

Are There Empirical Foundations for the Iron Law of Financial Regulation?

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Abstract

This paper examines whether there are empirical foundations for what I term the “iron law of financial regulation:” following financial crises, Congress enacts legislation that increases financial regulation, resulting in a regulatory ratchet in which new statutes are layered atop existing laws and new regulations are grafted onto existing ones, creating an increasingly complex and opaque regime. A key contention is that the shock to the economic system from a financial crisis results in legislation that is different in content and in its impact on regulation from that of legislation enacted in noncrisis times.

The paper investigates empirically two foundational premises of the iron law: 1) whether there is an association between financial crises and legislation; and 2) whether financial legislation enacted in the wake of crises differs significantly from that enacted in noncrisis times as measured by its content and regulatory effect. Using proxies for regulation related to textual constraints and complexity, crisis-driven financial legislation has significantly greater regulatory content, and is followed by higher levels of regulation, than noncrisis-driven legislation, although the impact differs across crises, as one of three crises identified in the literature has considerably less of an effect than the others.

1. Introduction

This paper, based on an address delivered at the 31st annual meeting of the American Law and Economics Association (ALEA), asks whether there are empirical foundations for what I term the “iron law of financial regulation”: following financial crises, Congress invariably enacts legislation, and that legislation increases financial regulation, resulting in a regulatory ratchet in which new statutes are layered on top of existing laws, and new regulations are grafted onto existing ones, creating an increasingly complex and opaque regulatory regime that is likely to contain at least some inapt provisions.

A key piece of the iron law is that the shock to the economic system from a financial crisis results in legislation that is different in its content and impact on regulation compared to legislation enacted in noncrisis times. This is not to say that this is a unique phenomenon: a similar pattern has been observed as Congress responds with legislation to other nonfinancial crises or severe economic or societal shocks, such as environmental disasters (Elliott and Esty, 2021) and stock market crashes (e.g., Banner, 1997). The paper’s focus is delimited to financial legislation and crises related to banking not because Congress’s response may be different in kind but because of greater tractability in undertaking the analysis. In addition, the vulnerability of highly leveraged financial institutions engaging in maturity transformation to shocks that create systemic risk, and the deleterious economic aftereffects of financial crises lasting far longer than downturns of the business cycle (Reinhart and Rogoff, 2009), are sources of utmost public policy concern.

The paper investigates empirically two foundational premises of the iron law: 1) whether there is an association between financial crises and legislation; and 2) whether financial legislation enacted in the wake of crises differs significantly from that enacted in noncrisis times

as measured by its content and regulatory impact. I find not only an association between financial crises and legislation but also, and more importantly, that crisis-driven financial legislation both has more regulatory content and is more complex, and has a greater regulatory impact, than noncrisis-driven financial legislation, although the effect differs in magnitude across financial crises.

2. Challenges of Crisis-driven Financial Legislation: The Iron Law of Financial Regulation

The iron law is a product of the confluence of three factors: i) financial firms' operating in markets characterized by dynamic innovation and two types of uncertainty – unknown unknowns (future states of the world to which a probability cannot be assigned because they cannot be imagined), also referred to as Knightian or radical uncertainty -- and the confounding of regulation by regulated entities' responses, both of which create risks that regulators cannot accurately anticipate; ii) legislators' behavior in the wake of financial crises; and iii) the stickiness of financial legislation and its implementing regulations. In combination these factors present considerable public policy challenges in terms of means-end rationality for implementing an effective regulatory regime (Romano and Levin, 2021).

This section provides a brief sketch of two of the three factors, those regarding the operation of the legislative process that frame the paper's inquiry: legislators' response to financial crises; and the stickiness of financial legislation once enacted and regulation once implemented. Theoretical and empirical support for the remaining factor – the dynamic uncertainty and innovation characterizing financial markets – is well-recognized in the literature, having been identified and analyzed by a number of economists (e.g., Lucas, 1976; Goetzmann, 2016; King, 2020).

2.1. Legislators' Behavior in Response to Financial Crises

A key factor informing the iron law involves the enactment of major financial legislation following financial crises, despite the timing being inopportune regarding the available information to craft an effective response. Although there is no generally accepted theory why and when issues come to the fore on the legislative agenda, the political science literature indicates that a key variable in moving issues to the top of the legislative agenda are “focusing events” and shifts in national mood, that render the public receptive to government action aimed at addressing a specific issue (Kingdon, 2011). A financial crisis is a paradigmatic focusing event, receiving intensive media coverage (Romano, 2023) and a demand for a prompt government response, as it creates widespread fear, if not panic in the public, along with severe economic distress.

Accordingly, legislators whose objective is conventionally understood to be reelection, even in the contemporary setting with the increased importance of being in the majority party (Mayhew, 1974; Gerber and Schickler, 2017), will rationally conclude that there is a need to do something beyond the actions of the central bank and executive branch in the midst of a crisis—i.e., to enact legislation – even though they will be legislating at a time when they cannot have confidence regarding what would be the better policy to adopt, given the tremendous uncertainty about what has just transpired, or may be ongoing, and why. This behavioral explanation informing the iron law is supported by theoretical agency models of the relation between voters and elected representatives (e.g., Besley, Burgess and Prat, 2002), that is lent plausibility by an empirical literature identifying a connection, across time and space between event salience (typically measured by media coverage), election outcomes and implemented policies (e.g., Yates and Stroup, 2000 (Environmental Protection Agency policy); Besley and Burgess, 2002 (India, state government policy), Vinson, 2003 (Congress, informed voters); Arnold, 2004 (Congress,

informed voters and election); Ferraz and Finan, 2008 (Brazil, mayoral reelection); Snyder and Strömberg, 2008 (Congress, member voting and policy)).

2.2. Legislative and Regulatory Stickiness

U.S. political institutions were designed to make the enactment of legislation slow and effortful. The constitutional architecture of separation of powers and checks and balances creates numerous veto points throughout the legislative process, as does the organization of Congress in a committee system, which creates additional vetogates. These institutional design features not only can render legislating difficult in noncrisis times, but they also render repeal or significant revision equally, if not more, challenging. Compounding the institutional bottlenecks that make legislation sticky is the scarcity of time and legislative capacity: as there is a limited amount of time for plenary floor action, legislators will seek to move on to new matters, rather than return to supposedly “resolved” issues (Adler and Wilkerson, 2012).

In addition, legislation creates supporting constituencies, and once organized, those interest groups have a vested interest in the legislation and can pose a powerful blocking force to those seeking revision (Patashnik, 2008). In fact, financial legislation enacted following crises often requires substantial investments by financial institutions to comply with new regulatory requirements (e.g., Simkovic and Zhang, 2020). That reduces institutions’ incentive to lobby for the regulations’ revision, let alone repeal, as the increased compliance costs not only advantage large over small firms due to economies of scale, but also deter new entrants, furthering large banks’ comparative advantage. As Lloyd Blankfein, the then-CEO of Goldman Sachs, candidly put it in an interview discussing his firm’s business model, regulations such as those required by Dodd-Frank benefitted his firm (Richards 2015):

“It’s very hard for outside entrants to come in (sic) disrupt our business simply because

we're so regulated. We hear people in our industry talk about the (sic) regulation, and they talk about it with a sigh about the burdensome (sic) of regulation. But in fact in some cases the burdensome regulation acts as a bit of a moat around our business.”

Financial legislation’s stickiness is reenforced by regulators’ proclivity to adhere to the status quo. A variety of well-recognized behavioral phenomena aid in explaining such a behavioral bias: common cognitive biases and risk aversion tend to advantage the status quo. In laboratory experiments, for instance, psychologists find that framing specific options as the status quo result in those options being selected far more frequently than when there is a neutral framing of the options (Samuelson and Zeckhauser 1988). That is to say, individuals tend to go along with what they perceive to be the status quo. Banking regulators’ behavior is no different; as Claudio Borio (2011), then Director of Research and now Head of the Monetary and Economic Development of the Bank for International Settlements, observes, “The fear of going against the manifest view of markets can have a powerful inhibiting effect.” In addition, policy benefits often accrue in the future (e.g., reduced probability of a crisis or its severity), while the costs are felt immediately (e.g, reduced availability of credit). That temporal mismatch, as the International Monetary Fund (2014) put it in discussing regulators’ implementation of macroprudential policy tools, “lead[s] to biases in favor of inaction.”

In noncrisis times there is an absence of countervailing demands from legislators or the public on regulators to alter the status quo. Financial regulation’s technical nature tends to result in legislators’ and the public’s ceding regulatory matters to experts, as they have a limited attention span and knowledge, and lose interest in an issue once the salience of a crisis recedes, legislation has been enacted and complex issues often delegated to agencies for implementation.

The contention is not that regulators do not revise extant regulations. Rather, the point is that behavioral factors tend to make regulations as sticky as authorizing legislation, despite their not having to pass through the many veto points required of statutes.

The stickiness of financial legislation and regulation produces a regulatory structure over time that will be increasingly complex, as new laws are piled onto old ones, and new regulations are layered on top of old regulations, that is, crisis-driven laws and regulations are grafted onto existing ones. The outcome of this dynamic is an increase in legal uncertainty and a corresponding increased probability of error. This is not to say that noncrisis-driven legislation does not increase regulation; it certainly does, and such an observation is fully consistent with the iron law. The iron law's claim is that i) Congress will not permit a financial crisis to go unanswered, whereas there is no determinate timing for when it might enact financial legislation in noncrisis times; and ii) crisis-driven legislation is unidirectional and greater in regulatory impact than noncrisis-driven legislation, which may on occasion modestly decrease regulation.

The iron law does not imply that increases in regulation or in regulatory complexity are ill-judged policy and ought to be reversed. Financial crises result in severe economic disturbance, adversely impacting the real economy and economic growth for many years (e.g., Reinhart and Rogoff, 2009). Accordingly, regulation that could minimize the probability of a crisis or a crisis's severity is desirable, assuming the increased cost does not outweigh the benefit. And while not all thoughtful regulators would concur (e.g., Haldane, 2012), it is intuitively plausible that a financial system with a number of extremely large, complex and interconnected banks, such as that of the United States, requires highly complex regulation. But an implication of the iron law, from the perspective of means-end rationality, is that a focused mechanism of periodic, comprehensive reassessment of legislation, that facilitates revision,

simplification or rationalization of laws and regulations, would generate a more adaptable and resilient regulatory system and reduce legal uncertainty. As I have contended elsewhere (e.g., Romano and Levin, 2021), that would be a highly desirable outcome because the origin of much financial regulation is in crisis-driven legislation drafted in circumstances of limited information and perceived exigency due to public fear and panic. This is a tumultuous political setting in which means-ends rationality could especially be out of alignment. Such a situation is only further exacerbated by the dynamic innovation in financial markets that can render even apt regulations ineffective over time.

3. Is There Empirical Support for the Iron Law?

The iron law is informed by human nature as we know it: in the wake of a financial crisis, Congress enacts significant legislation that invariably increases financial regulation, resulting in a one-way regulatory ratchet. But is that contention accurate? This section first shows that Congress does, in fact, repeatedly enact major financial legislation in the wake of financial crises. I then investigate whether there is a significant difference in regulatory impact between crisis-driven and noncrisis-driven financial legislation.

3.1. Financial Crises and Financial Legislation

The initial step in investigating the empirical foundation for the iron law is to define a financial crisis. Thereafter important financial legislation must be identified. Rather than reinvent the wheel, I take crises and important banking laws from lists that have been constructed by those with relevant expertise.

3.1.1. Defining a Financial Crisis

A number of economists have assembled time series of financial crises, most often employing a narrative approach that defines a crisis by identifying severe stress (using a variety

of quantitative and qualitative measures) in the banking sector along with government intervention. Sufi and Taylor (2021) provide a comprehensive review of the literature dating financial crises while Metrick and Schmelzing (2021) identify what they consider the most thorough studies dating crises in order to compile a dataset of government interventions in financial crises across time and space. The online appendix explains the time frame I use to identify crises from the literature and provides information on the crisis-identifying sources' methodologies. The literature identifies three modern U.S. financial crises: 1929-33 (Great Depression); 1984-91 (Savings and Loan (S&L) Crisis); and 2007-10 (Global Financial Crisis).

3.1.2. Defining Significant Financial Legislation

There is a dearth of political science research directed at identifying what constitutes major legislation of any sort, compared to economists' efforts at identifying financial crises, and those studies do not provide criteria that can be used for my inquiry. The online appendix discusses the literature's limitations. I use instead a list of statutes compiled by the Federal Deposit Insurance Corporation (FDIC) that it described as "the most important laws that have affected the banking industry in the United States" to identify important banking laws (FDIC, 2021). This list is the best available source for identifying statutes, for, as elaborated in the online appendix, by making a retroactive assessment of importance of laws related to banking, rather than all enacted legislation (the focus of the political science literature), its compilation contains the greatest number of potentially relevant statutes. The online appendix also discusses a list of top banking statutes constructed by Conti-Brown and Ohlrogge (2022), and explains shortcomings in their approach that render their list inappropriate for investigating the iron law.

I define statutes as crisis-driven as those enacted during a financial crisis or within two years of its end date. There are three reasons for selecting a two-year cutoff. First, it allows for

the impact of a change in political control and hence, a crisis response adopted by a new governing majority. Second, two years is the time span of a single Congress, and even expeditiously enacted legislation could span both sessions as it moves across chambers. Finally, as political scientists have observed a “clear tendency” of Congress to enact more laws in the second session, a two-year time frame controls for such a possible effect (Jones and Baumgartner, 2004).¹

Besides selecting a cutoff date for differentiating crisis- and noncrisis-driven legislation, because the iron law relates to the enactment of legislation directed at the regulation of financial institutions, I apply a filter widely used by political scientists to the FDIC list so that only statutes with a specific focus on banking regulation, as opposed, for instance, to statutes directed at all businesses and not specific to banks, such as the Sarbanes-Oxley Act of 2001, Pub. L. No. 107-204, are included in the analysis. I reviewed each filtered statute for whether its designated substantive content was a reasonable one. As discussed in the online appendix, this approach generates a list of twenty-five important banking statutes, ten crisis-driven and fifteen noncrisis-driven ones, enacted between 1927 and 2010.

3.1.3. Financial Legislation in Relation to Financial Crises

Table 1 lines up the twenty-five statutes by enactment date with the three financial crises identified in the literature and noncrisis periods, using the two-year post-crisis criterion for classifying statutes as crisis-driven. Consistent with the iron law, all three crises sparked legislation. In fact, there are several statutes enacted in the time frame of each crisis: two in the wake of the Great Depression of 1929-33 (enacted in 1933 and 1935); six during and following the S&L crisis of 1984-91 (adopted between 1987 and 1993); and two throughout the Global Financial Crisis of 2007-10 (enacted in 2008 and 2010).

A runs test provides a simple statistical test of the plausibility of the iron law’s assertion. The test analyzes the order, as opposed to the frequency, of events to ascertain whether a pattern of events, such as the order of heads or tails from a sequence of coin flips – here the event is whether a statute is enacted in a given year – is random. As the sampling distribution of the values expected from repeated random samples is known, the test compares whether the observed sample has more or fewer “runs” (where a run is a set of observations of heads or tails – here enactment of statutes – in a row) than would occur in a random sample (Siegel, 1956)

Runs tests were undertaken for crisis-driven and noncrisis-driven statutes, starting in 1927 with the enactment of the first statute in the study through 2010, enactment of the last statute. The runs test for enactment of crisis-driven statutes is statistically significantly different from zero at less than 1 percent (z-statistic of -4.0564), but the test for the noncrisis-driven statutes is insignificant (z-statistic of 0.6486). Hence, consistent with the iron law’s intuition, there is an association between the enactment of important financial legislation and financial crises. The results are robust as they are unchanged for runs tests beginning in 1915 and ending in 2015 (the entire time span of the dataset), and for those using a one-year cutoff to classify a statute as crisis-driven.

As the runs tests are computed separately for the two types of statutes, I estimated a model pooling the statutes, regressing the probability of a statute’s enactment on a dummy variable for a year in a crisis period. As the dependent variable is categorical, I estimated a logit model, i.e.,

$$\text{Probability (Statute enactment} = 1) = F(\beta_0 + \beta_1 * \text{Crisis}), \quad (1)$$

where $F(z)$ is the cumulative logistic distribution, $F(z) = e^z / (1 + e^z)$, and “Crisis” is an indicator =1 for years defining a crisis period as from its start date through two years after its end date. The

regression results are similar to the runs tests: estimated over 1927-2010, the crisis period dummy is statistically significant at less than 5 percent (coefficient 1.3516, standard error .5421, z-statistic 2.49, probability .013), with a regression likelihood ratio of 6.19 (probability .0128); and similarly significant when estimated over 1915-2015 (coefficient 1.4424, standard error .5248, z-statistic 2.75, probability .006), with a regression likelihood ratio of 7.41 (probability .0065). The results are of similar magnitude if a crisis is defined over the longer interval from a crisis's first year through two years after enactment of the last statute responding to the crisis (which are identified in table 1).

While the tests do not demonstrate that there is a causal relation between the pattern of legislation and financial crises, the findings that the pattern is not random and that there is a significant correlation between legislation and years of financial crisis, are highly suggestive of an association that accords with the iron law's intuition. The contrasting runs test result for noncrisis-driven statutes, that there is no rhyme or reason beyond randomness to the pattern of enactment, is further consistent with the iron law's intuition that crises are a powerful accelerator for major financial legislation.

3.2. Does the Regulatory Content Differ between Crisis-Driven and Noncrisis-Driven Statutes?

Because Congress enacts important banking legislation in noncrisis times as well as in response to crises, the key inquiry for testing the accuracy of the iron law is whether there is a discernible difference in the impact on regulation from crisis-driven statutes compared to noncrisis-driven ones? To answer that question, I employ a text-based methodology used in the literature assessing the growth of regulation, that tracks the occurrence of specific words in legislative and regulatory texts.

3.2.1. Measures of Regulation

The most refined approach among the text-based methodologies in studies of regulatory growth identifies increases in regulation by counting, in the text of statutes or regulations, specified “restrictive” words that are thought to impose binding constraints on regulated firms (Al-Ubaydli and McLaughlin, 2014). These restrictive words, determined by a textual analysis of the Code of Federal Regulations (“CFR”), are: “shall,” “must,” “may not,” “prohibited” and “required” (Al-Ubaydli and McLaughlin, 2014). The online appendix describes my use of the methodology, following Mahoney (2019).

A second textual proxy for increasing regulation entails measuring regulatory complexity. Complexity can be characterized as such a metric because it increases operating costs for firms as it makes it more difficult for managers and legal counsel to understand the law, let alone to determine whether they are in compliance. As summarized by Trapanese (2022), a substantial literature indicates that less complex rules “sometimes do a better job in dealing with Knightian uncertainty and in meeting [banking] supervisory objectives” as simpler rules improve “incentives for their enforcement from the perspective of both regulators and financial institutions.” For instance, simple, as opposed to complex, measures of bank capital perform better at predicting performance and simpler models to estimate risk in financial markets outperform complex ones (e.g, Demirguc-Kunt, et al. 2013; Haldane, 2012). But as earlier noted, acknowledging the costs of regulatory complexity does not imply that the regulatory regime should consist solely of simple rules, and Trapanese recommends a balanced regulatory approach that would reduce only what he terms “unnecessary complexity.”

I adopt a complexity measure formulated by Li, et al. (2015), a team of economists and computer scientists, who applied measures of complexity identified by computer software engineers in writing source code, to analyze the complexity of the U.S. code. Li, et al.

characterize complexity in computer codes as a function of the use of conditional statements. Those directives in a code increase complexity because each such statement requires a decision, creating a fork in the software's progress, i.e., a software program must run one of two different subroutines at the condition, and the nesting of conditional statements creates additional decisions, i.e., paths, that can increase exponentially the execution paths for any input. Software engineers ascribe the number of times a code must make a decision, i.e., the number of paths, as the measure of a source code's complexity.

The analogous notion for a legal code is that a large number of conditional statements, requiring numerous decisions, renders the law more complex, as it requires more exceptions and special cases to grasp the consequences of rules. The presence of numerous conditional statements in a legal code render it opaque and compliance more challenging. Li, et al. (2015:317) further contend that an "excessive" number of conditional statements might suggest the underlying rule is "faulty," given the need for numerous special cases and exceptions (the conditional terms). The reasoning is that the more complex a legal code – a code with a large number of conditions, cases and exceptions – the more difficult it is to understand and hence the more prone it is to error.

The terms Li, et al. use as analogues to the software structure of IF [condition] (execute subroutine A) ELSE (execute subroutine B), for measuring U.S. code complexity are: "if," "except," "but," "provided," "when," "where," "whenever," "unless," "notwithstanding" "in no event" and "in any event." They further note that a Senate drafting manual identifies words for use in "conditional provisions or provisos," that are a subset of those terms: the manual recommends "'if' instead of 'when' or 'where' to indicate a condition, and 'except that,' 'but' or 'if' over phrases involving the word 'provided.'" I tally occurrences of both sets of conditional

terms in the statutes identified in table 1 and implementing regulations. The online appendix provides Li et al's rationale for their approach and explains why I use their complexity measure as opposed to others in the literature.

Finally, the extent of regulation that follows statutes' enactment may be a function of the degree to which a statute delegates authority to agencies to act. Accordingly, I employ a third measure adopted from the political science literature to investigate whether there is such a relationship. Epstein and O'Halloran (1999) construct a measure of the extent of delegation Congress affords an agency in a statute, which they term "total executive discretion" or "discretion." The measure adjusts for the degree to which a statute both delegates and constrains agency authority, by generating a "net" measure of discretion from the proportion of a statute's provisions delegating authority and its relative constraints, derived from a factor analysis to reduce the dimensionality of the presence of a set of thirteen types of agency-constraining provisions. They use the term "discretion" because they view delegation as the granting to agencies of authority to undertake major initiatives.

Epstein and O'Halloran use legislative summaries published in the Congressional Quarterly Almanac (CQA) which contain detailed lists of statutes' major provisions to identify relevant provisions for their analysis. Using a single source to identify statutes' delegations and constraints has the benefit of providing consistency in the measure over time. I follow Epstein and O'Halloran's approach to measure discretion in the important banking statutes; the online appendix details their methodology and my adaptation of it. An unfortunate consequence of having to rely on the CQA to construct the measure is that reduces the number of statutes available for the analysis as only twenty statutes are summarized in CQA volumes (three predate the CQA's initial publication and two subsequently enacted statutes are not reviewed).

Investigating differences in delegation across crisis- and noncrisis-driven financial statutes can illuminate a related, albeit subsidiary, question regarding the iron law besides locating a source for statutes' differential regulatory impact. The textbook explanation of the administrative state is that agencies provide legislators with the expertise necessary to resolve technical policy issues (Strauss, 1996:748). Given the paucity of information that exists regarding a financial crisis and its causes when enacting crisis-driven financial legislation, it is possible that Congress could increase the use of delegation when legislating in such times. If that were so, then the iron law could be cast in a more positive light, as it might suggest that legislators are well aware of the problematic circumstances of legislating with limited information and seek to compensate for lack of knowledge by leaving policy decisions to administrative agencies when drafting crisis-driven legislation. Such a legislative strategy would enable crisis-related issues to be addressed at a time when better information is available, given that the rulemaking process is often a multiyear endeavor.

3.2.2. Caveat: Concerns Raised by Using Word Counts to Assess the Extent of Regulation

There are a few caveats to keep in mind when using word counts to gauge regulatory impact. It is, for example, possible that a statute increasing regulation could be more compactly expressed than a deregulatory initiative, if, say, legislators provide a short yet very broad delegation of authority in the former, but specify in detail a number of existing rules they wish altered in the latter. This concern is not, however, apt for considering statutory complexity because, by definition, complexity is a function of the presence of conditional terms.

Given this well-recognized potential shortcoming of using changing text counts to identify changes in regulation, Simkovic and Zhang (2020) have devised an alternative to text-

based measures, a “regulation index” derived from changes in corporate expenditures on employees engaged in compliance, which largely avoids many of the limitations of textual measures. However, changes in the coding of employment data used to construct their index over time render the measure infeasible for comparing the impact of statutes adopted in earlier decades as would be required for my project (Simkovic, 2019). Nevertheless, notwithstanding the textual methodology’s limitations, the Simkovic and Zhang regulation index and CFR restrictive word counts are significantly positively correlated (Simkovic and Zhang, 2020), providing some reassurance for the appropriateness of the text-based research strategy.

A further concern regarding the use of word counts to measure regulation, that agencies can engage in deregulation by a lax approach to enforcement, is discussed in the online appendix, along with issues in measuring enforcement activity. As that discussion indicates, banking regulators also often impose new regulations through enforcement actions rather than rulemaking, with the consequence that examining regulatory texts is at least as likely, if not more likely, to understate than to overstate regulation. Imperfect as the restrictive words measure of regulatory change may be regarding its relation to agencies’ enforcement initiatives, it is the best – indeed the only feasible – empirical technique available for measuring changes in financial regulation in relation to major banking legislation consistently over a century and the numerous agencies under investigation.

3.2.3. Comparing Characteristics of Crisis-driven and Noncrisis-driven Financial Legislation

Table 2 provides analyses of the textual characteristics of the important banking laws identified in table 1. In panel A, average values of the statutes’ textual characteristics that proxy for greater regulatory content – counts of the number of restrictive words and of conditional

words indicating complexity -- along with the extent of its delegation, are reported for all statutes as well as separately for crisis-driven and noncrisis-driven laws, along with results of statistical tests of whether there is a significant difference in mean across the two sets of statutes. The reported tests for restricted words and the complexity measures are one-tailed tests because the iron law has a directional prediction: higher values for crisis-driven statutes. I provide statistical results, despite the data constituting the population of important statutes, following the commentary of Epstein and Martin (2014), that using statistical tools captures the “uncertainty” that exists about “quantities of interest,” given that “idiosyncratic factors” will affect the set of observations, and that it is consistent with a goal in empirical legal research to draw inferences to a broader population that would include, in this instance, future crises and statutes.

As reported in the table, statutes adopted in the aftermath of financial crises have more restrictive words than noncrisis-driven ones: nearly four times greater at 1,220 compared to 339, a difference that is statistically significant (t-statistic -2.0502, probability .0346). The finding of statistically significantly more words that are associated with imposing regulatory constraints in the text of crisis-driven statutes tracks the iron law’s contention that crisis-driven legislation has a higher likelihood of increasing regulatory constraints on financial institutions than statutes enacted in noncrisis times. The two categories of statutes differ markedly in magnitude, in the direction predicted by the iron law.

Crisis-driven statutes also have greater complexity than noncrisis-driven statutes (612 compared to 218 words), containing almost three times more conditional terms, a statistically significant difference (t-statistic -1.8637, probability .0462). The difference is of the same magnitude and statistical significance if the comparison tallies only the subset of words recommended by the Senate manual for use in conditional provisions (258 compared to 92; t-

statistic -1.8834, probability .0445). The magnitude of the disparity across the two categories of statutes is, again, consistent with the iron law intuition: crisis-driven statutes are more complex than noncrisis-driven statutes. The greater complexity of crisis-driven statutes suggests that, compared to noncrisis-driven laws, those statutes may be more likely to generate legal uncertainty and regulatory error, which have been characterized as consequences of complexity in a legal code (Li, et al., 2015).

Finally, although the value of the discretion measure for crisis-driven statutes is not quite twice that of noncrisis-driven ones (.3374 compared to .1776), it is not statistically significant. We therefore cannot say whether the level of discretion afforded financial regulators could be a function of an informationally distinct temporal context (i.e., crisis-driven) in which a statute is enacted, despite the direction of the effect's being consistent with an information-based rationale. In addition, the variable's values for the two categories of statutes are relatively low compared to statutes that Epstein and O'Halloran identify as having a high level of delegation, which range from .48 to the maximum computed value of 1.00, yet also well above statutes with the lowest level of discretion in their study (discretion values below .05). However, the values are consistent with O'Halloran's recent research measuring delegation in financial legislation, broadly defined to include consumer finance and securities laws, as well as those related to banking, which reports an average discretion value for over 100 such statutes of .3326 (Groll, O'Halloran and McAllister, 2021). These comparisons are suggestive but the two studies' data are not strictly comparable to mine because, as indicated in the online appendix, discretion values are a function of the properties of the specific statutes used to construct them.

The failure to find a significant difference in delegation to agencies across the two categories of statutes is inconsistent with the notion that Congress would rationally delegate

substantially more authority when operating at an informational disadvantage, i.e., when legislating in the wake of a crisis compared to noncrisis times. However, the rationale for delegation that “agencies are the repositories of expert knowledge and experience” (Eskridge and Ferejohn, 2010:277) might suggest that the view that there would be a unique need to delegate in a time of informational disadvantage, such as a crisis, is mistaken. The technical nature of banking regulation calls for expertise that the overwhelming majority of members of Congress or their staff do not possess, even in a time when the informational difficulties of legislating during a crisis do not exist. That is to say, banking’s inherently technical nature could lead Congress to afford banking regulators a similar level of discretion, regardless of the political environment and economic circumstances at the time of a statute’s enactment.

The means comparison tests cannot account for a possibility that the differences across the two sets of statutes are due to changing congressional drafting practices, increasing the use of restrictive and conditional words over time. Even if there were a trend, it could not explain the difference between crisis- and noncrisis-driven statutes, as one set is not uniformly enacted earlier or later than the other. Nevertheless, I estimated a linear model that controls for the effect of a possible time trend on the statutes’ content, by regressing the statutes’ characteristics (y = restrictive words or a complexity measure) on both an indicator variable (“Crisis”) for whether the statute was enacted in the wake of a crisis and a time variable (“Year”), the year of enactment, which will capture a temporal trend. The model specification is:

$$y_i = \beta_0 + \beta_1 * \text{Crisis}_{it} + \beta_2 * \text{Year} + \varepsilon_i \quad (2)$$

The results of the regressions are reported in panel B of table 2. They are similar to those of the means comparison tests: statutes with higher restrictive word counts are more likely to be associated with financial crisis-driven statutes (indicator variable is statistically significant at less

than 5 percent), as are those with greater complexity (under either definition), than noncrisis-driven ones, while the difference across the two types of statutes in the amount of authority delegated to agencies is marginally significant (at 10 percent). Moreover, the time trend is insignificant in all of the regressions, indicating that Congress has neither increased nor decreased its use of regulatory constraints and textual complexity over time, but rather, that it uses such terms more frequently when drafting legislation in times of financial crisis.

4. Does the Growth in Regulation Differ after Enactment of Crisis-driven and Noncrisis-driven Statutes?

Crisis-driven financial legislation has greater regulatory content, measured either by restrictive language or complexity, thereby having the potential to impose, on average, higher compliance costs on financial institutions and a greater likelihood of error, compared to noncrisis-driven legislation. But core questions remain. Do the differences in statutory text affect the level of regulation through time? Do all crises have a similar impact on regulation or does it vary? Most specifically addressing the iron law, to what extent does crisis-driven legislation contribute to an upward regulatory ratchet, compared to non-crisis legislation?

4.1. Growth in Banking Regulation Over Time

A first take on the effect of crisis-driven legislation on regulation through time is a visual presentation. Figures 1, 2 and 3 plot the growth in restrictive words and complexity of regulations in title 12 of the CFR, which is the title containing banking regulations, over 1915-2015 (from the year the Fed was established and the first federal banking regulations were promulgated, through five years following the end date of the Global Financial Crisis). Given the tremendous increase in regulations over the century, the scaling of the y axis renders the plot of regulatory growth at the outset imperceptible, and suggests a dramatic increase commencing only

in the 1960s. Figures 4, 5, and 6 rectify that misperception by plotting regulatory growth using the log of the measures; an upward trajectory is now visible beginning in 1920, decades earlier than the trend observed in figures 1, 2 and 3, along with a steeper increase during the Great Depression and its aftermath. The online appendix provides a comprehensive explanation of the methodology used to identify and track the growth in regulation by counts of restrictive words and the two measures of complexity. As the growth of regulatory complexity (whether defined by the computer code or Senate manual approach) plotted in figures 2 and 3 closely mirrors that of the constraining restrictive words plotted in figure 1, the following discussion focuses solely on the trajectory of restrictive words.

The vertical lines indicate starting and concluding years of the three financial crises, while diamonds mark the enactment of the first and last crisis-driven statute for each crisis, as listed in table 1. Figure 1 shows a sizeable increase in regulation and complexity, beginning in the 1960s, a time span, identified in the literature on the growth of the administrative state, when regulation surged due to President Johnson’s Great Society initiatives (Grossman, 2014), continuing well into the 1970s. The surge in regulation in those years has been characterized in the administrative law literature as a decade of “rulemaking ascendant” or the “era of rulemaking” (Kerwin and Furlong, 2019). Consistent with characterizing the trend in banking regulation as mirroring a broader U.S. regulatory dynamic of the time, Dawson and Seater (2013), measuring growth in U.S. regulation by the number of pages in the entirety of the CFR, report a similar pattern of rapid growth in the 1970s, which slows in the early 1980s.

Because the number of agencies included in title 12 has increased over time, with, for example, two agencies added during the upward steepening in the graph, the Farm Credit Administration in 1967 and the National Credit Union Administration in 1970, the figure also

separately tracks growth in restrictive words for the three agencies that have been included in title 12 since its first edition in 1938: the Office of the Comptroller of the Currency (OCC), Fed and FDIC. As discussed in the online appendix, the years in which these agencies first issued regulations are, respectively, 1916, 1915 and 1933. Therefore, the regulatory growth tracked in that plot is not affected by the number of agencies, which is constant from the second vertical line in the figure, 1933, in contrast to the plot for all title 12 agencies, where the number of agencies changes over time, sometimes because an existing agency has been moved into title 12 from another CFR title, and sometimes because an agency has been created to regulate a specific type of lending institution.

A constant number of agencies makes possible a clean identification of an increase in regulation over time. Visual inspection suggests that the pattern of regulatory growth for the three longstanding and core banking agencies does not differ appreciably from that for the changing set of all title 12 agencies. The widening gap between the two plots in the 1990s would appear, at least in part, to be a function of the addition of eight agencies in the title over the decade (as indicated in online appendix table A7); the gap between the two plots is, of course, smaller in the log scale graphs, and in particular, it is relatively constant from the late 1960s on.

Regardless of the number of agencies included in title 12, the data are consistent with the iron law's characterization that financial regulation follows an upward ratchet over time, layering regulations on top of existing regulations. This pattern is at odds with a hypothesis advanced by Coffee (2012, 2019), that banking regulation follows a "regulatory sine curve," increasing for a time, then declining, and then increasing again, and so forth, such that the temporal pattern approximates the undulating shape of a sine curve. For the most important take away from figure 1 is that the upward trajectory of the plot is not materially altered by a few short-lived dips, the

largest occurring in the late 1990s, a time frame in which noncrisis-driven legislation with deregulatory initiatives was enacted (Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994, Pub. L. No. 103-329, 108 Stat. 2338, Economic Growth and Regulatory Paperwork Reduction Act of 1996, Pub. L. No. 105-208, and Gramm-Leach-Bliley Act of 1999, Pub. L. No. 106-102, 113 Stat. 1338). That perturbation did not alter the overall upward regulatory trajectory, for within three years from its nadir, the regulatory peak prior to the decline was surpassed.

4.2. Growth in Regulation over Crisis and Noncrisis Periods

A further presentation of the data is provided in table 3, which reports the rate of growth in regulation over time, along with the continuously compounded rate of growth (indicated in parentheses in the table beneath the growth rates) over the three financial crisis intervals and intervening noncrisis ones. The table includes continuously compounded growth rates because, in contrast to raw growth rates, they have the advantage of being comparable across intervals of different length.²

4.2.1. Growth over Crisis Intervals

The crisis intervals in the table extend from the first year of a crisis through two years after enactment of the last statute attributed to it, as indicated in table 1. The interval seeks to capture the impact of rules promulgated in response to newly enacted crisis-driven statutes, while minimizing the possibility of a confounding effect from regulations implementing a noncrisis-driven statute. Such a potential confounding effect is an issue solely for the S&L Crisis, where the last crisis-driven statute was followed within a year by noncrisis legislation, as indicated in table 1. But for consistency in comparisons, I adopt the two-year post-enactment time frame to define all three crisis intervals in the table, even though, as discussed in the online appendix, the rulemaking process can often take many years.

Crisis intervals begin in the table in the year identified in the literature as the crisis's start date, although an interval more precisely fitting the iron law hypothesis that attributes regulatory growth to crisis-driven legislation might more accurately commence in the year in which the first crisis-driven statute was enacted. An earlier starting point is used to avoid either having to divide up crisis intervals into an initial short few years before a statute is enacted and years thereafter, or omitting the initial years of a crisis to have a single interval per crisis and thereby creating gaps between intervals in the table. However, online appendix table A8 reports growth rates over crisis intervals defined to begin in the year of enactment of the first crisis-driven statute through two years after the last crisis-driven statute's enactment. Continuously compounded growth rates over the shorter crisis interval starting at the first crisis-driven statute's enactment are, in fact, higher than those reported in table 3 for all measures of regulation and agency configurations, findings that track the iron law thesis well, ranging from a modest .7 percent greater (Great Depression, restrictive words) to 87.5 percent greater (S&L Crisis, Senate complexity, three agencies), with the average over the 12 measures 36 percent higher. But even with a quite large increase in the Senate complexity measure's continuously compounded growth rate during the S&L Crisis over the shorter interval defining crises in the online appendix table, its growth rate is still less than half that of the other two crises (5 percent compared to 11 and 12 percent).

Confirming the upward trajectory in regulation following crises in figure 1, the data in table 3 confirm what is observable in figure 4, a striking burst in regulation following the Great Depression which is otherwise obscured in figure 1 due to the y-axis's scaling. The growth rate of all three proxy measures for regulation over the Great Depression interval is well over 100 percent, compared to far lower percentages for the other two crises. But, of course, a small increment in the number of restrictive or conditional words following the Great Depression has a

far greater impact on the growth rate in regulation than a similarly sized change following either the S&L Crisis or the Global Financial Crisis because the initial level of regulation skews the comparison. For instance, the number of restrictive words at the onset of the Great Depression was in total 363, whereas at the commencement of the Global Financial Crisis it was 29,288 (15,911 for the OCC, Fed and FDIC). Still, growth in restrictive words over the Great Depression interval when calculated as a continuously compounded rate, is higher than that of the Global Financial Crisis interval (11.97 percent compared to 10.81 percent), and both of those Crises's continuously compounded growth rates are far greater than that of the S&L Crisis interval (2.4 percent). As indicated in the table, the magnitude of the compounded continuously growth rates over the three crisis intervals for the complexity measures is about the same as that of the restrictive words.

Table A8 in the online appendix provides a further variation on the choice of a crisis interval, calculating growth rates from the first year of a crisis to two years after a crisis end date. The relative magnitudes of growth rates across crises over this interval are similar to those over the longer interval in table 3.

4.2.2. Growth over Noncrisis Intervals

The periodization of noncrisis growth rates after World War II follows Grossman (2014), who identifies a starting date of 1961 and an ending date of 1976 for growth in regulation that is associated with President Johnson's Great Society initiatives (enacted over 1964-65), an era he terms the "Long Great Society," as he provides quantitative and qualitative support for that time span's distinctive legislative activity and concomitant growth in the scope of government. Consistent with his periodization, the growth rate of restrictive words and the complexity measures in financial regulation, at over 300 percent, is far higher over that extended era than any

crisis interval. However, that interval is also considerably longer than any crisis interval and when growth is calculated on a comparable basis, the seemingly dramatic difference no longer exists. The continuously compounded growth rate of the Long Great Society of 10.25 percent is 14 percent lower than that of the Great Depression and 5 percent below that of the Global Financial Crisis. As only one important banking statute was enacted over the Long Great Society (Financial Institutions Supervisory Act of 1966, Pub. L. No. 89-695, which expanded the enforcement powers of federal banking agencies), the data for this era underscore what should perhaps be obvious, that agencies can increase regulation without receiving additional statutory authority.

Table 3 also presents the growth in regulation over the entire time span in which important banking statutes could have an effect, 1927-2012 (from the first statute's enactment to two years after the last statute's enactment), and over the entire 100 years for which I collected data (1915-2015). As expected, regulatory growth is astounding, at over 10,000 and 20,000 percent, respectively, but the continuously compounded growth rate ranges between 5-7 percent, depending on the measure and interval. Both the Great Depression and Global Financial Crises have far higher continuously compounded growth rates than that over the entire time span. In fact, the continuously compounded growth in restrictive words in both of those crisis intervals grew faster than that over any noncrisis interval (although those of the Long Great Society and noncrisis decade between the S&L Crisis and Global Financial Crisis approach that of the Global Financial Crisis). The data in table 3, when evaluated jointly with the visual presentation in the figures, are consistent with the iron law hypothesis that financial crises dramatically accelerate growth in regulation.

4.2.3 Comparing Regulatory Growth over Crisis and Noncrisis Intervals

Given the observed upward trajectory in regulation over time in the figures and generally higher growth rates during financial crises compared to earlier intervals in table 3 (the Long Great Society and S&L Crisis being notable outliers), there is a question whether the growth over financial crises is due to an increasing trend in regulation over time. Table 4 reports the results of two model specifications in which the proxy measures for regulation are regressed upon crisis indicators, controlling for time. Panel A contains results for restrictive words as the dependent variable, panel B for the computer code complexity measure and panel C for the Senate manual complexity measure. Additional specifications are provided in the online appendix that vary the interval defining a crisis.

The first specification (equation 4 below and columns 1 and 3 in table 4) includes a time trend (“Year”) and indicator variables for each crisis, which =1 from the first year of a crisis through two years after enactment of the last statute attributed to a crisis (“GD” for the Great Depression, “S&L” for the Savings & Loan Crisis, and “GFC” for the Global Financial Crisis). This model seeks to test the iron law hypothesis as a generic proposition: whether regulation increases following financial crises and legislation enacted in their aftermath? The second specification (equation 5 below and columns 2 and 4 in the table) adds an indicator variable, “LGS,” for the Long Great Society era to the first specification. This model investigates the comparative impact of the noncrisis interval with the greatest growth rate in table 3 (the Long Great Society) to that of financial crises. It thus tests a further component of the iron law hypothesis, whether crises have a greater regulatory impact than noncrisis intervals. The regression models are:

$$y_t = \beta_0 + \beta_1 * \text{Year} + \beta_2 * \text{GD} + \beta_3 * \text{S\&L} + \beta_4 * \text{GFC} + \varepsilon_t \quad (4)$$

$$y_t = \beta_0 + \beta_1 * \text{Year} + \beta_2 * \text{GD} + \beta_3 * \text{S\&L} + \beta_4 * \text{GFC} + \beta_5 * \text{LGS} + \varepsilon_t \quad (5)$$

The models are estimated for the dependent variable computed using all title 12 agencies (columns 1 and 2 in table 4) and for only the OCC, Fed and FDIC (columns 3 and 4 in the table), over 1927-2012, the year the first important banking statute (a noncrisis-driven law) was enacted through two years after the last important statute (a crisis-driven law) was enacted.

As indicated in the table, while regulatory constraints (as measured by restrictive words) and complexity increase over time (the Year variable is statistically significantly positive for all three measures in all specifications), with the exception of the S&L Crisis in some specifications, as noted below, financial crises are also significantly positively correlated with all three measures. Accordingly, the larger increases in regulation during crises and their aftermath evident in the figures and table 3 persist when controlling for a time trend of increasing regulation observable in the figures.

The regressions further indicate that the effect of a financial crisis on regulation is not constant. Namely, a test for whether the three crisis coefficients are equal is rejected in all estimations, as would be intuited given differing continuously compounded growth rates for the crises reported in table 3. This finding indicates that a model with a single indicator for all crisis years would be misspecified. However, I estimated both specifications, for all three dependent variables, with an aggregated crisis indicator in place of the three separate crisis indicators, and the aggregate crisis indicator was positive and statistically significant in all of the estimations.

Although as reported in table 3 and observable in the figures, regulation increased considerably over the Long Great Society, the indicator variable for that era is negative and statistically significant in all specifications. This suggests the possibility that the higher growth over the era reported in table 3 is largely a function of the increasing regulatory trend over time. Given that the regressions are estimating a straight line, some intervals will lie below and others

above it, in the estimation. But the fact that the crises variables are significantly positive, and the Long Great Society indicator and constant term are consistently negative is in accord with the iron law intuition that crises and Congress's legislative responses are more consequential for regulatory growth than noncrisis times and their associated legislation.

I experimented with a further specification of the time variable, including a squared term, and that did not affect the results reported in table 4. In that specification, the time trend is significantly negative and the squared time term is significantly positive; the S&L and Global Financial Crisis indicators are significantly positive and the Great Depression indicator is positive and insignificant but a test that the coefficients of the crisis indicators are the same cannot be rejected; and the Long Great Society indicator is always negative but not always significant. A specification including a cubed time term as well as a squared time term had no further benefits as the cubed term was collinear with the trend term, which had to be dropped to estimate the model. In those specifications, the squared term is negative and significant, the cubed term positive and significant and all other results the same as in the estimations simply adding a squared time term. In short, as observable in the figures, financial regulation increases over time, regardless of the economic environment or legislation, but crises and their aftermaths independently contribute to that trend.

Despite the different magnitude of their effect, with one exception, the sign on the separate crisis indicators is positive: the S&L Crisis indicator is insignificantly negative for the Senate manual complexity measure computed over all title 12 agencies, when the Long Great Society indicator is included. The positive coefficients on the Great Depression and Global Financial Crisis indicators are statistically significantly positive in all estimations, while that of the S&L Crisis indicator is statistically significantly positive in all of the estimations where the

dependent variable is restrictive words, but in only three of the eight estimations when the dependent variable is one of the complexity measures. The less frequent significance of the S&L Crisis indicator is consistent with the lower regulatory growth experienced over its duration.

4.2.4. Why Is the Regulatory Impact of the S&L Crisis Lower than that of Other Crises?

The data in tables 3 and 4 indicating that the S&L Crisis has a far smaller regulatory impact (if at all, given its insignificance in a few specifications) compared to the other two crises are somewhat puzzling. I can at best only speculate on a number of possible explanations for that phenomenon. But this much I can assert with a measure of confidence: it is not due to Congress's delegating less to banking agencies in its legislative responses to the S&L Crisis compared to the Global Financial Crisis (delegation not being calculable, as earlier noted, for Great Depression-associated statutes). The average level of discretion is, in fact, over three times as high for the six S&L Crisis-driven statutes (.41) than it is for the two Global Financial Crisis-driven statutes (.13), although the difference is not statistically significant (t-statistic of 1.1426; one-tailed probability, .1484).

There are several notable differences between the S&L Crisis and the other two financial crises that could have contributed to its lower impact on regulation (both in the imposition of constraints as reflected in restrictive word counts and complexity), but none, in my judgment, provide an entirely satisfactory explanation of the difference. For instance, the S&L Crisis was far more regional in impact than the other crises, as failed institutions were concentrated in the Southwest, particularly in Texas, and in the Northeast. In addition, that crisis had less of a national economic impact according to conventional indices: there was no stock market crash (defined as cumulative real returns of -25 percent or less) during the S&L Crisis compared to the other two crises (Barro and Ursúa, 2017), and there was a far shorter recession (8 months) during

the S&L Crisis's time span, compared to 43 months and 18 months, respectively, for the Great Depression and Global Financial Crisis (National Bureau of Economic Research, 2021).

However, the more restricted geographical and economic dimension of the S&L Crisis did not translate into fewer bank failures or less activity by Congress. More institutions failed during the S&L Crisis than the Global Financial Crisis --well over 2,000 failed in the former compared to fewer than 500 in the latter (FDIC, 2013). Although a common perception is that larger institutions failed during the Global Financial Crisis than the S&L Crisis, the cost incurred by the government in resolving failed institutions was higher for the S&L Crisis than the Global Financial Crisis, estimated at \$87.9 billion (U.S. General Accounting Office, 1996) and \$72.5 billion (FDIC, 2013), respectively, figures not adjusted for inflation and including only Resolution Trust Corporation and not FDIC resolutions for the S&L Crisis figure, which, if adjusted, would make the S&L Crisis loss considerably larger. And Congress enacted more statutes in response to the S&L Crisis than to the Great Depression and Global Financial Crisis combined, no doubt influenced by the S&L Crisis's persistent duration over many years. Given such a complex backdrop, we cannot mechanically posit that regulators would be appreciably less active during such a crisis context than in the others.

A more potentially promising distinction among crises that could explain when regulators might be incentivized to increase regulatory activity is one of political economy. The political environment in which legislative responses to the S&L Crisis occurred can be differentiated from that of the other crises. All but the last S&L Crisis-driven statutes were enacted under divided government (Republican President and Democrat-controlled Congress), whereas there was unified government under Democrats' control when statutes were enacted in response to the Great Depression, and by the time Dodd-Frank was enacted (2010), after which regulation

dramatically accelerated, as observed in figure 1. If regulators are more willing or more easily able to ratchet up regulation and its complexity when the party most closely associated with advocacy of more robust regulation (Democrats) is in control of both the executive and legislative branches, then the differing political context might go some distance in explaining the S&L Crisis's lower measurable regulatory impact relative to other crises.

While the differential political circumstances would appear to offer a plausible explanation of the less intensive regulatory response to the S&L Crisis, there are noncrisis intervals of unified government under Democrats' control when statutes were enacted that do not coincide with large increases in regulation and its complexity (e.g., 1950-52; 1994-95). In fact, in nine of twelve combinations for the two time intervals in which an enactment and subsequent years had unified Democratic government, three proxy regulatory measures and agency count type (all title 12 or three agencies), the rate of growth in regulation is negative. But perhaps a comparison to action taken in noncrisis times is inapposite, and a more tailored explanation should be advanced, that in a crisis environment, when all government branches are controlled by Democrats, political leaders and regulators are apt to respond most forcefully. I explore this conjecture in another paper (Romano, 2023).

4.3. Attributing Regulatory Changes to Statutes

This section takes a more fine-tuned approach to testing the iron law, by evaluating regulatory growth more closely in relation to the timing of specific legislation. Namely, it seeks to tie regulatory changes to the enactment of specific statutes, to assess as best as possible whether there is a greater increase in regulation following crisis-driven than noncrisis-driven legislation.

Attribution of particular regulatory changes to specific statutes with precision is not

feasible given the extended time frame and number of agencies investigated and limitations in the CFR's identification of sources of revisions. While the CFR does list statutory sources, most often it references multiple statutes without specific attribution of one legislative source for revisions. Moreover, as discussed in the online appendix, there is no self-evident means for selecting an appropriate time frame over which to attribute word counts to a statute. I adopt an approach that relates regulatory changes to statutes by proximity to the timing of their enactment, recognizing that doing so is at best an approximation as it is not possible to distinguish regulators' initiation of revisions under authority granted by preexisting legislation at the same time as new legislation has been enacted. The time frame for this analysis is one to two years post-enactment for, as noted earlier and as further elaborated in the online appendix, a short window is necessary to avoid confounding the effects of crisis- and noncrisis-driven statutes enacted in close proximity to one another, a particular problem for ascertaining the impact of S&L Crisis-driven statutes.

Table 5 reports means comparison tests for regulatory growth rates over one and two year intervals following statutes' enactment, the two intervals that avoid the greatest number of statutory overlaps, thereby permitting a relatively clean comparison for the greatest number of statutes. The selection rules I adopt to eliminate overlaps are detailed in the online appendix, and figure A1 in the online appendix diagrams how the rules function. As that diagram shows, seventeen statutes meet the decision rule requirements to be included in the analysis of growth over one year post-enactment, and sixteen in the analysis of growth over two years post-enactment.

The growth rates of restrictive words and both complexity measures in all title 12 agencies' regulations over one or two years following a statute's enactment, are reported in table

5, along with means comparison tests of differences across the two sets of statutes. As noted earlier regarding means comparison tests in table 2, reported significance levels are for one-tailed tests because the iron law has a specific, directional hypothesis. Table A11 in the online appendix reports post-enactment growth rates of the three measures in regulations issued by the OCC, Fed and FDIC; its findings are similar to those reported here. As intuited by the iron law, the growth in regulation, whether measured by restrictive words or the complexity measures, is considerably higher following crisis-driven than non-crisis-driven statutes, whether calculated over one or two years post-enactment. The difference is statistically significant for five of six comparisons, and marginally significant for the sixth. These findings further corroborate the earlier reported findings of post-crisis increases in regulation. Moreover, the difference in growth rate across the two sets of statutes is impressive, ranging between 2.5 and 6.7 times larger following crisis-driven statutes compared to noncrisis-driven ones.

Table 6 provides a parallel presentation of the impact of legislation on the incremental change in banking regulation in a regression framework. Annual incremental changes in restrictive words and the complexity measures ($y = y_{t+1} - y_t$) from 1927-2012 in regulations issued by all title 12 agencies are regressed on indicator variables =1 for the year after a statute's enactment, with separate indicators for crisis-driven ("PostCrisis") and noncrisis-driven ("PostNoncrisis") statutes in panel A.

$$y = \beta_0 + \beta_1 * \text{PostCrisis} + \beta_2 * \text{PostNoncrisis} + \varepsilon_t \quad (6)$$

Biennial incremental changes ($y = y_{t+2} - y_t$) are analyzed using otherwise the same specification in panel B, with the indicator variables =1 now in both years after a statute's enactment.

There are three years in which two noncrisis-driven statutes were adopted (1978, 1994 and 2006); hence there are only twenty-two observations with an indicator variable=1 in the

annual regressions, and only forty observations in the biennial regressions because during the S&L Crisis five statutes were enacted in consecutive years with the last followed in the next year by a non-crisis statute, resulting in overlapping first- and second-years post enactment. These specifications do not include a time trend because, as indicated in online appendix figures A2-A4, which plot the annual incremental change in restrictive words and the two complexity measures, respectively, there is no discernible time trend in these variables.

The regression results are similar to those of the means comparison tests: in both models for all three dependent variables—restrictive words and both complexity measures—the indicator variable for the year(s) after enactment of a crisis-driven statute is significantly positive and the indicator variable for the year(s) after enactment of a noncrisis-driven statute is insignificant. Regulation increases following crisis-driven legislation. Online appendix table A12 presents analogous regressions of the incremental change in regulations issued by the OCC, Fed and FDIC; the results parallel those in table 6, with positive significance of the post-enactment crisis-driven statute year indicator variables and insignificance of the post-enactment noncrisis-driven statute year indicator variables.

The attribution to statutes in the regressions in table 6 are not as clean as those in table 5, in that, although every one-year post-enactment increment is unique to a statute, in the S&L Crisis years, annual incremental change could include the continuing impact of a statute enacted in an earlier year. The comparisons in table 5 eliminate consecutively enacted S&L Crisis-driven statutes with such overlaps. As these overlaps are all crisis-driven statutes, inclusion in the regression does not pose a significant issue for the overlapping indicators are all capturing the impact of legislation responding to a crisis. Namely, there is no instance of a noncrisis-driven statute preceding a crisis-driven statute by a year, a circumstance in which growth following a

crisis-driven statute could be confounded by continuing growth due to an earlier noncrisis-driven one. In fact, the only overlap between statutes in different categories is the reverse, the incremental growth following the noncrisis-driven statute enacted in 1994 might capture a possibly continuing impact of crisis-driven statutes enacted in 1993 or 1992. This is therefore a relatively conservative test for measuring the effect of the iron law, at least for the S&L Crisis. In addition, the regressions compare the impact of crisis-driven statutes not only to that of noncrisis-driven statutes, but also to regulatory change in years not related to any legislation.

The data in tables 5 and A11 provide, in my judgment, compelling information regarding the iron law because they relate as best as possible changes in regulation to specific laws, and that in tables 6 and A12 provide additional confirming data. They also, in all likelihood, underestimate crisis-driven statutes' impact for by examining, by necessity, at most a two-year window post-enactment, both the means comparison tests and regressions ignore any subsequent effect from a rulemaking process that can take many years.

The tests are not, however, robust, in that, if growth rates are used rather than incremental changes as dependent variables of the regressions, the post-crisis-driven statute indicator variable is no longer significant, and means comparison tests of incremental changes rather than growth rates are not significant (despite extremely large differences in the incremental change in restrictive words and complexity measures across the two categories of statutes). Although there is a plausible explanation for finding a difference across the regressions and means comparison tests because fewer statutes are analyzed in the means comparison tests and the omitted crisis-driven statutes tend to have low values of the growth measures, I do not have an explanation for the differing findings within (as well as across) methodologies when the change in regulation is measured somewhat differently (as a growth rate versus the incremental change).

Nevertheless, the statistically significant results are, in my judgment, credible because they are corroborated by the earlier analyses-- the runs test, means comparison tests of statutes' regulatory content, and the specifications in table 4 showing the presence of a strong association between crises and increased regulations when controlling for time. Consistent with those analyses, the significantly greater levels of complexity and constraining text (i.e., restrictive words) in regulations issued closely following the enactment of crisis-driven statutes in contrast to noncrisis-driven ones, presented in tables 5 and 6, point in the same direction, in accordance with the iron law's conjecture that crises amplify increases in financial regulation that often occur in noncrisis times.

5. Conclusion

The iron law of financial regulation -- in the wake of financial crises, the U.S. Congress invariably enacts legislation that produces a regulatory ratchet, layering new laws and regulations upon existing ones -- has empirical support. In a hierarchy of relative importance, crisis-driven statutes are more consequential for the heightening of regulation than noncrisis ones. A simple runs test of the plausibility of the hypothesis (the association between legislation and crises) indicates that the enactment of crisis-driven statutes is a non-random event, in contrast to statutes enacted in noncrisis times, and parallel regression analysis indicates a strong correlation between years of financial crises and the probability of enactment of important banking laws. More important, crisis-driven financial legislation has significantly greater regulatory content, measured by text imposing constraints on firms (restrictive words) and textual complexity, and is followed by significantly higher levels of regulation (restrictive words and complexity) than noncrisis-driven legislation.

As would be intuited, banking regulation has increased in parallel with the growth of the

administrative state since the 1960s, particularly during the era referred to as the Long Great Society, during which the continuously compounded rate of growth in regulation was similar to that of the two most significant financial crises, the Great Depression and Global Financial Crisis. But a multivariate analysis indicates that financial crises have had a greater regulatory impact than all noncrisis intervals, controlling for an increasing regulatory trend over time, in accord with the iron law intuition, whereas the Long Great Society does not have such an effect. Further, the data corroborate the iron law's additional claim regarding financial legislation in noncrisis times, that their deregulatory initiatives which occur intermittently, are short-lived as measured by regulation on the books, as subsequent legislation generates regulations that quickly swamp any decline from such initiatives.

Finally, crises and their legislative aftermath result in substantial increases in restrictive words and regulatory complexity, but the effect differs across crises. The S&L Crisis has a far more attenuated impact on regulation than both the Great Depression and Global Financial Crisis, despite its considerably longer duration and more frequent congressional responses with legislation.

The finding of a significant differential regulatory impact of crisis-driven financial legislation suggests that there might be value added to consider adopting mechanisms within the extant legislative toolkit that focus on periodic reassessments of legislation that can mitigate potential adverse effects generated by statutes enacted in the exigency of tumultuous economic times. Such an approach would seem to have the potential to add value, for as the originators of the complexity measure suggest, intuitively, greater complexity tends to generate greater legal uncertainty and a heightened possibility of error.

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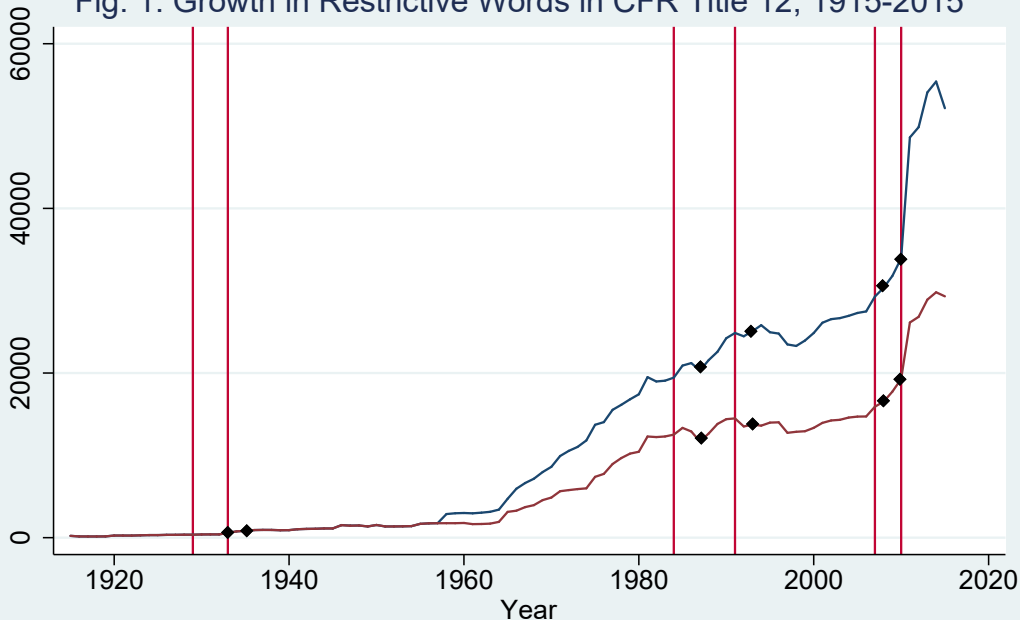
Notes

1. The two-year cutoff includes only two statutes that would be excluded using a one-year cutoff. They are best characterized as crisis driven because they relate to agencies created by legislation enacted during the financial crisis they followed. The Banking Act of 1935, Pub. L. No. 74-305, 49 Stat. 684, made permanent the FDIC, which was created as a temporary agency in the Banking Act of 1933, Pub. L. No. 73-66, 48 Stat. 162. The Resolution Trust Corporation Completion Act, Pub. L. No. 103-204, 107 Stat. 2369 (1993), extended funding for the Resolution Trust Corporation, which was established in the Financial Institutions Reform, Recovery and Enforcement Act of 1989 (FIRREA), Pub. L. No. 101-73, 103 Stat. 183, to resolve failed financial institutions. However, unless otherwise indicated, none of the statistically significant findings using this definition of a crisis-driven statute differ from those when the two statutes are classified as noncrisis-driven.

2. The rate of growth, R , over an interval, is calculated as: $R = (W_1 - W_0)/W_0$, where $W =$

the number of words (restrictive or conditional used to define complexity) in the year indexed by the subscript 0 (interval's starting year) and 1 (interval's ending year). The continuously compounded growth rate is computed by solving for r in the formula for continuous compounding: $W_1 = W_0 e^{rt}$, where W_0 and W_1 are as defined above, t is the number of years in the interval (i.e., the period over which the growth rate is being compounded), and e is a mathematical constant approximately equal to 2.71828. The equation is solved by dividing by W_0 and taking the natural log of both sides, i.e., $\ln(W_1/W_0) = \ln(e^{rt}) = rt \ln(e)$; $r = \ln(W_1/W_0)/t$, as $\ln(e) = 1$.

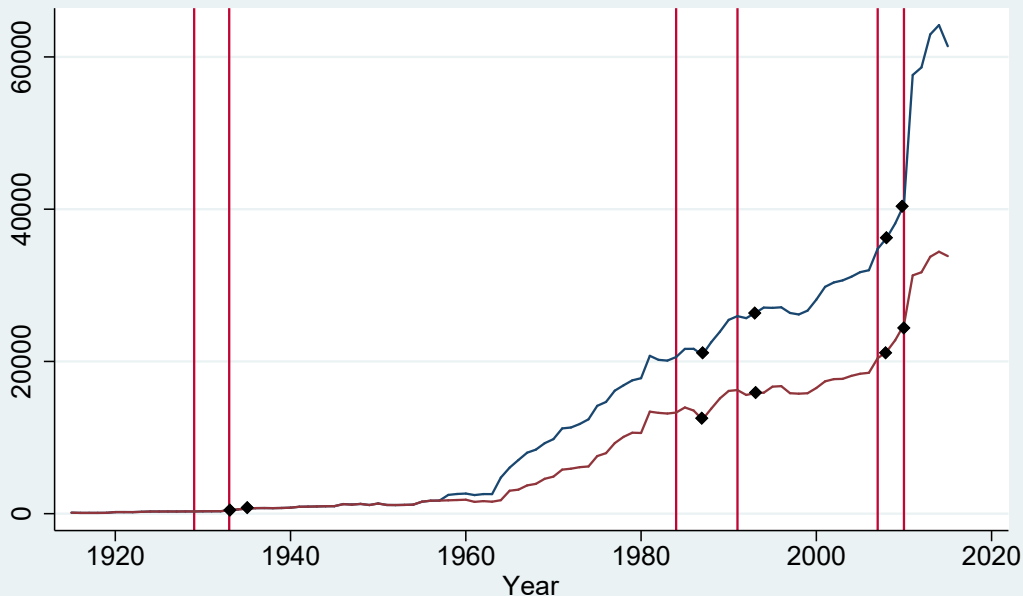
Fig. 1. Growth in Restrictive Words in CFR Title 12, 1915-2015



— All Title 12 Agencies — OCC, Fed, FDIC

Lines: financial crisis start and end years; diamonds: first and last crisis-driven statute

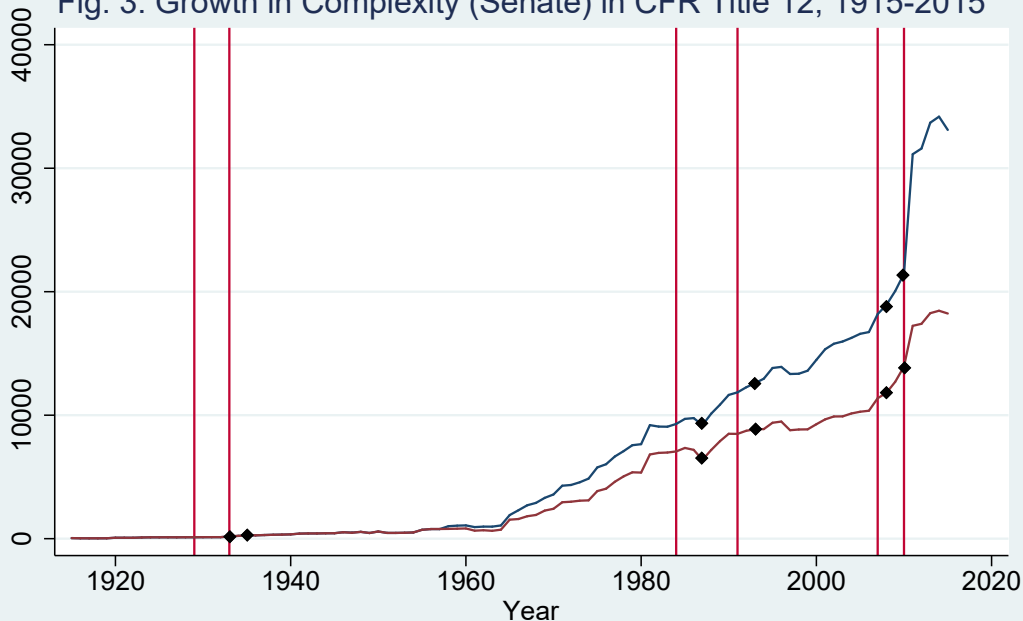
Fig. 2. Growth in Complexity in CFR Title 12, 1915-2015



— All Title 12 Agencies — OCC, Fed, FDIC

Lines: financial crisis start and end years; diamonds: first and last crisis-driven statute

Fig. 3. Growth in Complexity (Senate) in CFR Title 12, 1915-2015



— All Title 12 Agencies — OCC, Fed, FDIC

Lines: financial crisis start and end years; diamonds: first and last crisis-driven statute

Fig. 4. Log Growth in Restrictive Words in CFR Title 12, 1915-2015

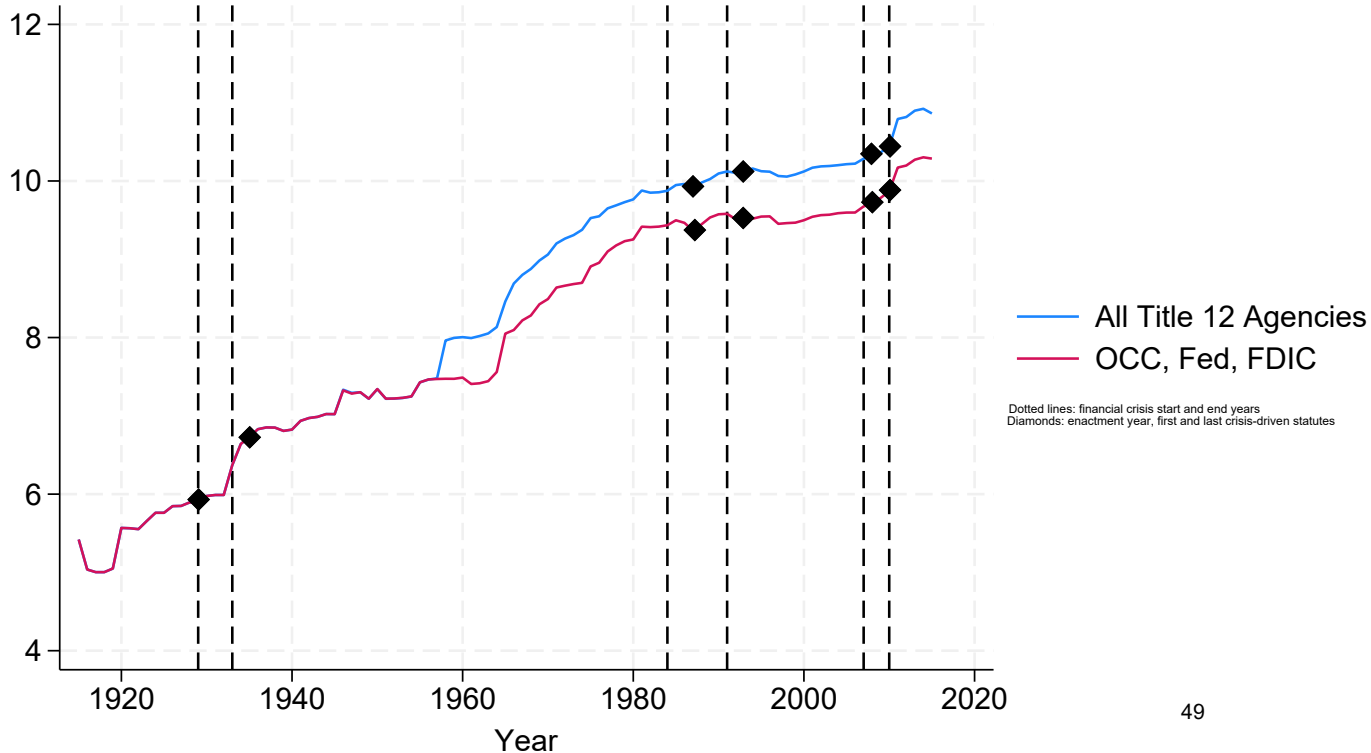


Fig. 5. Log Growth in Complexity in CFR Title 12, 1915-2015

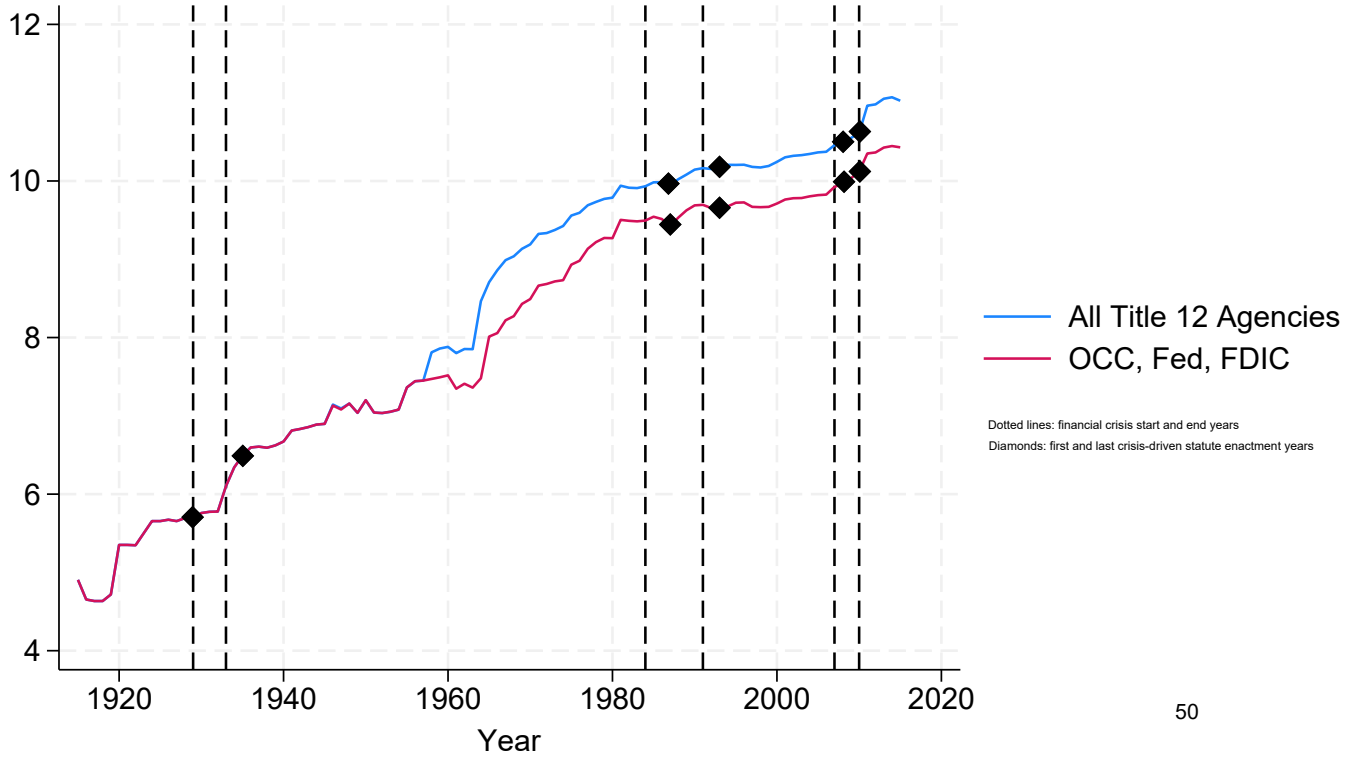


Fig. 6. Log Growth in Complexity (Senate) in CFR Title 12, 1915-2015

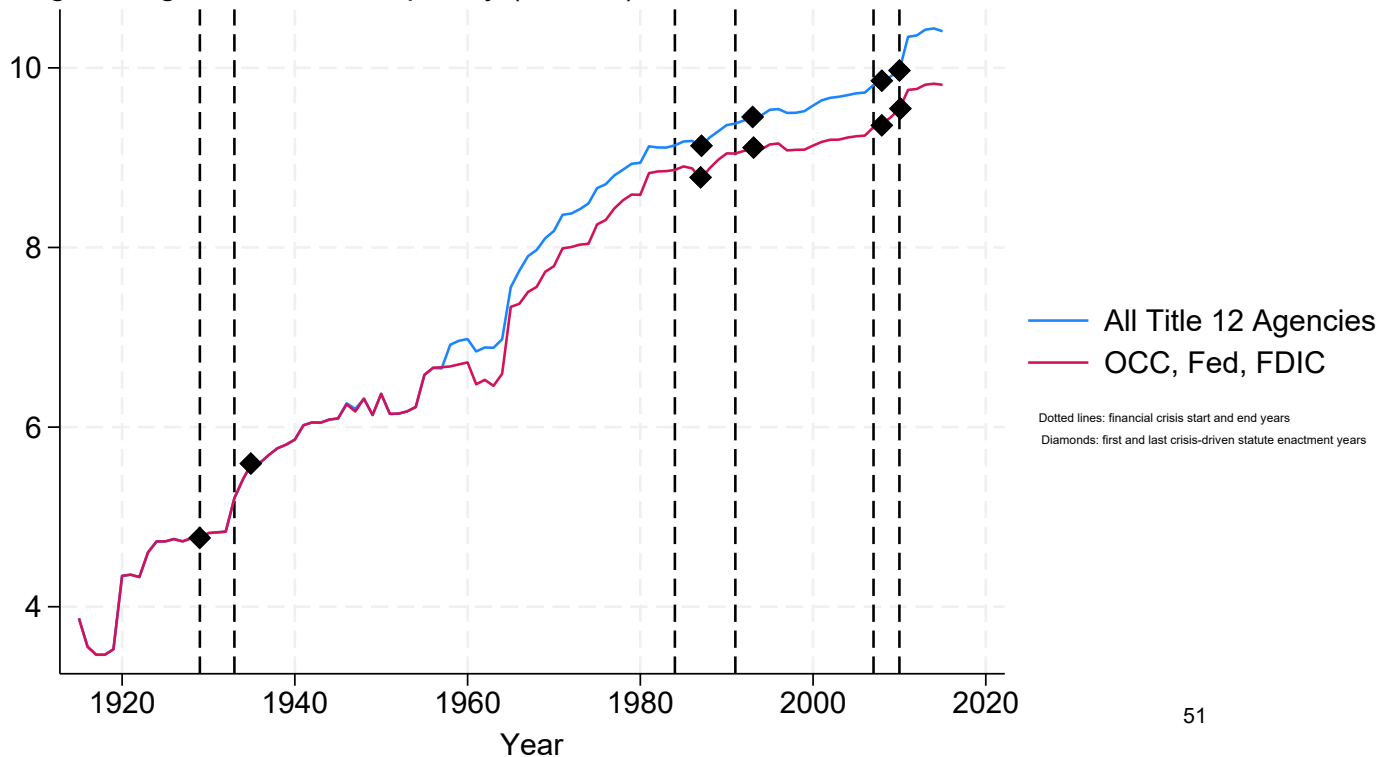


Table 1. US Banking Crises and Important Banking Legislation after the Organization of the Federal Reserve System.

Years*	Important Banking Laws^
1927	Act to Amend the National Banking Laws and the Federal Reserve Act (also known as the McFadden Act of 1927) (Pub. L. No. 69-639)
Great Depression 1929-33	<i>Banking Act of 1933 (Pub. L. No. 73-066)</i> <i>Banking Act of 1935 (Pub. L. No. 74-205)</i>
1950-66	Federal Deposit Insurance Act of 1950 (Pub. L. No. 81-797) Bank Holding Company Act of 1956 (Pub. L. No. 84-511) Financial Institutions Supervisory Act of 1966 (Pub. L. No. 89-695)
1978-82	International Banking Act of 1978 (Pub. L. No. 95-369) Financial Institutions Regulatory and Interest Rate Control Act of 1978 (Pub. L. No. 95-630) Depository Institutions Deregulation and Monetary Control Act of 1980 (Pub. L. No. 96-221) Garn-St. Germain Depository Institutions Act of 1982 (Pub. L. No. 97-320)
Savings & Loan Crisis 1984-91	<i>Competitive Banking Act of 1987 (CEBA) (Pub. L. No. 100-86)</i> <i>Financial Institutions Reform, Recovery, and Enforcement Act of 1989 (FIRREA) (Pub. L. No. 101-73)</i> <i>Crime Control Act of 1990 (Title XXV, Comprehensive Thrift and Bank Fraud Prosecution and Taxpayer Recovery Act of 1990) (Pub. L. No. 101-647)</i> <i>Federal Deposit Insurance Corporation Improvement Act of 1991 (FDICIA) (Pub. L. No. 102-242)</i> <i>Housing and Community Development Act of 1992 (Pub. L. No. 102-550)</i> <i>RTC Completion Act (Pub. L. No. 103-204, enacted in 1993)</i>
1994-99	Riegle Community Development and Regulatory Improvement Act of 1994 (Pub. L. No. 103-325) Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994 (Pub. L. No. 103-328) Economic Growth and Regulatory Paperwork Reduction Act of 1996 (Pub. L. No. 104-208) Gramm-Leach-Bliley Act of 1999 (Pub. L. No. 106-102)

2001-06	Check Clearing for the 21 st Century Act (Pub. L. No. 108-100, enacted in 2003) Federal Deposit Insurance Reform Act of 2005 and Federal Deposit Insurance Conforming Amendments Act of 2005 (Pub. L. Nos. 109-171 and 109-173, both enacted in 2006) Financial Services Regulatory Relief Act of 2006 (Pub. L. No. 109-351)
<i>Global Financial Crisis 2007-10</i>	<i>Emergency Economic Stabilization Act of 2008 (Pub. L. No. 110-343)</i> <i>Dodd-Frank Wall Street Reform and Consumer Protection Act (Pub. L. No. 111-203, enacted in 2010)</i>

* Years in bold italics are years in which the United States experienced a financial crisis since the establishment of the Federal Reserve System, as identified in the literature summarized in appendix table A1. ^ Statutes are identified from a list of important banking laws constructed by the Federal Deposit Insurance Corporation (2021) and that have Policy Agenda Project (PAP) codes for banking regulation; public law numbers and information about PAP codes are provided in the online appendix. Statutes classified as crisis-driven are in bold italics.

Table 2. Characteristics of Important Banking Laws

A. Means Comparison Tests

Characteristic of statute (number of statutes)	All Statutes	Statutes enacted in the wake of a financial crisis	Statutes not enacted in the wake of a financial crisis	t-statistic for difference in means (probability)
Restrictive words (25)	691	1,220	339	-2.0502* (0.0346)
Complexity (25)	376	612	218	-1.8637* (0.0462)
Complexity (Senate) (25)	159	258	92	-1.8834* (0.0445)
Discretion (20)	.2415	.3374	.1776	-1.3973 (0.1976)

B. Regressions

Variable	Restrictive words	Complexity	Complexity (Senate)	Discretion
Financial crisis statute	863.37* (345.52)	385.73* (172.28)	161.77* (70.81)	.1973+ (.1080)
Year	9.78 (7.18)	4.76 (3.58)	2.39 (1.47)	-.0028 (.0034)
Constant	-19028.61 (14227.17)	-9215.81 (7093.75)	-4636.64 (2915.73)	5.72 (6.80)
No. observations	25	25	25	20
Adjusted R-squared	.2096	.1728	.2037	.0659

This table presents, in panel A, mean values of characteristics of the twenty-five statutes (ten crisis-driven and fifteen noncrisis-driven) identified in table 1 and t-test comparing the means across the two types of statutes, and in panel B, linear regressions with the dependent variables the statute characteristics. “Restrictive words” are the number of the following terms in a statute: “shall,” “must,” “may not,” “prohibited” and “required” (Al-Ubaydli and McLaughlin, 2014). “Complexity” is measured by the number of conditional words (“if,” “except,” “but,” “provided,” “when,” “where,” “whenever,” “unless,” “notwithstanding,” “in no event,” and “in the event”),

that indicate complexity in computer source codes and “Senate Complexity” counts the number of recommended terms for conditional provisions in a Senate drafting manual: “if,” “but” and “except that” (Li et al., 2015). “Discretion” measures the extent to which a statute delegates authority to an agency, adjusted for the statute’s imposition of constraints on agency authority, adapted from Epstein and O’Halloran (1999). Given missing data, discretion is calculated for eight crisis-driven and twelve noncrisis-driven statutes. “Financial crisis statute” is an indicator variable for a crisis-driven statute. “Year” is the year in which a statute is enacted. Means comparison tests are computed in Stata; variances are tested for equality and where the variances are unequal, Welch’s formula is used for the comparison test. Regressions are estimated in Stata. Standard errors are in parentheses. + = significant at 10 percent; * = significant at 5 percent; and ** = significant at 1 percent. The means comparison tests for restrictive words and the complexity measures are one-sided tests as the iron law hypothesis is directional; the means comparison test for discretion is two-tailed as the iron law has no specific prediction regarding delegation.

Table 3. Growth in Regulations in CFR Title 12 Over Time

Time Interval	Restrictive words, all agencies	Complexity, all agencies	Senate Complexity, all agencies	Restrictive words, 3 agencies	Complexity, 3 agencies	Senate Complexity, 3 agencies
Establishment of Fed to pre-GD (1915-28)	.6062 (.0365)	1.20 (.0607)	1.4375 (.0685)	.6062 (.0365)	1.20 (.0607)	1.4375 (.0685)
<i>GD to last statute +2 (1929-37)</i>	<i>1.6061 (.1197)</i>	<i>1.5085 (.1150)</i>	<i>1.5299 (.1160)</i>	<i>1.6061 (.1197)</i>	<i>1.5085 (.1150)</i>	<i>1.5299 (.1160)</i>
Pre-war (1938-41)	.0900 (.0287)	.2452 (.0731)	.2915 (.0853)	.0900 (.0287)	.2452 (.0731)	.2915 (.0853)
War years (1942-45)	.0506 (.0165)	.0680 (.0219)	.0447 (.0146)	.0506 (.0165)	.0680 (.0219)	.0447 (.0146)
Post-war (1946-60)	.9572 (.0480)	1.0920 (.0527)	1.050 (.0513)	.1785 (.0111)	.4720 (.0276)	.5942 (.0333)
Long Great Soc. (1961-76)	3.6537 (.1025)	4.9776 (.1192)	5.3937 (.1237)	3.7039 (.1032)	4.1277 (.1090)	5.2308 (.1220)
Post-Long Great Soc. to pre-S&L crisis (1977-83)	.2248 (.0338)	.2447 (.0365)	.3645 (.0518)	.3737 (.0529)	.4187 (.0583)	.5143 (.0692)
<i>S&L Crisis to last statute +2 (1984-95)</i>	<i>.2986 (.0238)</i>	<i>.3209 (.0253)</i>	<i>.4934 (.0365)</i>	<i>.1164 (.0100)</i>	<i>.2561 (.0207)</i>	<i>.3287 (.0258)</i>
Post-S&L Crisis to pre-GFC (1996-2006)	.0989 (.0094)	.1735 (.0160)	.1946 (.0178)	.0505 (.0049)	.1046 (.0099)	.0924 (.0088)
<i>GFC to last statute +2 (2007-12)</i>	<i>.7166 (.1081)</i>	<i>.6918 (.1052)</i>	<i>.7429 (.1111)</i>	<i>.6860 (.1045)</i>	<i>.5532 (.0881)</i>	<i>.5297 (.0850)</i>
<i>First statute to last statute +2 (1927-2012)</i>	<i>141.05 (.0583)</i>	<i>203.99 (.0626)</i>	<i>277.31 (.0662)</i>	<i>76.31 (.0512)</i>	<i>109.90 (.0554)</i>	<i>153.0 (.0593)</i>

<i>All years (1915-2015)</i>	227.30 <i>(.0543)</i>	453.93 <i>(.0612)</i>	685.52 <i>(.0653)</i>	128.73 <i>(.0487)</i>	249.67 <i>(.0552)</i>	378.92 <i>(.0594)</i>
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This table presents growth rates of word counts in title 12 of the Code of Federal Regulations, which contains banking regulations, for all title 12 agencies and for three agencies (Office of Controller of the Currency, Federal Reserve System and Federal Deposit Insurance Corp.), for three proxy measures of regulation, computed over intervals indicated in column one, with financial crisis periods in bold italics. “Fed” is Federal Reserve System; “GD” is the Great Depression (1929-33); “S&L Crisis” is the Savings & Loan Crisis (1984-91); “GFC” is the Global Financial Crisis (2007-10). The duration of the crisis intervals is from the first year of a crisis through two years after the enactment of the last statute attributed to a crisis, in order to capture the impact of regulations adopted in response to crisis-driven statutes. “Long Great Soc.” = Long Great Society era dated 1961-76 (Grossman, 2014). “Restrictive words” are the following terms in a regulation: “shall,” “must,” “may not,” “prohibited” and “required” (Al-Ubaydli and McLaughlin, 2014). “Complexity” is a count of the following conditional words in a regulation: “if,” “except,” “but,” “provided,” “when,” “where,” “whenever,” “unless,” “notwithstanding,” “in no event” and “in any event” and “Complexity (Senate)” counts the following conditional words, identified in the Senate’s drafting manual, in a regulation: “if,” “but” and “except that” (Li et al., 2015). The growth rate over an interval is calculated as: $R = (W_1 - W_0)/W_0$, where W = the number of words (restrictive or conditional used to define complexity) in the year indexed by the subscript 0 (interval’s starting year) and 1 (interval’s ending year). The rate of growth, r , continuously compounded over an interval, which is the figure in parentheses, is calculated by solving for r in the formula for continuously compounded interest, $W_1 = W_0 e^{rt}$, where t is the number of years of compounding over the interval, the W ’s are as defined above, and e is a mathematical constant approximately equal to 2.71828.

Table 4. Effect of Crises on Banking Regulation

A. Restrictive Words as Dependent Variable

Variable	All Agencies	All Agencies	Three Agencies	Three Agencies
Year	421.34** (19.77)	424.51** (18.32)	228.43** (11.37)	230.59** (10.14)
GD	5545.95** (1327.58)	4755.75** (1246.36)	2786.07** (763.21)	2248.25** (689.91)
S&L	3434.57** (1107.61)	2465.43* (1056.43)	2643.67** (636.76)	1984.06** (584.78)
GFC	9425.71** (1609.36)	8393.22** (1514.28)	5090.76** (925.21)	4388.04** (838.22)
LGS		-3310.15** (868.74)		-2252.91** (480.89)
Constant	-819378.5** (38890.12)	-824710.2** (36028.95)	-443715.5** (22357.51)	-447344.3** (19943.59)
No. observations	86	86	86	86
Adjusted R-squared	.9274	.9378	.9220	.9380

B. Complexity as Dependent Variable

Variable	All Agencies	All Agencies	3 Agencies	3 Agencies
Year	483.78** (22.67)	487.27** (21.15)	282.12** (13.08)	285.19** (10.80)
GD	6595.63** (1522.53)	5723.43** (1438.91)	3840.89** (878.26)	3076.29** (734.36)
S&L	2398.13+ (1270.26)	1328.43 (1219.64)	2284.41** (732.74)	1346.68* (622.45)
GFC	13073.74** (1845.69)	11934.13** (1748.22)	7149.85** (1064.67)	6150.83** (892.22)
LGS		-3653.62** (1002.96)		-3202.86** (511.87)
Constant	-941248.7** (44600.98)	-947133.7** (41595.16)	-548697.3** (25727.64)	-553856.1** (212228.43)
No. observations	86	86	86	86

Adjusted R-squared	.9291	.9384	.9310	.9531
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C. Complexity (Senate) as Dependent Variable

Variable	All Agencies	All Agencies	3 Agencies	3 Agencies
Year	245.28** (13.39)	247.97** (11.74)	158.05** (7.46)	159.87** (6.03)
GD	3742.45** (898.89)	3071.26** (798.75)	2275.68** (500.91)	1821.36** (409.99)
S&L	673.12 (749.95)	-150.06 (677.03)	1146.92** (417.91)	589.72+ (347.51)
GFC	8200.12** (1089.68)	7323.13** (970.45)	4069.76** (607.23)	3476.14** (498.12)
LGS		-2811.62** (556.75)		-1903.16** (285.77)
Constant	-477666.5** (26331.92)	-482195.2** (23089.78)	-307592.9** (14673.54)	-310658.3** (11851.62)
No. observations	86	86	86	86
Adjusted R-squared	.9102	.9311	.9280	.9531

This table presents linear regressions with dependent variables in panel A of the number of restrictive words, in panel B of complexity, and in panel C, of complexity (Senate), of all regulations in title 12 of the Code of Federal Regulations, the banking title, from 1927-2012, the year the first important banking statute in table 1 was enacted through two years after the end of the last financial crisis, the Global Financial Crisis, and the last statute enacted in table 1. “Restrictive words” are the number of the following terms: “shall,” “must,” “may not,” “prohibited” and “required” (Al-Ubaydli and McLaughlin, 2014). “Complexity” is a count of the following conditional words: “if,” “except,” “but,” “provided,” “when,” “where,” “whenever,” “unless,” “notwithstanding” “in no event” and “in any event” and “Complexity (Senate)” counts the following conditional words, identified in the Senate’s drafting manual: “if,” “but” and “except that” (Li et al., 2015). “Year” is a time trend variable denoted by year; “GD,” “S&L” and “GFC” are indicator variables =1 for a year in the Great Depression (1929-37), Savings & Loan Crisis (1984-1995) and Global Financial Crisis (2007-2012), respectively, the interval from the first year of a crisis through two years after enactment of the last statute attributed to the crisis; “LGS” is an indicator variable =1 for a year in the Long Great Society era (1961-1976). Standard errors are in parentheses. + = significant at 10 percent; * = significant at 5 percent; and ** = significant at 1 percent.

Table 5. Growth in Regulation after Enactment of Important Banking Laws

A. Growth in Regulation over One-year Post-enactment

Measure of growth in regulation	All Statutes	Statutes enacted in the wake of a financial crisis	Statutes not enacted in the wake of a financial crisis	t-statistic for difference in means (probability)
Restrictive words	.0781	.1734	.0260	-2.1119* (.0381)
Complexity	.0813	.1673	.0344	-2.3696* (.0158)
Complexity (Senate)	.0803	.1555	.0393	-1.7554* (.0498)

B. Growth in Regulation over Two-years Post-enactment

Measure of growth in regulation	All Statutes	Statutes enacted in the wake of a financial crisis	Statutes not enacted in the wake of a financial crisis	t-statistic for difference in means (probability)
Restrictive words	.1503	.2552	.1027	-1.4759+ (.0811)
Complexity	.1184	.2634	.0524	-3.0911** (.0040)
Complexity (Senate)	.1279	.2728	.0621	-2.7138** (.0084)

This table presents the mean values of growth in restrictive words and complexity of all agency regulations in title 12 of the Code of Federal Regulations, the banking title, over two intervals following the enactment of seventeen statutes (six crisis-driven and eleven noncrisis-driven) in the one-year interval; and sixteen statutes (five crisis-driven and eleven noncrisis-driven) in the two-year interval, from those identified in table 1, whose one- or two-year post-enactment intervals have no overlap with another statute’s one- or two- year post-enactment interval, respectively. “Restrictive words” are the number of the following terms in a statute: “shall,” “must,” “may not,” “prohibited” and “required” (Al-Ubaydli and McLaughlin, 2014). “Complexity” is a count of the following conditional words in a regulation: “if,” “except,” “but,” “provided,” “when,” “where,” “whenever,” “unless,” “notwithstanding,” “in no event” and “in any event” and “Complexity (Senate)” counts the following conditional words, identified in the Senate’s drafting manual, in a regulation: “if,” “but” and “except that” (Li et al., 2015). The analysis avoids double counting by using only one observation for years in which two statutes were enacted for in contrast to table 2 whose variable values are unique to each statute, CFR tallies do not vary for statutes enacted in the same year. Means comparison tests are computed in Stata; variances are tested for equality and where the variances are unequal, Welch’s

formula is used for the comparison test. Significance levels are from one-sided tests because the iron law hypothesis is directional; + = significant at 10 percent; * = significant at 5 percent; and ** = significant at 1 percent.

Table 6. Incremental Change in Regulation after Enactment of Important Banking Laws

A. One-year Incremental Change in Regulation

Variable	Restrictive Words	Complexity	Complexity (Senate)
1 year post- Crisis statute enactment	1709.32** (541.04)	1995.36** (629.04)	1194.05** (351.48)
1 year post-Noncrisis statute enactment	6.27 (500.53)	314.31 (581.94)	263.33 (325.16)
Constant	369.48+ (198.91)	398.44+ (231.24)	188.75 (129.21)
No. observations	86	86	86
Adjusted R-squared	.0879	.0867	.1019

B. Two-year Incremental Change in Regulation

Variable	Restrictive Words	Complexity	Complexity (Senate)
2 years post- Crisis statute enactment	1189.29* (460.67)	1443.21** (534.54)	929.61** (296.72)
2 years post-Noncrisis statute enactment	-37,15 (399.67)	128.18 (464.02)	147.44 (257.91)
Constant	358,22 (233.71)	371.90 (271.35)	150.24 (150.82)
No. observations	86	86	86
Adjusted R-squared	.0573	.0587	.0841

This table presents linear regressions with the dependent variables the one-year (panel A) and two-year (panel B) incremental change in restrictive words and complexity in regulations in title 12 of the Code of Federal Regulations, the banking regulations title, for all title 12 agencies, from 1927-2012, to examine the effect on growth following the enactment of important banking statutes (identified in table 1). “Restrictive words” are the number of the following terms in a statute: “shall,” “must,” “may not,” “prohibited” and “required” (Al-Ubaydli and McLaughlin, 2014). “Complexity” is a count of the following conditional words in a regulation: “if,” “except,” “but,” “provided,” “when,” “where,” “whenever,” “unless,” “notwithstanding,” “in no event” and “in any event” and “Complexity (Senate)” counts the following conditional words, identified in the Senate’s drafting manual, in a regulation: “if,” “but” and “except that” (Li et al., 2015). “1 year post-Crisis statute enactment” is an indicator variable =1 for the year after a crisis-driven statute’s enactment; “1 year post-Noncrisis statute enactment” is an indicator variable for the year after a noncrisis-driven statute’s enactment; “2 year post-Crisis statute enactment” is an indicator variable =1 for the first and second years after a crisis-driven statute’s enactment; “2 year post-Noncrisis statute enactment” is an indicator variable for the first and second years after a noncrisis-driven statute’s enactment. Standard errors are in parentheses. + = significant at

10 percent; * = significant at 5 percent; and ** = significant at 1 percent.