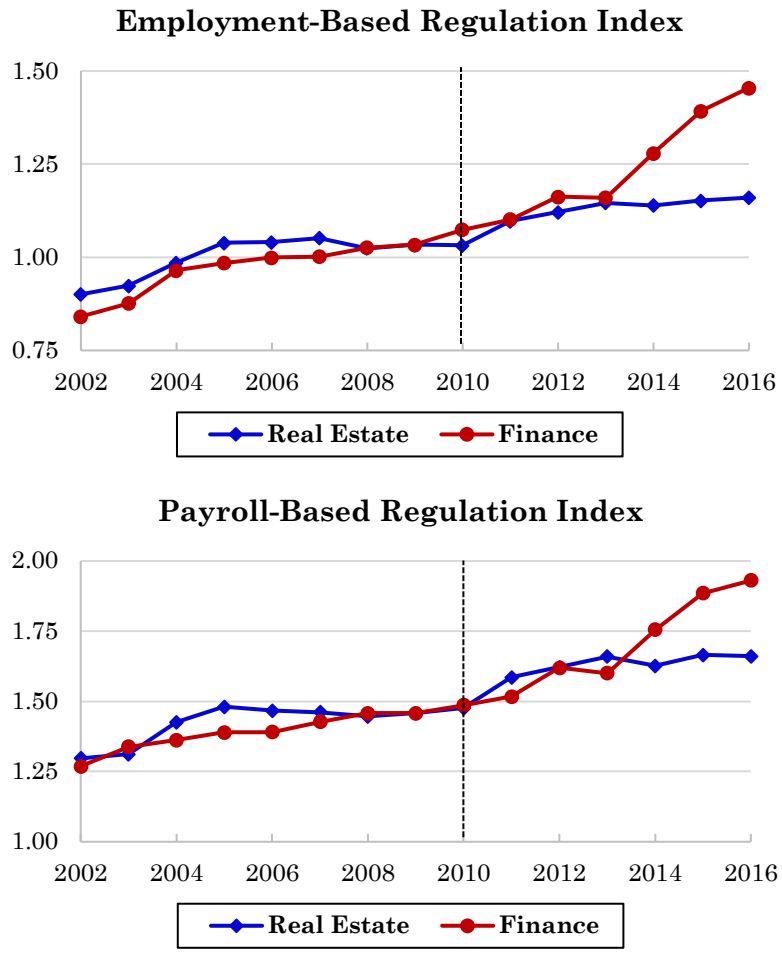
Financial services experienced not only an increase in regulation from Dodd-Frank, but also a sharp contraction because of the mortgage crisis and related recession. To test whether changes in the index could be driven by recession rather than increases in regulation, we

[29] Zaring finds that FSOC's decision to de-designate General Electric and AIG as SIFIs was justified by changes in AIG and GE's businesses which reduced their contributions to systemic risk. However, he finds FSOC's de-designation of Prudential as a SIFI and FSOC's decision to drop its appeal of the *MetLife* decision less convincing on substantive grounds. (Zaring, 2018)

compare financial services to real estate. Like financial services, real estate experienced a sharp contraction during the recession as real estate prices fell and mortgage lending decreased. However, unlike financial services, real estate was not directly subjected to new regulations. We define real estate as NAICS codes 531 (real estate leasing and sales) and 236 (real estate construction). Note that real estate does not include mortgage lending, which is categorized as part of financial services (specifically, mortgage lending is included in several categories related to credit intermediation).

Figure 2 below shows that the Regulation Index was relatively parallel for finance and real estate before the enactment of Dodd-Frank, but after the enactment of Dodd-Frank, the Regulation Index increased substantially faster for finance than for real estate. After 2010 and the enactment of Dodd-Frank, although real estate experienced a continued upward trend in the Regulation Index, the growth of the index was significantly higher for financial services.

Figure 2: Regulation Index for Finance versus Real Estate, 2002-2016



In Figure 2, note that the indexes for Finance and Real Estate diverge around 2014. New regulations were written and phased in for more than 5 years after the enactment of Dodd-Frank. As noted above, most of the important regulations under Dodd-Frank did not take effect until around 2014. The parallel trend before 2010 illustrates that Regulation Indexes for financial industries and real estate followed similar trends before the treatment.

We further use regressions to add industry fixed effects and other controls. Table 4 shows that versions of the Regulation Index went up significantly more for financial industries than other industries after Dodd-Frank Act was passed. Financial services industries (excluding central banking) consist of nine 4-digit NAICS codes listed below.

- 5221 = Depository Credit Intermediation
- 5222 = Nondepository Credit Intermediation
- 5223 = Activities Related to Credit Intermediation
- 5231 = Securities and Commodity Contracts Intermediation and Brokerage
- 5232 = Securities and Commodity Exchanges
- 5239 = Other Financial Investment Activities
- 5241 = Insurance Carriers
- 5242 = Agencies, Brokerages, and Other Insurance Related Activities
- 5511 = Management of Companies and Enterprises

Table 4: Dodd-Frank: Regulation Index for Financial and Real Estate Industries
Financial industry (*fin*): NAICS = 52XX (Finance and Insurance) or NAICS = 55XX (Management of Companies and Enterprises). Because OES data consists of 3-year moving averages, we exclude data during 2010-2013 to ensure the Regulation Index truly reflects the occupational composition after Dodd-Frank Act which passed in mid-2010. Many regulations required under the Dodd-Frank Act did not become effective until 2013 or 2014. All regressions require the industry (NAICS4) to have data in the six years of 2007-2009 and 2014-2016. *dfrank* is a dummy of post Dodd-Frank. All regressions include industry fixed effects. Observations are at the industry-year level. All regressions are weighted by industry's total employment or total payroll. All standard errors are clustered at the industry level. *, **, *** represent significance at the 10%, 5%, and 1% level, respectively.

	Employment-Based RI		Payroll-Based RI	
	(1)	(2)	(3)	(4)
dfrank	0.29***	0.09***	0.36***	0.15***
	(0.04)	(0.01)	(0.05)	(0.02)
dfrank X fin		0.28***		0.26***
		(0.05)		(0.05)
Observations	96	96	96	96
Adj. R2	0.98	0.98	0.97	0.97

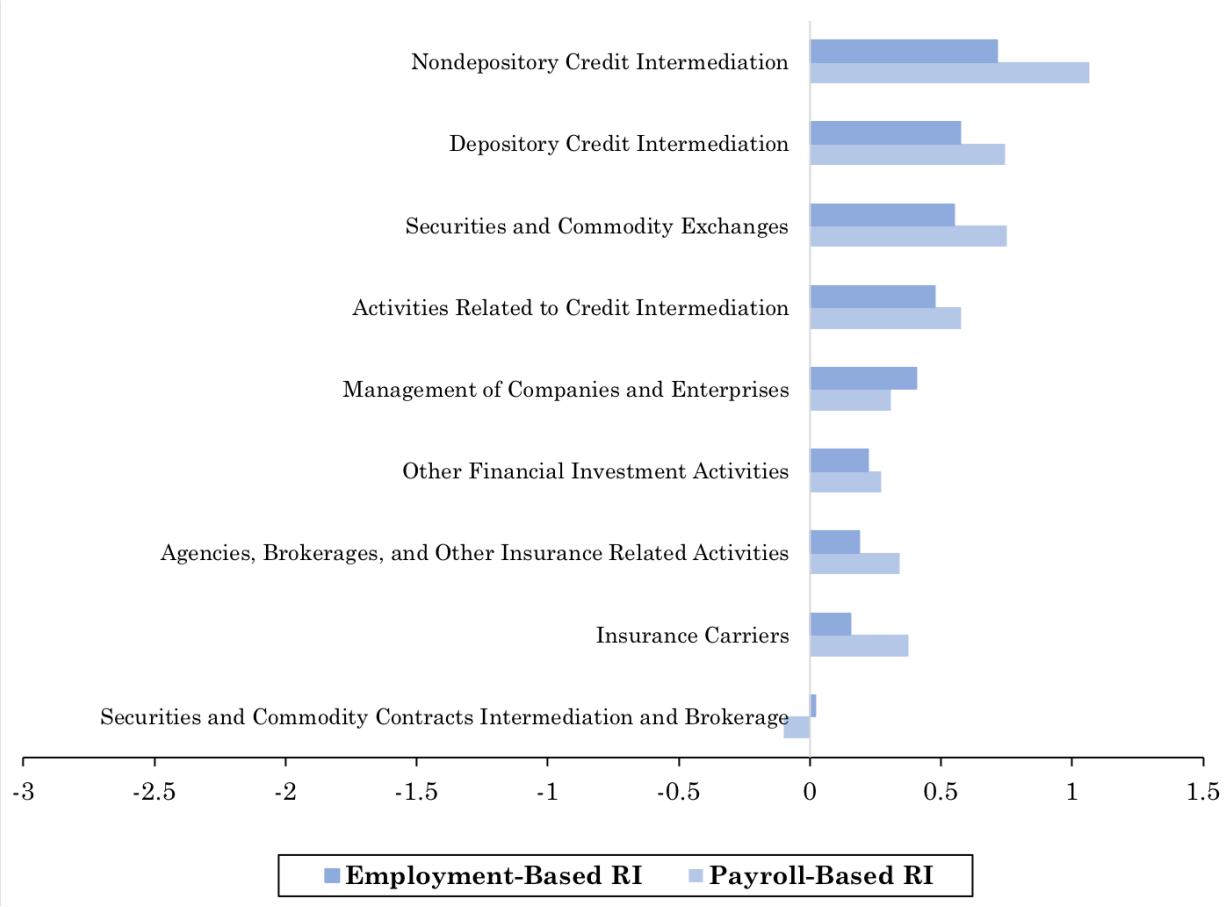
In an unreported analysis, we also compare Financial Services to all other industries. Results are substantially similar to results for the comparison to real estate.

3. Finance subsectors after Dodd-Frank

Figure 3 below compares the increase in the Regulation Index before and after Dodd-Frank for various financial services subsectors. The figure shows the largest increase in regulation for credit intermediation, specifically non-depository credit intermediation (for most versions of the index), followed by bank holding companies. The lowest increase in regulation was for the insurance industry and securities brokers. As discussed in Part II.B.1. above, this is consistent with contemporaneous qualitative assessments of applicable statutes, regulations, and case law. Dodd-Frank affected credit intermediation but had a minimal impact on insurance firms and broker dealers.

Dodd-Frank was passed in the wake of a credit crisis in which the worst performing loans were originated by lightly regulated non-depository lending companies. (Simkovic, 2013) Dodd-Frank specifically targeted these institutions for increased scrutiny, and also included broader provisions. In the wake of the mortgage crisis, regulatory scrutiny appears to have been increased most for mortgage lenders who are widely believed to have played an extremely important role in the most recent financial crisis. This is consistent with theories of crisis-driven regulation. (Romano, 2004, 2012; Gerding, 2013; McDonnell, 2013)

Figure 3: Change in Regulation Index for Finance Subsectors before and after Dodd-Frank (2007-2009 vs. 2014-2016)



The Regulation Index detects large increases in regulation of credit intermediation and minimal increases in regulation of insurance—consistent with case law and common understanding of federal legislation. Other measures of regulation based on automated analysis of the text of the CFR, such as RegData, suggest that the increase in insurance regulation after Dodd-Frank was proportionately greater than the increase in regulation of even non-depository credit intermediation. This is implausible. We interpret this as evidence that the Regulation Index more accurately reflects the relative impact of regulations on specific industries.

B. Oil & Gas deregulation and reregulation

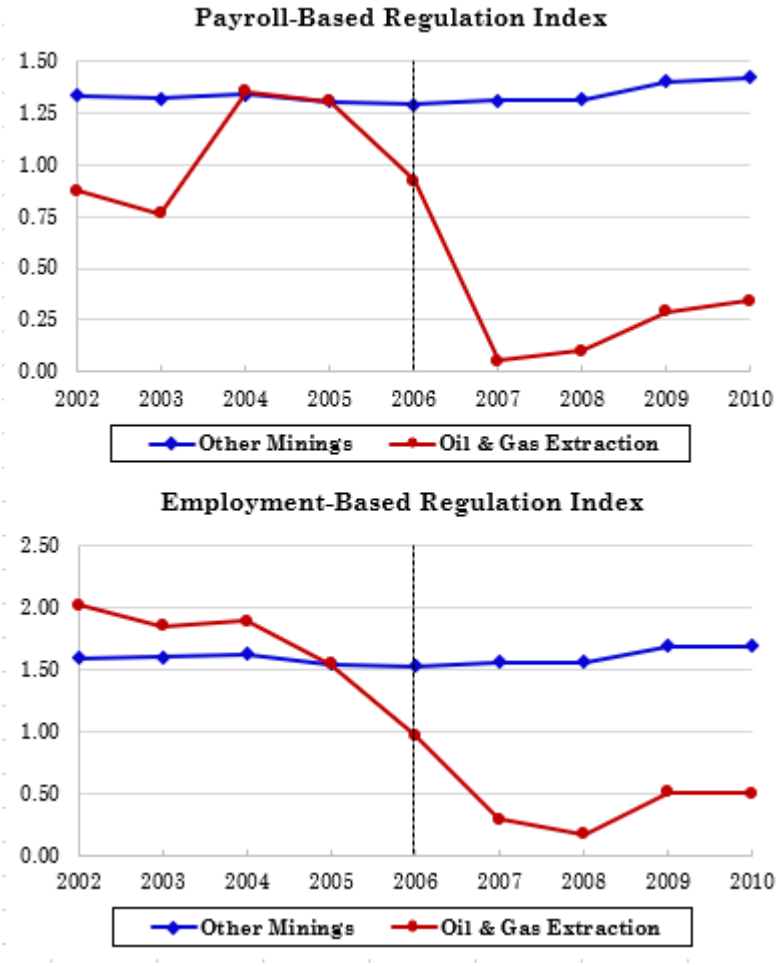
1. Deregulation of Oil & Gas Extraction under the Energy Policy Act of 2005

The Energy Policy Act of 2005 (EPA 2005) deregulated domestic oil and gas production with the intention of increasing production by reducing environmental regulations. EPA 2005 exempted oil and gas extraction from the Safe Drinking Water Act and Clean Water Act, preempted state and local regulations relating to oil and gas extraction, refining, storage and transportation, exempted hydraulic fracturing from regulation by the Environmental Protection Agency (except when diesel fuel is injected into the ground), streamlined environmental review of oil, gas, and coal extraction leases on federal lands, and deregulated oil, gas and coal leases on Indian lands by removing the requirement of approval from the Secretary of the Interior. (Holt and Glover, 2016, pp. 22–24, 28–37)

Because EPA 2005 became effective on August 8, 2005, we consider 2006 to be the first treatment year in assessing the regulatory effects of EPA 2005. Our treated industry is Oil and Gas Extraction (NAICS 2111) and we use other mining (NAICS 212X), which includes Coal Mining, Metal Ore Mining, and Nonmetallic Mineral Mining and Quarrying, as our control industries

As seen from Figure 4 below, there were parallel trends for the treatment and control industries before the enactment of EPA 2005 (especially for the employment version of the index). However, after EPA 2005 became effective, there is a dramatic decline in the Regulation Index for Oil & Gas Extraction relative to the control industries.

Figure 4: Change in Regulation Index for Oil & Gas Extraction versus Other Mining, before and after enactment of the Energy Policy Act of 2005



This decline in the Regulation Index for Oil & Gas is consistent with contemporary readings of EPA 2005. The Energy Policy Act of 2005 was almost universally understood as deregulating the Oil & Gas Extraction industry.

However, measures of regulation based on counting words of the CFR, such as RegData and counting mentions of regulation in 10-Ks, do not detect the decline in regulation for Oil & Gas extraction neither in absolute terms nor relative to other mining industries. To the contrary, such measures implausibly show an *increase* in regulation of Oil & Gas Extraction in both absolute terms and relative to other mining industries. We interpret this as evidence that the Regulation Index is better able to distinguish regulation from deregulation than measures of regulation based on counting words of the CFR.

2. Reregulation of Oil & Gas Extraction following the Deepwater Horizon Oil Spill in 2010

On April 20, 2010, the BP Deepwater Horizon, an offshore oil rig near the Mississippi River Delta, exploded, caught fire, and subsequently sank. 11 workers were killed and 17 were injured. As a result, the uncapped Macondo oil well discharged millions of gallons of oil into the Gulf of Mexico before the well was sealed nearly 3 months later, making it the largest marine oil spill to date. The spill caused extensive damage to marine and wildlife habitats, as well as to the fishing and tourism industries. There were also reports of adverse health effects on cleanup workers, fishermen and children living in neighboring communities.

In response, President Obama issued Executive Order 13543, which formed a National Commission to investigate the spill and provide recommendations for improving the safety of offshore oil drilling. These recommendations included strengthening regulations and oversight to protect public health and safety, workers' safety and the environment. (Obama, 2010) Nearly two months later, the White House issued Executive Order 13547, which addressed the oil spill and called for environmental conservation and science-driven decision-making with respect to management of coastal and ocean resources. Various government investigations, government lawsuits and private civil lawsuits followed, ultimately resulting in multi-billion-dollar settlements.

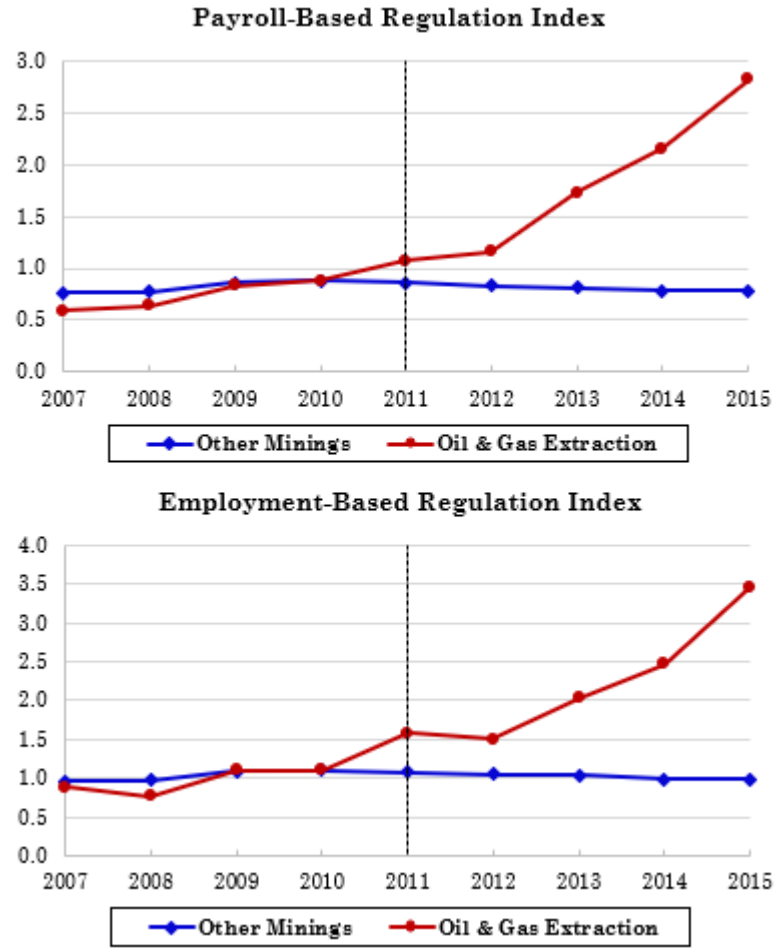
The National Commission report, published in January 2011, blamed the disaster on lax regulatory oversight, political interference with regulators' autonomy and a lack of resources for inspections, insufficient policy emphasis on environmental protection, and expedited permitting and plan approvals. The report specifically faulted exemptions from environmental review of offshore drilling in certain parts of the Gulf of Mexico, which were enacted to stimulate production. The National Commission also warned of industry-wide deficiencies in risk management and inadequate emphasis on safety, coupled with excessive deference by regulators to industry judgments about safety precautions. The Commission called for a "broader reexamination of the nation's overall energy policy." (Graham et al., 2011, pp. vii, 59, 66, 72, 74, 82, 126, 294, 299) In October 2011, the U.S. Department of the Interior reorganized to separate safety regulation and enforcement from leasing and revenue collection.

The entire Oil & Gas Industry was affected by the renewed emphasis on safety and environmental regulation. One study found that among oil and gas firms drilling in US waters, those with greater environmental disclosures suffered smaller negative shareholder wealth effects following the spill, presumably because they were positioned to navigate more intense regulatory scrutiny. (Carter et al., 2016; Heflin and Wallace, 2017) There is also evidence that consumers penalized oil companies that were perceived to be lax with respect to environmental compliance. (Barrage et al., 2014)

For purposes of evaluating the effects of policy changes following the Deepwater Horizon oil spill, we consider 2011 as the first treatment year. The treated industry is Oil and Gas Extraction (NAICS 2111), while the control industries remain other mining (NAICS 212X) including Coal Mining, Metal Ore Mining, and Nonmetallic Mineral Mining and Quarrying.

As can be seen from Figure 4 below, we see parallel trends for our treatment and control industries and a dramatic increase in the Regulation Index for Oil & Gas following the regulatory shock.

Figure 5: Change in Regulation Index for Oil & Gas Extraction versus Other Mining, after the BP Deepwater Horizon Oil Spill



It should be noted that re-regulation following the Deepwater Horizon BP oil spill was largely accomplished without new federal legislation and prior to the enactment of new regulations through a combination of Executive Orders, administrative policy changes, and reorganization, litigation, and shareholder pressure. Measures of regulation focused on the CFR itself do not detect an increase in regulatory intensity in Oil & Gas Extraction relative to other mining industries during this period.

We interpret this as evidence that the Regulation Index can detect changes in regulatory burdens or intensity that relate to changes in the world or subtle changes in policy, even when those changes are not codified in written regulations or federal legislation.

C. Credit Card regulation under the Credit Card Act of 2009

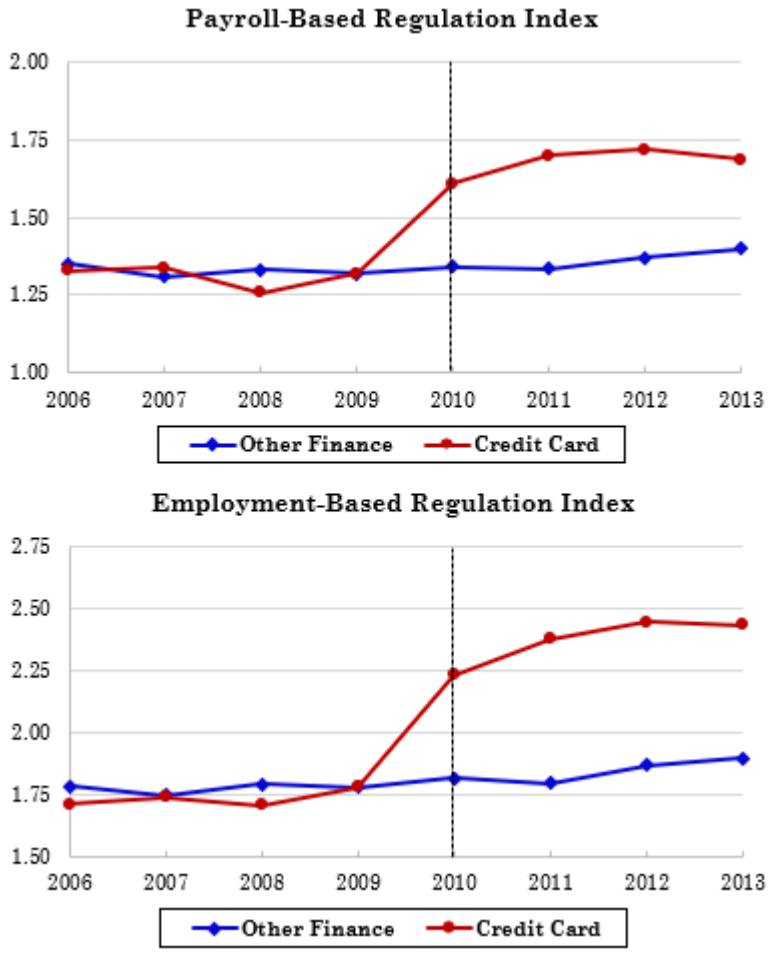
In 2005, Congress passed the Bankruptcy Abuse and Consumer Protection Act (BAPCPA), which made it more challenging for consumers to use bankruptcy to discharge their debts, especially unsecured debts. Proponents of the legislation argued that BAPCPA would reduce losses to credit card lenders, who would then compete with each other on price, thus passing on the savings to borrowers in the form of lower interest rates, reduced fees and better terms. However, although credit card company losses declined after the enactment of BAPCPA, credit card company prices actually increased and profit margins swelled. (Simkovic, 2009a)

This was believed to be due in part to complex pricing practices that made it difficult for consumers to compare prices, and which thereby reduced price-competitiveness. (Ausubel, 1991; Simkovic, 2009a; Moloney and Schumer, 2009) To combat this, Congress enacted the Credit Card Accountability Responsibility and Disclosure Act of 2009 (Credit Card Act). The Credit Card Act bans certain pricing practices that were confusing to consumers and mandates enhanced disclosures.

The Credit Card Act became effective on February 22, 2010. We therefore consider 2010 as the first treatment year. Credit cards are not a distinct industry, but rather are included within Nondepository Credit Intermediation (NAICS 5222), which we use as our treatment industry. For our control industries, we use all other financial industries (NAICS 52XX except for 5222). The results are very similar if we use Depository Credit Intermediation (NAICS 5221) as the control industry.

As can be seen from Figure 6 below, we find evidence of increased regulatory burdens for credit card lenders relative to other financial institutions following the enactment of the Credit Card Act.

Figure 6: Change in Regulation Index for Credit Cards versus Other Financial Services After Credit Card Act of 2009



We observe parallel trends for credit cards lenders and other financial institutions prior to the Credit Card Act becoming effective, and a jump in the Regulation Index for credit card lenders afterward.

Although the proximity of the Credit Card Act to Dodd-Frank raises some questions about causation, this noise is mitigated because, as noted above in Section III.A, the Dodd-Frank Act did not have much effect until around 2013 because key policy decisions were delegated to administrative agencies and new rules generally did not take effect until 2013 or later. Dodd-Frank also created the Consumer Financial Protection Bureau (CFPB), which regulates mortgages and student loans as well as credit cards. However, the CFPB did not begin operating until July 2011 and its first Director was not installed until January 2012 and not confirmed by the Senate until July 2013. In addition, our control industries operate in several key consumer finance markets regulated by the CFPB but not regulated by the Credit Card Act.

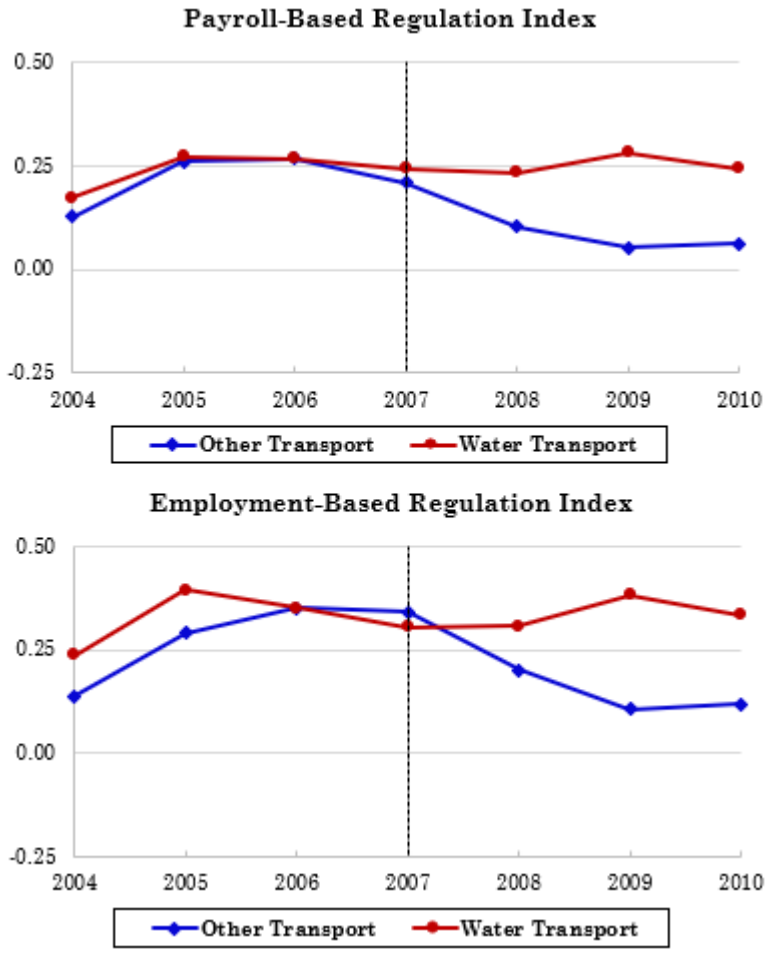
D. Regulation of Ports under the SAFE Port Act of 2006

On July 22, 2004, the National Commission on Terrorist Attacks Upon the United States (the 9/11 Commission) published its report on the attacks of September 11, 2001. The report emphasized the need for greater protection for maritime transportation to prevent future terrorist attacks. Congress responded by passing the Security and Accountability For Every Port Act of 2006 (SAFE Port Act, P.L. 109-347). The SAFE Port Act regulates water transportation in an effort to prevent threats from reaching the United States, to track and protect containers in transit and to harden security at U.S. ports.

The SAFE Port Act became effective on October 13, 2006. We therefore consider 2007 the first treatment year. Our treated industry is Support Activities for Water Transportation (NAICS 4883), while the control industries are other support activities for transportation (NAICS 488X except for 4883), including Support Activities for Air Transportation, Support Activities for Rail Transportation, Support Activities for Road Transportation, Freight Transportation Arrangement, and Other Support Activities for Transportation.

As can be seen from Figure 7 below, after the SAFE Port Act becomes effective, the Regulation Index holds steady for our treated industry whereas it declines for the control industries.

Figure 7: Change in Regulation Index for Water Transportation versus Other Transportation after the SAFE Port Act of 2006



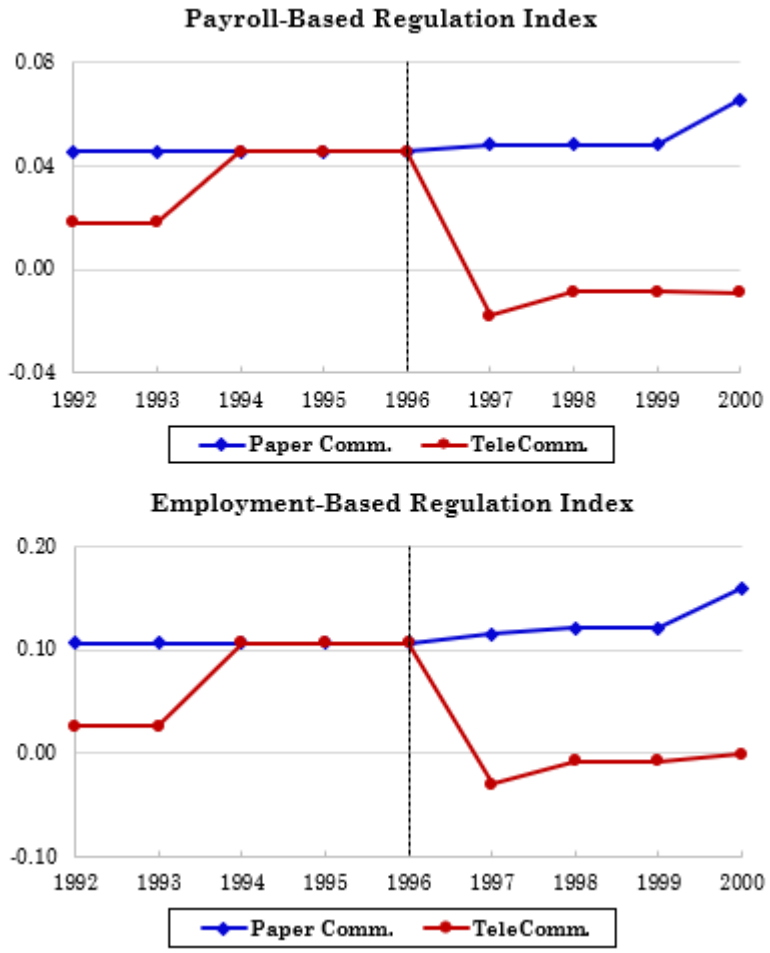
E. Deregulation under the Telecommunications Act of 1996

The Telecommunications Act of 1996 deregulated telecommunications—Television and Radio Broadcasting, Cable Television, Telephony and Internet—with the stated goal of promoting more competition. The Telecommunications Act removed barriers to entry and facilitated media cross-ownership and consolidation through greater horizontal and vertical integration. (Drushel, 1998, p. 5; Gilens and Hertzman, 2000, p. 373) The Act also deregulated broadcasting by substantially reducing the risk that a license would not be renewed if a broadcaster failed to serve the public interest through informative or factual programming or committed serious violations of the Communications Act, such as engaging in personal attacks without notifying the target and allowing for a response on the air, or failing to disclose sponsorship that could create a conflict of interest. (Krattenmaker, 1996, p. 12) The Act contained some regulatory provisions related to obscenity, but many of these were held to be unconstitutional.

The Telecommunications Act of 1996 became effective on February 8, 1996. We therefore consider 1996 the first treatment year. Treated industries are those within Communications (SIC 48X), which includes Telephone Communications (481), Telegraph and Other Message Communications (482), Radio and Television Broadcasting Stations (483), Cable and Other Pay Television Services (484), and Communications Services, not elsewhere classified (489). For our control industries, we use print media within Printing & Publishing (SIC 27X), which includes Newspapers Publishing or Publishing & Printing (271), Periodicals: Publishing or Publishing & Printing (272), Books (273), Miscellaneous Publishing (274), Commercial Printing (275), Manifold Business Forms (276), Greeting Cards (277), Blank books, Looseleaf Binders, and Bookbinding (278), and Service Industries For The Printing Trade (279).

As can be seen in Figure 8 below, the Regulation Index reflects deregulation of the Telecommunications Industry relative to print media following the passage of the Telecommunications Act of 1996.

Figure 8: Change in Regulation Index for Telecommunications versus Print Media after the Telecommunications Act of 1996



Conclusion

This article contributes to the empirical legal studies and law and economics literature by creating the first generalizable index of change in regulatory intensity, complexity, or compliance costs that is objectively mapped to specific industries and sectors, that captures changes in regulatory burdens regardless of source (federal, state or private; statute, regulation, case law; litigation or enforcement action), and that is based on the responses of industry participants to regulation rather than based on a subjective assessment of the nature or importance of a particular regulation. The Regulation Index effectively captures recent increases in financial regulation following the financial crisis of 2007 to 2009 and the enactment of Dodd-Frank in 2010 and distinguishes sectors that were regulated heavily from those that were not. The index captures both deregulation and reregulation in the oil & gas industry, regulation in the credit card industry, and regulation of ports in the transportation

industry, and deregulation in the telecommunications industry. It is sensitive to shifts in regulation that are due to changes in regulatory policy and litigation rather than outright legislative or rules changes. The index is available on an annual basis going back decades and can become an important part of the toolkit of empirical researchers studying the causes, effects, and timing of regulation of industry.

References

Adrian, T., 2014. Financial Stability Policies for Shadow Banking (Federal Reserve Bank of New York Staff Report No. 664). Federal Reserve Bank of New York, New York, NY.

Adrian, T., Boyarchenko, N., Shachar, O., 2017. Dealer Balance Sheets and Bond Liquidity Provision. J. Monetary Econ., Carnegie-Rochester-NYU Conference Series on the Macroeconomics of Liquidity in Capital Markets and the Corporate Sector 89, 92–109. https://doi.org/10.1016/j.jmoneco.2017.03.011

Aghion, P., Boustan, L., Hoxby, C., Vandenbussche, J., 2009. The causal impact of education on economic growth: evidence from US. Unpublished paper.

Agrawal, A.K., 2013. The Impact of Investor Protection Law on Corporate Policy and Performance: Evidence from the Blue Sky Laws. J. Fin. Econ. 107, 417–435. https://doi.org/10.1016/j.jfineco.2012.08.019

Akerlof, G.A., 1970. The Market for "Lemons": Quality Uncertainty and the Market Mechanism. Q. J. Econ. 84, 488–500. https://doi.org/10.2307/1879431

Allen, J.L., 2012. Derivatives Clearinghouses and Systemic Risk: A Bankruptcy and Dodd-Frank Analysis Note. Stan. L. Rev. 64, 1079–1108.

Al-Ubaydli, O., McLaughlin, P.A., 2017. RegData: A numerical database on industry-specific regulations for all United States industries and federal regulations, 1997-2012: RegData: US federal regulation data. Regulation & Governance 11, 109–123. https://doi.org/10.1111/rego.12107

Ausubel, L.M., 1991. The Failure of Competition in the Credit Card Market. Am. Econ. Rev. 81, 50–81.

Ayotte, K., Skeel, D.A., 2013. Bankruptcy Law as a Liquidity Provider. U. Chi. L. Rev. 80, 1557–1624.

Bachmeier, L., Gaughan, P., Swanson, N.R., 2004. The Volume of Federal Litigation and the Macroeconomy. Int'l Rev. L. & Econ. 24, 191–207. https://doi.org/10.1016/j.irle.2004.08.004

Balasubramnian, B., Cyree, K.B., 2014. Has Market Discipline on Banks Improved After the Dodd–Frank Act? Journal of Banking & Finance 41, 155–166. https://doi.org/10.1016/j.jbankfin.2014.01.021

Bao, J., O'Hara, M., Zhou, X. (Alex), 2018. The Volcker Rule and Corporate Bond Market Making in Times of Stress. Journal of Financial Economics 130, 95–113. https://doi.org/10.1016/j.jfineco.2018.06.001

Bao, J., Pan, J., Wang, J., 2011. The Illiquidity of Corporate Bonds. The Journal of Finance 66, 911–946. https://doi.org/10.1111/j.1540-6261.2011.01655.x

Bar-Gill, O., 2003. Seduction by Plastic. Nw. UL Rev. 98, 1373.

Barr, M.S., 2012. The Financial Crisis and the Path of Reform. Yale J. on Reg. 29, 91–119.

Barrage, L., Chyn, E., Hastings, J., 2014. Advertising as Insurance or Commitment? Evidence from the BP Oil Spill (Working Paper No. 19838). National Bureau of Economic Research. https://doi.org/10.3386/w19838

Becker, G.S., 1983. A Theory of Competition Among Pressure Groups for Political Influence. Q. J. Econ. 98, 371–400. https://doi.org/10.2307/1886017

Beisner, J.H., Shors, M., Miller, D., 2005. Class Action "Cops": Public Servants or Private Entrepreneurs? Stan. L. Rev. 57, 1441.

Beltratti, A., Stulz, R.M., 2012. The Credit Crisis Around the Globe: Why Did Some Banks Perform Better? J. Fin. Econ. 105, 1–17. https://doi.org/10.1016/j.jfineco.2011.12.005

Bernanke, B.S., 2011. Clearinghouses, financial stability, and financial reform.

Board of Governors of the Federal Reserve System, 2013. Final Rules to Implement the "Volcker Rule."

Bubb, R., Krishnamurthy, P., 2015. Regulating Against Bubbles: How Mortgage Regulation Can Keep Main Street and Wall Street Safe—from Themselves. University of Pennsylvania Law Review 163, 1539–1630.

Bubb, R., Pildes, R.H., 2014. How Behavioral Economics Trims Its Sails and Why. Harv. L. Rev. 127, 1593.

Buchanan, J.M., Tollison, R.D., 1984. The Theory of Public Choice--II. University of Michigan Press.

Carter, D.A., Humphrey, P., Simkins, B., 2016. The Market's Reaction to Unexpected, Catastrophic Events: The Case of Oil and Gas Stock Returns and the Gulf Oil Spill. J. Risk. Fin. 17, 2–25. https://doi.org/10.1108/JRF-08-2015-0072

Casey, A.J., Posner, E.A., 2015. A Framework for Bailout Regulation. Notre Dame L. Rev. 91, 479.

Chatterjee, R., 2011. Dictionaries Fail: The Volcker Rule's Reliance on Definitions Renders it Ineffective and a New Solution is Needed to Adequately Regulate Proprietary Trading. Brigham Young University International Law & Management Review 8, 33–62. https://doi.org/10.2139/ssrn.1857371

Chava, S., Purnanandam, A., 2011. The Effect of Banking Crisis on Bank-Dependent Borrowers. J. Fin. Econ. 99, 116–135. https://doi.org/10.1016/j.jfineco.2010.08.006

Chayes, A., Chayes, A.H., 1985. Corporate Counsel and the Elite Law Firm Symposium on the Corporate Law Firm. Stan. L. Rev. 37, 277–300.

Chen, L., Lesmond, D.A., Wei, J., 2007. Corporate Yield Spreads and Bond Liquidity. J. Fin. 62, 119–149. https://doi.org/10.1111/j.1540-6261.2007.01203.x

Chernenko, S., Sunderam, A., 2014. Frictions in Shadow Banking: Evidence from the Lending Behavior of Money Market Mutual Funds. Rev. Fin. Stud. 27, 1717–1750. https://doi.org/10.1093/rfs/hhu025

Chodorow-Reich, G., 2014. The Employment Effects of Credit Market Disruptions: Firm-level Evidence from the 2008–9 Financial Crisis. Q. J. Econ. 129, 1–59. https://doi.org/10.1093/qje/qjt031

Coffee, J.C., 2014. Extraterritorial Financial Regulation: Why E.T. Can't Come Home. Cornell L. Rev. 99, 1259.

Coffee, J.C., 1986. Understanding the Plaintiff's Attorney: The Implications of Economic Theory for Private Enforcement of Law through Class and Derivative Actions. Colum. L. Rev. 86, 669. https://doi.org/10.2307/1122577

Coffee, J.C., 1984. Market Failure and the Economic Case for a Mandatory Disclosure System. Va. L. Rev. 70, 717–753. https://doi.org/10.2307/1073083

Conti-Brown, P., Ohlrogge, M., 2018. Does Financial Legislation Require a Crisis? A Quantitative Historical Assessment 52.

Cooley, T.F., Richardson, M.P., Acharya, V.V., 2010. Regulating Wall Street: The Dodd-Frank Act and the New Architecture of Global Finance. John Wiley & Sons.

Covitz, D., Liang, N., Suarez, G.A., 2013. The Evolution of a Financial Crisis: Collapse of the Asset-Backed Commercial Paper Market. J. Fin. 68, 815–848. https://doi.org/10.1111/jofi.12023

Dawson, J.W., Seater, J.J., 2013. Federal Regulation and Aggregate Economic Growth. J. Econ. Growth 18, 137–177.

DeMarzo, P.M., Fishman, M.J., Hagerty, K.M., 2005. Self-Regulation and Government Oversight. Rev. Econ. Stud. 72, 687–706. https://doi.org/10.1111/j.1467-937X.2005.00348.x

Dick-Nielsen, J., Feldhütter, P., Lando, D., 2012. Corporate Bond Liquidity Before and After the Onset of the Subprime Crisis. Journal of Financial Economics 103, 471–492. https://doi.org/10.1016/j.jfineco.2011.10.009

Donohue, J.J.I., Siegelman, P., 1993. Law and Macroeconomics: Employment Discrimination Litigation over the Business Cycle. S. Cal. L. Rev. 66, 709–766.

Drushel, B.E., 1998. The Telecommunications Act of 1996 and Radio Market Structure. J. Media Econ. 11, 3–20. https://doi.org/10.1207/s15327736me1103_2

Duff, A.W.S., Zaring, D., 2013. New Paradigms and Familiar Tools in the New Derivatives Regulation Striking the Right Balance: Investor and Consumer Protection in the New Financial Marketplace. Geo. Wash. L. Rev. 81, 677–706.

Duffie, D., 2012. Market Making Under the Proposed Volcker Rule. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.1990472

Duygan-Bump, B., Parkinson, P., Rosengren, E., Suarez, G.A., Willen, P., 2013. How Effective Were the Federal Reserve Emergency Liquidity Facilities? Evidence from the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility. J. Fin. 68, 715–737. https://doi.org/10.1111/jofi.12011

D'Vari, R., Bernstein, T., 2016. What Lies Ahead: The Challenges of Securitizing Non-Qualifying Mortgage Loans. Journal of Structured Finance 22, 47–55. http://dx.doi.org.lib-proxy1.usc.edu/10.3905/jsf.2016.22.1.047

Engelmann, K., Cornell, B., 1988. Measuring the Cost of Corporate Litigation: Five Case Studies. J. Legal Stud. 17, 377–399. https://doi.org/10.1086/468134

Federal Reserve System, U.S. Department of the Treasury, Office of the Comptroller of the Currency, Federal Deposit Insurance Corporation, 2013. Interagency Guidance on Leveraged Lending. Federal Register 78, 17766–17776.

Finkle, V., 2018. Goodbye, nonbank SIFIs. We hardly knew you. American Banker 4.

Fischer, D., 2015. Dodd-Frank's Failure to Address CFTC Oversight of Self-Regulatory Organization Rulemaking Notes. Colum. L. Rev. 115, 69–126.

Floros, I., White, J.T., 2016. Qualified residential mortgages and default risk. J. Banking & Fin. 70, 86–104. https://doi.org/10.1016/j.jbankfin.2016.06.007

Friewald, N., Jankowitsch, R., Subrahmanyam, M.G., 2012. Illiquidity or credit deterioration: A study of liquidity in the US corporate bond market during financial crises. Journal of Financial Economics 105, 18. https://doi.org/10.1016/j.jfineco.2012.02.001

Furman, S., 2019. CFPB and Insurance Regulation [WWW Document]. American Bankers Association. URL https://www.aba.com/Advocacy/Issues/Pages/CreditInsDPP.aspx (accessed 1.9.19).

Gandel, S., 2018. Volcker Rewrite Only Widens Existing Loopholes. Bloomgerg.
Garth, B., Nagel, I.H., Plager, S.J., 1988. The Institution of the Private Attorney General: Perspectives from an Empirical Study of Class Action Litigation. S. Cal. L. Rev. 61, 353.
Gelman, A., Loken, E., 2014. The Statistical Crisis in Science. Am. Sci. 102, 460–465.
Gerding, E.F., 2013. Law, Bubbles, and Financial Regulation-Chapter 1-The Regulatory Instability Hypothesis. Erik F. Gerding, Law, Bubbles, and Financial Regulation (Routledge 2013).
Gigerenzer, G., Selten, R., 2002. Bounded Rationality: The Adaptive Toolbox. MIT Press.
Gilens, M., Hertzman, C., 2000. Corporate Ownership and News Bias: Newspaper Coverage of the 1996 Telecommunications Act. J. Pol. 62, 369–386. https://doi.org/10.1111/0022-3816.00017
Goff, B., 1996. An Index of Regulation, in: Goff, B. (Ed.), Regulation and Macroeconomic Performance. Springer US, Boston, MA, pp. 85–103.
Gong, K., Yannelis, C., 2018. Measuring the Impact of Regulation on Firms 1–84.
Gonzalez, G., 2018a. Metlife, Regulator Ask for Dismissal of 'too Big to Fail' Case. Business Insurance 1.
Gonzalez, G., 2018b. Bills to ease insurer regulatory burdens pass House committee. Business Insurance.
Gordon, J.N., Muller, C., 2011. Confronting Financial Crisis: Dodd-Frank's Dangers and the Case for a Systemic Emergency Insurance Fund. Yale J. on Reg. 28, 151.
Gorton, G., Metrick, rew, Shleifer, A., Tarullo, D.K., 2010. Regulating the Shadow Banking System [with Comments and Discussion]. Brookings Papers on Economic Activity 261–312.
Gorton, G., Metrick, A., 2012. Securitized Banking and the Run on Repo. J. Fin. Econ., Market Institutions, Financial Market Risks and Financial Crisis 104, 425–451. https://doi.org/10.1016/j.jfineco.2011.03.016
Graham, B., Reilly, W.K., Beinecke, F., Boesch, D.F., Garcia, T., Murray, C.A., Ulmer, F., 2011. Deep Water: The Gulf Oil Disaster and the Future of Offshore Drilling: Report to the President. National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling : For sale by the Supt. of Docs., U.S. G.P.O, Washington, D.C.
Gray, W.B., Shadbegian, R.J., 1993. Environmental Regulation and Manufacturing Productivity at the Plant Level (Working Paper No. 4321). National Bureau of Economic Research.
Greenblum, B.M., 2005. What Happens to a Prosecution Deferred - Judicial Oversight of Corporate Deferred Prosecution Agreements Note. Colum. L. Rev. 105, 1863–1904.
Hart, O., Zingales, L., 2011. A New Capital Regulation for Large Financial Institutions. Am Law Econ Rev 13, 453–490. https://doi.org/10.1093/aler/ahr001
Heflin, F., Wallace, D., 2017. The BP Oil Spill: Shareholder Wealth Effects and Environmental Disclosures. J. Bus. Fin. & Acct. 44, 337–374. https://doi.org/10.1111/jbfa.12244
Hoffman, M.A., 2016. Designation of MetLife as SIFI "arbitrary and capricious": Federal Judge. Business Insurance.
Holt, M., Glover, C., 2016. Energy Policy Act of 2005: Summary and Analysis of Enacted Provisions (No. RL33302), CRS Report for Congress. Congressional Research Service, Library of Congress.

Ioannidis, J.P.A., 2005. Why Most Published Research Findings Are False. PLoS Med 2. https://doi.org/10.1371/journal.pmed.0020124

Ivashina, V., Scharfstein, D., 2010. Bank Lending During the Financial Crisis of 2008. J. Fin. Econ., The 2007-8 financial crisis: Lessons from corporate finance 97, 319–338. https://doi.org/10.1016/j.jfineco.2009.12.001

Jackson, H.E., 2007a. The Impact of Enforcement: A Reflection. U. Pa. L. Rev. PENNumbra 156, 400.

Jackson, H.E., 2007b. Variation in the Intensity of Financial Regulation: Preliminary Evidence and Potential Implications. Yale J. on Reg. 24, 253.

Jin, G.Z., Leslie, P., 2003. The Effect of Information on Product Quality: Evidence from Restaurant Hygiene Grade Cards. Q. J. Econ. 118, 409–451. https://doi.org/10.1162/003355303321675428

Karmel, R.S., 2008. Should Securities Industry Self-Regulatory Organizations be Considered Government Agencies. Stan. J.L. Bus. & Fin. 14, 151–198.

Keppo, J., Korte, J., 2018. Risk Targeting and Policy Illusions—Evidence from the Announcement of the Volcker Rule. Management Science 64, 215–234. https://doi.org/10.1287/mnsc.2016.2583

Kim, S., Plosser, M.C., Santos, J.A.C., 2018. Macroprudential Policy and the Revolving Door of Risk: Lessons from Leveraged Lending Guidance. J. Fin. Intermediation, Assessing Banking Regulation During the Obama Era 34, 17–31. https://doi.org/10.1016/j.jfi.2018.01.011

Kolstad, C.D., Ulen, T.S., Johnson, G.V., 1990. Ex Post Liability for Harm vs. Ex Ante Safety Regulation: Substitutes or Complements? Am. Econ. Rev. 80, 888–901.

Krattenmaker, T.G., 1996. The Telecommunications Act of 1996. Fed. Comm. L.J. 49, 1–50.

Kress, J.C., 2011. Credit Default Swaps, Clearinghouses, and Systemic Risk: Why Centralized Counterparties Must Have Access to Central Bank Liquidity. Harv. J. on Legis. 48, 49–94.

Kroszner, R.S., Strahan, P.E., 2011. Financial Regulatory Reform: Challenges Ahead. American Economic Review 101, 242–246. https://doi.org/10.1257/aer.101.3.242

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R.W., 1998. Law and Finance. Journal of Political Economy 106, 1113–1155. https://doi.org/10.1086/250042

Laffont, J.-J., Tirole, J., 1991. The Politics of Government Decision-Making: A Theory of Regulatory Capture. Q. J. Econ. 106, 1089–1127. https://doi.org/10.2307/2937958

Langevoort, D.C., 2006. Internal Controls after Sarbanes-Oxley: Revisiting Corporate Law's Duty of Care as Responsibility for Systems. J. Corp. L. 31, 949–973. https://doi.org/10.2139/ssrn.808084

Leifer, S.C., 2014. Protecting Whistleblower Protections in the Dodd-Frank Act Note. Mich. L. Rev. 113, 121–150.

Levine, M.E., Forrence, J.L., 1990. Regulatory Capture, Public Interest, and the Public Agenda: Toward a Synthesis. J. Law, Econ & Org. 6, 167.

Levitin, A.J., 2011. In Defense of Bailouts. Geo. L.J. 99, 435.

Levitin, A.J., Pavlov, A.D., Wachter, S.M., 2012. The Dodd-Frank Act and Housing Finance: Can It Restore Private Risk Capital to the Securitization Market. Yale J. on Reg. 29, 155–180.

Loss, L., 1957. The Conflict of Laws and the Blue Sky Laws. Harv. L. Rev. 71, 209–253. https://doi.org/10.2307/1338013

Lubben, S.J., 2017. Always Crashing in the Same Car—Clearinghouse Rescue in the United States under Dodd–Frank. J Financ Regul 3, 133–158. https://doi.org/10.1093/jfr/fjx007

Lubben, S.J., 2015. Failure of the Clearinghouse: Dodd-Frank's Fatal Flaw. Va. L. & Bus. Rev. 10, [i]-160.

Macey, J.R., 2004. Wall Street in Turmoil - State-Federal Relations Post-Eliot Spitzer. Brook. L. Rev. 70, 117–140.

Macey, J.R., Miller, G.P., 1991. The Plaintiffs' Attorney's Role in Class Action and Derivative Litigation: Economic Analysis and Recommendations for Reform. U. Chi. L. Rev. 58, 1–118. https://doi.org/10.2307/1599901

Mahoney, P.G., 2018. Deregulation and the Subprime Crisis. Va. L. Rev. 104, 235.

Mahoney, P.G., 1997. The Exchange as Regulator. Va. L. Rev. 83, 1453–1500. https://doi.org/10.2307/1073764

McDonnell, B., 2013. Dampening Financial Regulatory Cycles. Fla. L. Rev. 65, 1597.

Merkley, J., Levin, C., 2011. The Dodd-Frank Act Restrictions on Proprietary Trading and Conflicts of Interest: New Tools to Address Evolving Threats Policy Essay. Harv. J. on Legis. 48, 515–554.

Merrill, T.W., Merrill, M.L., 2014. Dodd–Frank Orderly Liquidation Authority: Too Big for the Constitution? U. Pa. L. Rev. 163, 165–247.

Mian, A., Sufi, A., 2009. The Consequences of Mortgage Credit Expansion: Evidence from the U.S. Mortgage Default Crisis. Q. J. Econ. 124, 1449–1496. https://doi.org/10.1162/qjec.2009.124.4.1449

Mofsky, J.S., 1969. Blue Sky Restrictions on New Business Promotions. Duke L.J. 1969, 273–290.

Moloney, C.B., Schumer, C.E., 2009. Vicious Cycle: How Unfair Credit Card Practices Are Squeezing Consumers and Undermining the Recovery. The Joint Economic Committee.

Nabilou, H., 2017. Bank Proprietary Trading and Investment in Private Funds: Is the Volcker Rule a Panacea or Yet Another Maginot Line? Bank. & Fin. L. Rev. 32, 297–341.

Nicoletti, G., Scarpetta, S., 2003. Regulation, Productivity and Growth (OECD Economics Department Working Papers No. 347).

Nonbank Financial Company Designations [WWW Document], n.d. . Financial Stability Oversight Council. URL https://www.treasury.gov/initiatives/fsoc/designations/Pages/default.aspx (accessed 1.9.19).

Obama, P.B., 2010. Executive Order 13543: National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling.

Omarova, S.T., 2011a. Wall Street as Community of Fate: Toward Financial Industry Self-Regulation. U. Pa. L. Rev. 159, 411–492.

Omarova, S.T., 2011b. The Dodd-Frank Act: A New Deal for a New Age. N.C. Banking Inst. 15, 83–98.

Paulsen, E., 2007. Imposing Limits on Prosecutorial Discretion in Corporate Prosecution Agreements Note. N.Y.U. L. Rev. 82, 1434–1469.

Peltzman, S., 1976. Toward a More General Theory of Regulation. The Journal of Law and Economics 19, 211–240. https://doi.org/10.1086/466865

Pigou, A., 2017. The Economics of Welfare. Routledge. https://doi.org/10.4324/9781351304368
PricewaterhouseCoopers, 2015. Volcker Rule: Are You Really Market Making? (Regulatory Brief). PriceWaterhouseCoopers.
Reinhart, C.M., Rogoff, K.S., 2009. This Time Is Different: Eight Centuries of Financial Folly, F First Edition edition. ed. Princeton University Press, Princeton.
Romano, R., 2012. Regulating in the Dark. Yale Law & Economics Research Paper.
Romano, R., 2004. The Sarbanes-Oxley Act and the making of quack corporate governance.
Santos, J.A.C., 2011. Bank Corporate Loan Pricing Following the Subprime Crisis. Rev. Fin. Stud. 24, 1916–1943. https://doi.org/10.1093/rfs/hhq115
Schmidt, L., Timmermann, A., Wermers, R., 2016. Runs on Money Market Mutual Funds. Am. Econ. Rev. 106, 2625–2657. https://doi.org/10.1257/aer.20140678
Schultz, P.H., 2014. Perspectives on Dodd-Frank and Finance. MIT Press.
Schwarcz, S.L., 2017. Too Big to Fool: Moral Hazard, Bailouts, and Corporate Responsibility. Minnesota Law Review 102.
Schwarcz, S.L., 2016. Macroprudential Regulation of Mortgage Lending. S.M.U. L. Rev. 69, 595–608.
Schwarcz, S.L., 2012. Shadow Banking, Financial Markets, and the Real Estate Sector. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.2157605
Schwarz, D., Zaring, D., 2017. Regulation by Threat: Dodd-Frank and the Nonbank Problem. U. Chi. L. Rev. 84, 1813–1882.
Shavell, S., 2007. Chapter 2 Liability for Accidents, in: Shavell, A.M.P. and S. (Ed.), Handbook of Law and Economics. Elsevier, pp. 139–182.
Siegelman, P., Donohue, J.J., 1995. The Selection of Employment Discrimination Disputes for Litigation: Using Business Cycle Effects to Test the Priest-Klein Hypothesis. J. Legal Stud. 24, 427–462. https://doi.org/10.1086/467964
Simkovic, M., 2018. Limited Liability and the Known Unknown. Duke L.J. 68, 275–332. https://doi.org/10.2139/ssrn.3121519
Simkovic, M., 2013. Competition and Crisis in Mortgage Securitization. Ind. L.J. 88, 213.
Simkovic, M., 2009a. The Effect of BAPCPA on Credit Card Industry Profits and Prices. Am. Bankr. L.J. 83, 1.
Simkovic, M., 2009b. Secret Liens and the Financial Crisis of 2008. Am. Bankr. L.J. 83, 253.
Skeel, D., 2010. The New Financial Deal: Understanding the Dodd-Frank Act and Its (Unintended) Consequences. John Wiley & Sons.
Smith, R.A., 1936. State "Blue-Sky" Laws and the Federal Securities Acts. Mich. L. Rev. 34, 1135–1166. https://doi.org/10.2307/1282195
Song, J., Price, D., Guvenen, F., Bloom, N., von Wachter, T., 2018. Firming Up Inequality (No. w21199). National Bureau of Economic Research, Cambridge, MA. https://doi.org/10.3386/w21199
Stefanadis, C., 2003. Self-Regulation, Innovation, and the Financial Industry. J. Reg. Econ. 23, 5–25. https://doi.org/10.1023/A:1021858812744
Stigler, G.J., 1971. The Theory of Economic Regulation. Bell J. Econ. & Mgmt. Sci. 2, 3–21. https://doi.org/10.2307/3003160

Stiglitz, J.E., 2009. Government Failure vs. Market Failure: Principles of Regulation, in: Balleisen, E., Moss, D. (Eds.), Government and Markets. Cambridge University Press, Cambridge, pp. 13–51. https://doi.org/10.1017/CBO9780511657504.002

Stout, L.A., 1995. Are Stock Markets Costly Casinos? Disagreement, Market Failure, and Securities Regulation. Va. L. Rev. 81, 611–712. https://doi.org/10.2307/1073496

Sun, B., Tam, X., Young, E., 2014. Regulatory Intensity, Crash Risk, and the Business Cycle (No. 416), 2014 Meeting Papers. Society for Economic Dynamics.

Thaler, R.H., Sunstein, C.R., 2009. Nudge: Improving Decisions About Health, Wealth, and Happiness, Revised & Expanded edition. ed. Penguin Books, New York.

Trebbi, F., Xiao, K., 2017. Regulation and Market Liquidity. Management Science. https://doi.org/10.1287/mnsc.2017.2876

Wang, Y., Xia, H., 2014. Do Lenders Still Monitor When They Can Securitize Loans? Rev. Fin. Stud. 27, 2354–2391. https://doi.org/10.1093/rfs/hhu006

Webb, P., 2016. Leveraged Lending Guidance and Enforcement: Moving the Fulcrum. N.C. Banking Inst. 20, 91–126.

Webel, B., 2014. Insurance Regulation: Issues, Background, and Legislation in the 113th Congress. Congressional Research Service, Library of Congress, Washington, D.C.

Werner, W., 1984. The SEC as a Market Regulator. Va. L. Rev. 70, 755–784. https://doi.org/10.2307/1073084

Whitehead, C.K., 2011. The Volcker Rule and Evolving Financial Markets. Harvard Business Law Review 1, 39–73.

Williamson, O.E., 1971. The Vertical Integration of Production: Market Failure Considerations. Am. Econ. Rev. 61, 112–123.

Wilmarth Jr, A.E., 2010. Dodd-Frank Act: A Flawed and Inadequate Response to the Too-Big-to-Fail Problem, The. Or. L. Rev. 89, 951.

Winston, C., Crandall, R.W., Niskanen, W.A., Klevorick, A., 1994. Explaining Regulatory Policy. Brookings Papers on Economic Activity. Microeconomics 1994, 1. https://doi.org/10.2307/2534728

Yadav, Y., 2012. The Problematic Case of Clearinghouses in Complex Markets. Geo. L.J. 101, 387–444.

Yagiz, B., 2017. Ending AIG's systemic-risk status raises questions on stability... Reuters.

Yellen, J.L., 2011. Macroprudential Supervision and Monetary Policy in the Post-crisis World. Bus Econ 46, 3–12. https://doi.org/10.1057/be.2010.35

Zaring, D., 2018. The Federal Deregulation of Insurance. Tex. L. Rev. 97, 125–161.