Testing the Crisis-Legislation Hypothesis: Citation Indexing and the Measurement of Legislative Importance

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Abstract

Scholars frequently assert that financial legislation in the U.S.—both legislation that affects capital markets and the banking system—is invariably crisis-driven. This 'crisis legislation hypothesis' is often cited as an explanation for various supposed shortcomings of US financial legislation, including that it is ill-conceived, inadequate to the problems it aims to address, and subject to political manipulation. Despite the prevalence of the crisis legislation hypothesis, however, its threshold assumption—that Congress passes major financial legislation only when crises arise—has never been analyzed empirically. This article provides that analysis. We first devise a new system for systematically assessing legislative importance based on the notion of citation indexing, the principal at the heart of algorithms used by modern search engines such as Google. Using a suite of legislative importance metrics, we show that the crisis legislation hypothesis fits strongly for securities laws, but far less so for banking legislation.

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1 Introduction

In the late fall of 2008, as markets imploded and storied firms on Wall Street stumbled toward (or beyond) collapse, policymakers affiliated with President-elect Barack Obama strategized about the appropriate legislative policy course for the new Administration to address the problems of the financial system that the 2008 crisis had, to their eyes, exposed. Rahm Emanuel, a Democratic congressman tapped by the new president, (in)famously summed up the legislative opportunity confronting the Administration and its congressional coalition to a Wall Street Journal conference, "You never want a serious crisis to go to waste." (Seib, 2008). The crisis concentrated the minds of legislators, the thinking went, so letting the opportunity pass without reform would close that window of opportunity.

The idea that financial legislation in the United States is caused by a political response to crises is not only promoted by those who seize the levers of reform. Over the last two decades, legal scholars have formed a hypothesis about the causal relationship between crises and financial legislation (roughly, legislation governing both the capital markets and banking). Roberta Romano, for example, describes an "iron law" of financial regulation: that is, that major legislation is "invariably" crisis-driven. (Romano, 2014). Paul Mahoney writes similarly that "nearly all significant financial reform legislation in England and America has been enacted in the aftermath of a collapse in equity values" (Mahoney, 2015). This idea has become the common ground for warring scholarly camps who see crisis either as the necessary prerequisite for organizing collective action (Gerding, 2009; Coffee, 2012) or as the toxic background that promotes counterproductive law (Romano, 2005, 2014; Bainbridge, 2010; Mahoney, 2015). If the crisis legislation hypothesis is correct, then it provides valuable focus to both groups, indicating that efforts to improve our financial system should focus scholarly attention and policy advocacy on the periods immediately following crises. If the hypothesis errs, however, efforts by both groups to understand and improve our financial system may be led astray.

History provides some obvious examples of "crisis legislation." Besides the 2010 Wall Street Reform and Consumer Protection Act (Dodd-Frank), scholars frequently point to the Federal Reserve Act of 1913 as crisis legislation intended to respond to the Panic of 1907 (Lowenstein, 2015; Bruner and Carr, 2008). And the Great Depression ushered in the short- and long-lived reforms such as federal deposit insurance (still in place), and the separation of commercial and investment banking (essentially abolished). Rahman (2012).

On the other hand, there are numerous counter-examples to the crisis-legislation hypothesis in which prominent pieces of legislation, have been passed at significant distance from financial crises, such as the Bank Holding Company Act of 1956, what is commonly called the Bank Secrecy Act of 1970, the Private Securities Litigation Reform Act of 1995, and even the Federal Reserve Act of 1913 itself (see Conti-Brown (2016). Other major pieces of banking regulation, such as the 1975 Home Mortgage Disclosure Act

(HMDA) or the 1977 Community Reinvestment Act (CRA) were likewise passed with no financial crises in sight. And, arguably one of the most extensive governmental interventions in the financial market in the past century, the creation (and concurrent regulation) of the government sponsored enterprises (GSEs) such as Fannie Mae, Freddie Mac, and Sallie Mae, was largely accomplished through a series of non-crisis laws, such as the Housing Act of 1948, the Housing Act of 1954, The Housing and Urban Development Act of 1968, the Emergency Home Finance Act of 1970, and the Education Amendments of 1972.[1]

It is not enough, though, to list examples and counterexamples to assess the validity and applicability of the crisis legislation hypothesis. While the extensive list of counter-examples above makes it difficult to accept the strongest versions of the crisis legislation hypothesis—that major legislation is "invariably" crisis-driven—we may wonder, are these the exceptions that prove the rule, or is there more exception than rule? And, might the hypothesis be truer for certain types of legislation than other, or for certain historical eras more than others?

To make progress on these questions, we develop a novel methodology for systematically measuring the importance of hundreds of pieces of US financial legislation passed between 1912 and 2011.[2] Our method is based on the principles of citation indexing. These principles have been used for over half a century in other fields such as assessing the impact of academic articles (Garfield, 1955) and in identifying important web sites to return in search results in modern search engines such as Google (Vise and Malseed, 2017). Using these new metrics of legislative importance, we examine what percentage of "important" legislation, defined variably, is attributable to periods immediately following financial crises.

We develop four separate metrics of legislative importance, based on citations of laws by sources such as the US Code, US judicial opinions, and the *New York Times* (NYT). To build these metrics we develop new tools to mine unstructured, textual databases, including over 4000 pages (2 million words) spanning a dozen editions of the US Code, over 1 million judicial opinions, and millions of articles from the NYT. We show that the metrics we produce generate credible lists of the most important pieces of securities and banking legislation in the United States. Our analyses demonstrate robustness of conclusions across these metrics, and present some evidence that a combination metric created by averaging the four may produce the most accurate measures by enabling errors in individual metrics to at least partially cancel each other out.

Having constructed our metrics, we divide the crisis legislation hypothesis into two fields: securities legislation and banking legislation. These fields also point to separate kinds of predicate crises. For banking

[1] These laws are just examples. For instance, the Small Business Administration (SBA), whose lending facilities have become central to government responses to COVID-19, was established by legislation in 1953. Prior to COVID-19, the SBA processed hundreds of billions of dollars of federally subsidized loans, hardly a "minor" institution, even before its recent expansion.
[2] For reasons we describe below, our quantitative methods as currently formulated are less suited to measuring the importance of legislation before 1912 or after 2011.

legislation, we use the banking crises identified by Reinhart and Rogoff (2009) and Eichengreen and Bordo (2002). The literature on crises and securities legislation—ironically given the focus the capital markets received in earlier work—does not define crises specifically. To make the crisis legislation hypothesis testable for securities, therefore, we define crises based on large drops in US equity prices. For instance, in one of "baseline" specifications, we consider a peak-to-trough decline of 35% or more in equity prices to constitute a crisis,[3] though we also consider a wide range of other specifications.[4]

We find that, under a representative baseline specification, roughly 84% of all US securities legislation was passed in the immediate aftermath of equity crises, despite these periods constituting just 27% of the time period we examine. The crisis legislation hypothesis therefore strongly suggests congressional reaction to equity crises.

By contrast, we find that only 36% of US banking legislation was passed in the aftermath of banking crises, with these periods constituting roughly 28% of the time period we examine. The crisis legislation hypothesis therefore does not describe the context of banking legislation nearly as well.[5]

These results have three key implications. First, the division between capital markets and banking is a defining question for economists (e.g., Kroszner and Rajan, 1994) and legal scholars (e.g., Armour et al., 2016). Our findings suggest that these divisions are not only a central part of the U.S. legal framework, but also central to the U.S. political framework.

Second, from the perspective of policy reforms, those who, like Rahm Emanuel, want to see major changes to the capital markets are better off focusing on legislative sessions that follow equity crises. But for those who would reform the banking system, Emanuel was simply wrong: while there may be some advantages of pushing for reform following crises, an exclusive post-crisis strategy would have left out over half of the important banking legislation in the past century.

Third, for those who see many ills and inefficiencies in US banking legislation and the regulatory implementation that follows, the pathologies that may attach to "crisis legislation" offer at best only a partial explanation. Legislative proposals in banking should therefore rise and fall on their own (de)merits.

In constructing our metrics of importance and empirical tests, we must make a number of assumptions, some arbitrary. For instance, how do we draw the line between "major" and "minor" legislation to analyze?

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[3] This identification method is thus very similar to that used by Barro and Ursúa (2017). We discuss this in more detail below.

[4] At times, the crisis-legislation literature also mentions the notion of "scandal" being connected with the causal channel for financial legislation (see, e.g. Romano, 2005). For several reasons, we choose not to attempt to measure "scandals" or include them in our tests. First, while "scandals" are at times mentioned, they do not feature nearly as frequently or as prominently in the majority of the academic literature on the crisis legislation hypothesis. For instance, the primary work in this field—Romano (2014), Coffee (2012), and Bainbridge (2010), rarely mention scandals and focus almost exclusively on crises. Second, to craft a definition of "scandal," where none have previously been devised in the literature, and then to incorporate that into our empirical tasks, would add further complexity and length to this project. We therefore leave empirical investigations of the relationship between "scandals" and "crises" as a topic for further research (on this point more broadly, see Hail et al., 2018).

[5] We take no position on the question whether 36% of banking legislation attributable to 28% of time in crisis represents a confirmation of or challenge to the crisis legislation hypothesis.

How far removed from a crisis can a law be and still be considered "crisis legislation?" We take a two-fold approach to ensuring robustness of our conclusions over the many plausible ways of devising our empirical tests. First, in this article, we discuss a range of specifications and demonstrate that our overall conclusions are generally stable across them. Second, we have created two interactive, online web platforms that allow users to choose for themselves how to resolve a large number of the different alternatives in formulating our analyses.[6] With roughly half a dozen different dimensions by which users can choose to vary the analyses, and multiple options along each dimension, users have literally thousands of different variations on our analyses they can easily run and examine. These tools aim to provide readers with the ability to evaluate for themselves how robust they consider our conclusions over the set of formulations they consider most informative. We also hope that readers may find these tools useful for investigating questions that go beyond those that we formally consider in this article.

We do not claim that these metrics capture the perfect truth of legislative importance. Imperfect measurements are endemic to quantitative analyses. We assert that a sufficient condition for our metrics to advance academic understanding is that they (a) capture some meaningful amount of signal of legislative importance, relative to the inevitable noise, and (b) do so in an unbiased way – meaning here, that they are no more likely to under/over weight importance for laws close to or far from crises. The credible lists of rankings of most important laws that our metrics generate attest to the meaningful signal they pick up, and would be very hard to explain were the metrics pure or mostly noise.[7] In our sections below that describe construction of the metrics, we address efforts to ensure they are unbiased, for instance, by ensuring that increasing length of legislation does not in and of itself register as increasing importance.

Finally, a word about what this article does not cover. Some articulations of the crisis legislation hypothesis—see Romano (2014), Coffee (2012), Gerding (2010)— include the idea that post-crisis reforms will be less favorable to industry incumbents (or perhaps more generally "pro-regulatory"), whereas non-crisis reforms will tend to favor industry. That element of the hypothesis is attractive, in that it can specify a theory of political economy that illustrates when party coalitions form (or not) relative to specific events and specific legislative outcomes.

Our investigation sheds no light on this question because we regard the answer to it to be conceptually, historically, and empirically fraught. The biggest problem is the missing certainty that a piece of legislation can be categorized as "pro" or "anti" industry. For example, the Gramm-Leach-Bliley Act of 1999 (GLB)

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[6] These tools can be accessed here:
http://ohlrogge.law.nyu.edu:3838/apps/Crisis_Legislation/Individual_Laws/
http://ohlrogge.law.nyu.edu:3838/apps/Crisis_Legislation/Histograms/

[7] Indeed, while there are surely many factors other than importance that influence whether a law is cited by a court opinion, by the US Code, or by the New York Times, it would be exceedingly odd to imagine that the importance of the law has no impact on such citations, that a federal court or a NYT op-ed are equally likely to cite the most trivial and the most consequential pieces of legislation.

is widely viewed as one of the most important pieces of pro-industry legislation in history, abolishing key elements of the Depression-era Glass-Steagall Act. But the Act also introduced extraordinary compliance costs for privacy and other consumer protections, part of the legislative coalition required to push through Congress.[8] See Mearian (2001) (discussing roughly contemporaneously those costs); see also MacCarthy (2011, 435) (estimating GLB compliance costs at "between $2 and $5 billion a year).[9] Is GLB anti-industry, given these costs? Or pro-industry given its benefits? As with many laws subject to legislative compromise, the truth is likely in-between, yet a precise measurement of the proportion of pro- and anti-industry components is daunting.

We can conduct the same analysis on Dodd-Frank, which contains elements—stress tests, capital regulation, consumer financial protection—widely opposed by industry, and some elements—derivatives clearing, resolution authority—that industry supported. The Act's name contains the word "reform" in it and Democrats (the partisan sponsors) have praised it as reigning in Wall Street, but Republican presidential candidate Mitt Romney called the bill in 2012 "the biggest kiss that's been given to New York banks I've ever seen." Wessel (2012). Indeed, reflecting the complexity of categorizing Dodd-Frank, David Skeel has called it "corporatist" legislation, reflecting the collaboration between government and industry at the heart of much of the law. Skeel (2010). We could run the same analysis for legislation often characterized as staunchly reform-oriented, such as the Bank Secrecy Act of 1970 (supported by industry, despite its costs), or those that are more ambiguous, such as the Cares Act of 2020 (including major loans and grants to industry, but also oversight).[10]

The limitations of classifying laws as pro or anti-industry, as regulatory or de-regulatory, apply also in attempts to use the crisis legislation hypothesis to gain insights or predictions into future legislation. For instance, during the last financial crisis, the GSEs Fannie Mae and Freddie Mac were privatized by the US government. A pressing legislative matter for financial reform that remains outstanding is if, when, and how these entities will be re-privatized. A law effecting such changes in the GSEs would surely be a "major" reform. But would such a move be de-regulatory, because it would be a step-back from nationalization (surely the most intensive form of government intervention in an enterprise)? Or, would it be regulatory, because it would likely be accompanied by new regulatory requirements for such entities?

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[8] Such tradeoffs of provisions favorable to multiple different factions are common throughout banking legislative history. See also, for instance, the Competitive Equality Banking Act of 1987, which combined introduced new capital regulations for some institutions, loosed capital regulations (through forbearance programs) for other institutions, and loosened interstate branching restrictions, amongst many other provisions.

[9] For more on the rise of compliance costs following Gramm-Leach-Bliley, see Miller (2014).

[10] Another example is the McFadden Act of 1927. It strengthened the Federal Reserve in key ways, such as by changing it from a fixed-length to perpetual charter. At the same time, it expanded the ability of national banks to operate multiple branches within a state, clearly a de-regulatory move. Similarly, consider the Housing and Community Development Act Amendments of 1979. This expanded government guarantee programs for privately originated mortgages, while at the same time pre-empting state usury laws that would otherwise prohibit some of these loans on account of their interest rates,

Would such a move be pro-industry or anti? Would we anticipate the reform to be well thought out or poorly executed, and would we expect it to occur in the wake of a crisis or when one is distant?

This is not to say that we see no value in attempting to measure the extent to which laws are pro- or anti-industry, regulatory or de-regulatory. Instead, we simply note that making such designations is a far more nuanced and ambiguous conceptual task than it might seem upon initial consideration. In order to make the scope and complexity of this current project manageable, therefore, we focus on devising new methods to measure the importance of legislation and leave it as a task for future research to develop methods to systematically measure the pro/anti-industry effects of legislation. Finally, as we describe in more depth below, our online data tools enable readers to run all of our analyses on customized sets of laws. Thus, to the extent that readers have pre-identified sets of laws they consider to be pro or anti-industry, regulatory or de-regulatory, wise or foolish, or different along any other classification criteria, readers can easily use these tools to examine the extent to which such laws fit the crisis-legislation hypothesis.

The remainder of this article proceeds as follows. Section 2 surveys prior research. Section 3 works to define the hypothesis with sufficient precision to render it testable. Section 4 discusses our motivations for using citation indexing. Section 5 presents details on constructing our metrics of legislative importance. Section 6 examines whether our metrics capture credible information on legislative importance. Section 7 presents the results of our empirical tests of the crisis legislation hypothesis, and Section 8 concludes. Appendices present more variations of our metrics for related tests.

2 Prior Research

2.1 The Crisis Legislation Hypothesis

The "crisis-legislation hypothesis," as we label it, began as a study of securities law and has expanded to cover all of "financial regulation." In this section, we briefly review this scholarly hypothesis, how it moved from its origins to become a prevalent modern explanation for the incidence of financial law, and the policy prescriptions that have been premised on acceptance of the law's applicability to the field of banking in particular.

The idea that crises prompt political reaction, of course, extends far into the history of political science.[11] The modern strain in legal thought evaluating the correlation between financial crises and financial legislation didn't begin in earnest until the late 1990s. Stuart Banner, a legal historian, argued that new securities regulations and legislation are often introduced in the wake of declines in equity prices, even though, as he documents in rich detail, the intellectual foundations of such regulations frequently date back

[11] See Reinhart and Rogoff (2009), Grossman (2010), and Goetzmann (2016) for broad treatments.

hundreds of years prior to the crisis (Banner, 1997, 1998).[12]

These historical observations took on much greater policy salience in 2005, with the publication of Roberta Romano's article "The Sarbanes-Oxley Act and the Making of Quack Corporate Governance." Romano (2005). Romano argued that Congress failed to take account of the empirical literature relating to certain securities legislation it adopted in the aftermath of the Enron, WorldCom, and related accounting scandals. This led Romano to conclude that the effort was "quack corporate governance," borne not of "careful deliberation by Congress" but came as "emergency legislation, enacted under conditions of limited legislative debate, during a media frenzy" (Romano, 2005, p.1528). Romano recommended therefore that future "emergency financial legislation" passed in the wake of crises include sunset provisions that would automatically repeal such legislation unless it was re-approved by Congress post-crisis.

The line of thinking expanded further still in the wake of the global financial crisis of 2008. Looking to explain the "appalling legislative and regulatory state of affairs" of heavily bank-oriented legislation passed in the US (with Dodd-Frank) and many other jurisdictions (with Basel III) in the wake of the financial crisis, Romano (2014) articulated an "iron law of financial regulation" in which:

> (1) Enactment is invariably crisis driven, adopted at a time when there is a paucity of information regarding what has transpired; (2) resulting in "off-the-rack" solutions often poorly fashioned to the problem at hand; (3) with inevitable flaws given the dynamic uncertainty of financial markets; (4) but arduous to revise or repeal given the stickiness of the status quo in the U.S. political framework of checks and balances. The ensuing one-way regulatory ratchet generated by repeated financial crises has produced not only costly policy mistakes accompanied by unintended consequences, but also a regulatory state whose cumulative regulatory impact produces, over time, an increasingly ineffective regulatory apparatus. (Romano, 2014, p.56)

Thus, the link between crises and legislation started as an observation about a loose association in the history of securities law, not directly connected to evaluating policy merits (Banner, 1997, 1998). This association then went to play a key role in the critique of a particular piece of securities legislation (Romano, 2005). By the time of the financial crisis and its aftermath, the explicitly causal hypothesis had become an "iron law of financial regulation" applicable to securities and banking alike. Romano's "iron law" also included testable empirical claims that that major financial legislation is "invariably crisis driven" and that this crisis-driven nature of legislation is capable of explaining "an increasingly ineffective regulatory apparatus." Under this viewpoint then, the crisis legislation hypothesis is capable of explaining not just why we have the financial legislation that we do, but also what specifically is wrong with it and how to fix those shortcomings.

[12] To be clear, Banner explicitly does not seek to evaluate the merits of the legislation whose history he examines (Banner, 1998, p.7) and refers to the association between equity declines and legislation as a "general trend, not an absolute rule" (Banner, 1997, p.850).

Coffee (2012, pp.1033-35) objects to the policy solutions that Romano poses,[13] particularly her suggestion of mandatory sunsetting first proposed in response to the Sarbanes Oxley securities reforms and then applied to Dodd-Frank and Basel III banking reforms. Coffee still starts his analysis, however, from the premise that "experience has shown ... that only after a catastrophic market collapse can legislators and regulators overcome the resistance of the financial community and adopt comprehensive 'reform' legislation." (Coffee, 2012, p.1020). Much of Coffee's analysis, then, is focused on (a) the need to ensure that the unique legislative opportunity posed by crises is not wasted and (b) the challenges of protecting, post-crises, the sensible aspects of reform that do get passed.[14]

Other authors engage with the theme linking crises and financial legislation in different ways. Paul Mahoney's 2015 book *Wasting a Crisis*, for instance, is a work largely focused on explaining the causes of the equity crisis preceding the New Deal securities reforms and the links between those crises and the legislation that followed. The evidence, according to Mahoney, does not support what he calls a "market failure" hypothesis that would call for the need of additional regulatory tools, but a "government failure" hypothesis that puts more blame at the feet of governmental actors who used (or failed to use) the authorities they already had.

But to explain why the narrative that Mahoney rejects took root, he develops an account that does rely on a crisis-driven explanation of legislative change. Mahoney writes that "[t]he timeline of financial reform almost always consists of a financial crisis, followed by reform legislation, followed by no financial crisis. To the casual observer, then, financial reforms always appear to make things better." (Mahoney, 2015, p.4-5). Here, Mahoney largely relies largely on Romano: the core arguments and evidence in *Wasting a Crisis* do not depend on the crisis-driven narrative. To the extent, though, that Mahoney needs an explanation for why politicians and others prefer the "market failure" account of financial legislation generally, our evidence below call into question just how much "crisis legislation" can provide that explanation.

Political scientists have focused on causes of legislative action, sometimes including "crises". John Kingdon's influential book, Agendas, Alternatives, and Public Choices looks at how external events activate policy entrepreneurs in different "streams" who shape legislation. Crises play into those activation points, but are neither necessary nor sufficient to culminate in legislative enactment. Kingdon (2010). Closer to financial legislation, Sarah Binder and Mark Spindel write about how Congress exerts authority over the Federal Reserve, suggesting that a mix of crises and institutional coalitions produce a one-way ratchet that grants the Fed ever-expansive authority, though largely through legislative threats

[13] Coffee, writing in 2012, was responding in part to a working paper and subsequent book chapter by Romano that previewed much of the content in (Romano, 2014).

[14] Coffee's argument is similar to an earlier theory articulated by Gerding (2009), which articulates a "regulatory instability hypothesis" that connects crises, legislative reactions, and the political economy that eventually erodes those protections when markets "appear" to be soaring. Gerding's analysis is focused on the acts of regulators and is therefore less sensitive to the "crisis legislation hypothesis," although it depends on this hypothesis in part.

and proposals rather than legislation itself. Binder & Spindel (2017). Neither Kingdon nor Binder & Spindel specify what constitutes crises nor the empirical link between crises and legislation.

Thus, the crisis-legislation hypothesis that this present article engages is one that has been articulated in a wide range of recent literature and used to inform a wide range of broader policy-oriented inquiries. The analyses we present here by no means suggest that any of these prior inquiries are without merit. Legislation based on accurate empirical research (Romano, 2005) is undeniably beneficial. Correctly diagnosing the causes of crises (Mahoney, 2015) is likewise critical, as is ensuring that effective legislation is passed in their wake and that such legislation does not have its utility degraded over time (Coffee, 2012; Gerding, 2009). This article thus engages with the prior literature, seeking to build a stronger factual background with which the contributions of these authors can be better understood and evaluated.

2.2 Prior Research: Methodological Foundations

The research that is methodologically and topically most similar to ours is Hail et al. (2018). In that, the authors look at a cross section of 26 counties and the major newspapers in each. The authors examine whether the occurrence of words for "scandal" (with additional filtering to ensure these are accounting scandals) systematically precede the occurrence words for "regulator," and draw inferences based on this regarding the relationship between accounting scandals and political pressure for accounting reforms. Our present article makes many distinct contributions beyond those in Hail et al. (2018). Most importantly, we are directly concerned with, and develop novel tools to measure, the legislative outcomes of the political process, rather than popular sentiment inputs. Additionally, we focus on banking and securities legislation, rather than accounting reform, and look at the relationship between these and financial crises, rather than corporate scandals.

Several other recent articles bear methodological similarities to ours in terms of seeking to derive new information from unstructured legal texts and thereby test hypothesis relevant to law, economics, and political science. For instance, Pozen et al. (2019) develop tools to mine speeches on the floor of Congress to measure political polarization, and Simkovic and Zhang (2019) develop tools to mine job descriptions to measure regulatory intensity across different industries.

3 Defining the Crisis Legislation Hypothesis

3.1 The Need for a Precise Definition of the Crisis Legislation Hypothesis

As with any hypothesis, for the crisis legislation hypothesis to be meaningful, it must make testable predictions. In this section, we articulate four questions that we assert any articulation of the crisis legislation hypothesis must address but which no scholar has yet articulated or answered. We then discuss our answers to these questions.

3.2 How we Define the Crisis Legislation Hypothesis

3.2.1 Question 1: Defining Financial Crises

Because the literature began focusing on equity crises, we seek to formalize the definition of equity crises by looking at peak-to-trough drop in in the S&P 500, an equity index, using data provided by the firm Global Financial Data.[15] Detecting peaks and troughs in a time series is a non-trivial task in signal processing, with no widely agreed upon method.[16] As a baseline, we consider a bandwidth of 12 months and thus identify a date as a "peak" if the S&P 500 value is greater on that date than on any of the preceding or subsequent six months. We then identify the "troughs" as the minimum points between peaks. We designate a crisis as occurring when there is a peak-to-trough decline beyond a specified threshold. We consider alternative thresholds of 25%, 30%, 35%, 40%, 45%, and 50%.[17] In our formulation, an equity crisis persists until prices rebound above this threshold of decline.[18]

When testing the hypothesis for banking legislation, we follow the definitions of banking crises as established by Reinhart and Rogoff (2009) and Eichengreen and Bordo (2002). Reinhart and Rogoff define their rule for identifying banking crises as follows:

> [W]e mark a banking crisis by two types of events: (1) bank runs that lead to the closure, merging, or takeover by the public sector of one or more financial institutions; and (2) if there are no runs, the closure, merging, takeover, or large scale government assistance of an important financial institution (or group of institutions) that marks the start of a string of similar outcomes for other financial institutions.[19] (Reinhart and Rogoff, 2009, p.10)

Appendix B provides the specific sets of dates identified as crises under each of our definitions. In all of the analyses that we discuss in Section 7 below, we consider the relationship between banking crises and banking legislation, and between equity crises and securities legislation. Nevertheless, our suite of online data tools allows readers to investigate the relationship between equity crises and banking legislation, and

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[15] www-globalfinancialdata-com. This data seeks to reconstruct an equivalent to the S&P 500 during the period prior to 1926 when the S&P index was first created.

[16] For an overview of the issue and various responses to it, see generally Palshikar et al. (2009).

[17] Barro and Ursúa (2017) consider stock-market crashes, which they define as "cumulated multi-year real returns of -25 percent or less." This largely maps on to our definition of peak-to-trough declines, although Barro and Ursua use a less granular source of stock return data (so as to make it comparable with multiple countries) and thus reach slightly different time designations for crises than we do. Barro and Urusa also consider instances in which stock market crashes are followed by major/minor depressions. They define a major depression as a 25% or more contraction of GDP, and a minor one as a 10% or more contraction. In our sample, the only period qualifying under either definition is the crash in 1929. This would thus exclude Sarbanes Oxley, Dodd-Frank, the Investment Company Act of 1940: pieces of legislation central to the modern crisis legislation hypothesis. As such, we do not explicitly consider analyses that use 1929 as the sole crisis period, but our online tools make it easy for readers to examine this on their own if they consider this to be the only relevant financial crisis over the past century.

[18] Suppose, for instance, that we are using a 35% threshold and that the S&P index had a starting value of 1000. The S&P begins dropping in value. It hits 650 in March of some year and drops down to 550 by June. By November, it has risen back to 650. We would then consider the equity crisis to persist from March, when the index first dropped below 35% from its high value of 1000, until November, when it first rose to above the crisis threshold.

[19] The decision rule used by Eichengreen and Bordo (2002) is very similar, resulting in no different classifications of years during the period of our study.

between banking crises and securities legislation.

3.2.2 Question 2: Defining Periods Following Financial Crises

Crisis legislation must also be specified by its proximity to the predicate crisis. Otherwise, every piece of legislation in U.S. history that came chronologically after the Panic of 1792 could conceivably be crisis legislation responsive to that event. To answer this question, then, we use a schema for formalizing the temporal and causal connection between legislation and "crises." Elections perform an important function in our analysis. We use presidential and congressional elections as the separation point between immediate crises and their legislative byproducts, and those legislative efforts that are merely responding to general trends in political economy.

To differentiate between these types of legislation, we define crisis legislation as either "first-order" or "second-order" and then consider them again in the context of both presidential and congressional terms. First-order crisis legislation refers to any statute passed during the same electoral period as a financial crisis. Second-order crisis legislation refers to a statute passed in the electoral period after an intervening election. Anything passed after two successive elections have occurred cannot, in our schematic, be called "crisis legislation." Because congressional elections are biannual and presidential elections are quadrennial, this period of crisis legislation can extend for as many as eight years beyond a crisis. We recognize that such a window extends the period of "crisis legislation" in ways that may favor the hypothesis. In Section 7 and our online data tools, we consider variations of the crisis legislation hypothesis using each of these four periods following crises: first- and second-order congressional periods, first- and second-order presidential periods.[20]

Our schematic does not assert that precedent crises are no longer relevant to financial reform. Ideas can percolate through a political system for decades and even have profound influence on the shape of subsequent events. We assert instead that the robust causal link that the crisis legislation hypothesis requires is broken if legislation passes two elections. By then, the short attention span of the electorate has moved on in the ways that the crisis legislation hypothesis imagines.

Our temporal specifications are consistent with those who endorse the crisis legislation hypothesis. The criticism is that the haste associated with financial reform necessarily promotes the interests of "policy entrepreneurs" who seek to exploit the focused attention of the electorate to accomplish their own goals, rather than engage in reflection about the causes and consequences of financial panic. When multiple elections have passed since a crisis, the time horizon is no longer consistent with the view of "rushed" legislation. Crises in those instances may thus inform the formulation of financial legislation, but the populist enthusiasms for financial reform are distinct.

3.2.3 Question 3: Identifying "Major" Legislation

[20] In particular then, all laws that qualify as first-order also qualify as second-order, while the converse does not hold.

Given how often Congress legislates, a risk in testing the crisis legislation hypothesis is to assign identical weight to all legislation. This is risky because Congress frequently passes "technical" amendments and other smaller pieces of legislation that are, presumably, of only passing interest at best to those who would endorse or critique the crisis legislation hypothesis. We thus evaluate legislation according to "importance," which we evaluate using metrics that are continuous and formulated to assign large values to important legislation and potentially very small values to minor laws. We therefore take two complementary approaches to the question of which legislation qualifies as sufficiently important so as to be covered by the crisis legislation hypothesis.

From certain perspectives on practical policy outcomes, there should be little difference between whether a given set of actions are taken in a single law or spread over multiple pieces of legislation. It would be, for instance, an odd proposition to assert that the 1933 Securities Act and the 1934 Securities Exchange Act would have been more important or influential had only they been passed as a single bill, rather than in subsequent years. Indeed, existing work in political science documents that large changes in policy are at times accomplished through a series of incremental legislative moves (see, e.g., Graetz and Shapiro, 2011). Thus, as a default, our analyses of the crisis legislation hypothesis consider all legislation that impacts the U.S. Code in Titles 15 (capital markets legislation) or 12 (banking legislation).

There are many minor pieces of legislation whose importance is one hundred or even one thousand times less than the most important laws we identify, as measured by our metrics. Importance this low means that such laws have relatively little impact on the conclusions of our analyses. This fact arguably obviates the need to draw an arbitrary line of importance separating what is "major" versus what is not. Nevertheless, to complement this approach, we also consider formulations of our analyses in which we only consider, for instance, the ten most important pieces of banking or securities legislation according to our metrics. The online tools allow others to draw these specifications wherever they prefer.

4 Citation Indexing: Background and Motivation

To our knowledge, citation indexing has never before been used to assess the importance of legislation.[21] Indeed, given the years and decades that many legal scholars spend in developing expertise on a small suite of legislation, the notion that algorithms could lend insight into legislative importance not available to experts may seem audacious.

There are two motivations behind our use of these techniques. First, there are roughly six hundred pieces of legislation that have impacted securities and banking law in the United States between 1912 and 2011. The sheer quantity of legislation makes it extremely difficult to even fathom what a purely qualitative

[21] The practice does, however, have wide intellectual history and support in fields such as assessing the impact of academic articles (Garfield, 1955; Garfield and Merton, 1979) and in computer science, for identifying important web pages, such as in Google's PageRank algorithms (Vise and Malseed, 2017).

analysis of this many laws would look like.[22]

Second, citation indexing allows us to move beyond some of the limitations of subjective assessment that are inherent to qualitative analyses. For instance, a qualitative analysis of banking law can discuss the fact that some important pieces of legislation, such as Dodd-Frank or the Banking Act of 1933, were passed shortly after financial crises, whereas others, such as the Federal Reserve Act or the McFadden Act, were more temporally removed from crises. This approach poses important questions, though: What does this fact mean for evaluating the crisis legislation hypothesis? Is it mostly true, with a few exceptions? Is it mostly untrue, with a few salient examples that fit it? Is the crisis legislation hypothesis equally true for banking and securities, or does one area of law clearly fit better? By their nature, qualitative analyses are not well suited to answer these kinds of questions, particularly in situations where scholars may disagree on how much importance to assign to different pieces of legislation.[23]

5 Defining Metrics of Legislative Importance

5.1 Identifying the Universe of Relevant Laws

A necessary precursor to measuring the importance of financial laws in the US is to identify the universe of laws that we will study. The US Congress has passed tens of thousands of laws in the past century. These laws are not inherently labeled by Congress as pertaining to "financial regulation" or not, much less as being "banking" or "securities" laws, nor could they be, especially in an age of "omnibus" legislation where many substantive areas are broached in a single large bill (see, e.g., Sinclair, 2019; Gluck et al., 2015).

To identify the set of relevant laws, we therefore turn to the US Code, which codifies and compiles all legislation passed by Congress and organizes that legislation into different titles based on subject area. We focus in particular on Title 15, which contains securities legislation, and Title 12, which contains banking legislation. Each of these titles contains a set of chapters, organized by subject matter, which further organize their content. Title 15, for instance, covers all of "Commerce," not merely securities legislation. Therefore, we focus on the subset of chapters directly pertinent to securities.[24] Title 12 is more specifically focused on banking. We thus consider the majority of the title, but exclude certain chapters of trivial

[22] The large number of laws at play also makes it difficult for even deeply versed experts to be meaningfully familiar with all of the relevant legislation. Indeed, a potential advantage of the systematic approach that we take is that it may serve to bring attention to legislation that is important but that otherwise might be overlooked.

[23] This is not to say that an approach using citation indexing eliminates subjectivity. For instance, we made subjective decisions regarding the sources used when counting citations. The advantage is that we can explicitly articulate the subjective assessments that we make, inviting critique of those assumptions, and in many cases, we can compare analytic results across a range of plausible decisions.

[24] In particular, we look at Chapter 2A - Securities and Trust Indentures; Chapter 2B - Securities Exchanges, Chapter 2B-1 - Securities Investor Protection, Chapter 2C - Public Utility Holding Companies, Chapter 2D - Investment Companies And Advisers, Chapter 98 - Public Company Accounting Reform And Corporate Responsibility, and Chapter 109 - Wall Street Transparency And Accountability.

importance to banking,[25] such as, for instance, those segments governing check truncation.[26] Unless otherwise noted, whenever we refer to Title 15 or Title 12 in this article, we are referring just to the chapters that we have selected in this fashion.

The Office of Law Revision Council (OLRC), which produces the US Code, does not simply insert whole pieces of legislation into the respective titles of the Code. Instead, the chapters of the Code are organized into sections and other divisions that seek to articulate all of the active law on a given subject. As such, each section will generally be influenced by multiple laws. "Source credits" appear at the end of each of these sections, stating which laws influenced the section's contents through addition, modification, or repeal of provisions in that section.[27] These source credits form the basis for identifying the set of laws relevant to securities and banking legislation. This undertaking is non-trivial. Both Titles 12 and 15 of the US Code are sprawling documents, together covering over 4,000 print pages and two million words. Over the course of our study period, we identify roughly 600 separate pieces of legislation that have amended the chapters of these titles that we examine.

We identify these laws by writing computer programs, based on regular expression matching, to identify the Statutes at Large citations (unique to each law), contained in the source credits to the US Code. We then cross-reference these citations with the OLRC's "Popular Name Tool"[28] to identify the names by which the laws are commonly referred to and the dates on which they were passed.[29] Having generated these lists of laws to consider, we next proceed to constructing our four metrics of legislative importance, each based on a different type of citation to these laws.

5.2 Metric #1: US Code Citations

Our first metric is based on the number of different sections of the US Code that cite to a given law in their source credits. New codifications of the US Code are released roughly every six years. Thus, we look to the codification in which a piece of legislation first appears in order to capture its contemporaneous importance.

This focus on contemporaneous importance runs through all of our methods. A separate consideration

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[25] Specifically, we exclude Chapter 7 - Farm Credit Administration, Chapter 7a - Agricultural Marketing, Chapter 7b - Regional Agricultural Credit Corporations, Chapter 8 - Adjustment And Cancellation Of Farm Loans, Chapter 9 - National Agricultural Credit Corporations, Chapter 10 - Local Agricultural-credit Corporations, Livestock-loan Companies And Like Organizations; Loans To Individuals To Aid In Formation Or To Increase Capital Stock, Chapter 23 - Farm Credit System, Chapter 25 - National Commission On Electronic Fund Transfers, Chapter 26 - Disposition Of Abandoned Money Orders And Traveler's Checks, Chapter 27 - Real Estate Settlement Procedures, Chapter 31 - National Consumer Cooperative Bank, Chapter 37 - Solar Energy And Energy Conservation Bank, and Chapter 50 - Check Truncation.

[26] Check truncation is the process of converting a paper check into electronic form for inter-bank settlement.

[27] For more detail, see http://uscode.house.gov/detailed_guide.xhtml

[28] See http://uscode.house.gov/popularnames/popularnames.htm

[29] Certain pieces of very minor legislation are excluded from the OLRC's Popular Name Tool. We exclude these from our considerations as well.

could be one of importance over time - that is, which pieces of legislation have "stood the test of time" and shown themselves to be of lasting importance. We decline to pursue this for two reasons. First, practically speaking, a test of growing importance over time would exclude highly relevant pieces of recent legislation, such as the Dodd-Frank Act. Second, and more fundamentally, whether or not a given law grows in importance over time has much to do with subsequent actions of Congress, regulators, and others. For instance, a law that is passed and then repealed ten years later will generally not grow in importance. But, what happens years or decades after a law's passage is a matter of the political economy of those subsequent periods. The crisis legislation hypothesis, by contrast, is squarely and consistently articulated in terms of the political economy of the Congress that actually passes given laws.

One challenge with our first metric in its simplest form is that over time there is a strong trend towards laws becoming longer and more complex and thus influencing more sections in the US Code.[30] A more complex law, however, is not necessarily a more important one.[31] To address this secular trend, we develop a procedure to normalize the metric. Specifically, for each law, after generating an aggregate count of sections of Title 15 or Title 12 that it introduces, eliminates, or modifies, we divide that count by the total number of sections in in Title 15 or 12 in the next codification to be released following the law's passage. Thus, for example, if a law affected every single section of Title 15 or Title 12 in the codification following its passage, that law would have a normalized importance value of one.

We use a series of regression analyses to more precisely illustrate the presence of these secular trends and the effectiveness of our normalization procedures to control for them. For instance, if we consider all pieces of banking legislation passed in a given year, and count the total number of sections of the US Code, Title 12 that cite those laws, and then regress the log of this count plus one on the year plus an intercept, we obtain a coefficient of 0.021 (t-value = 4.890, adjusted R^2 = 0.32). In other words, there is a steady trend by which each passing year increases, on average, the importance of banking legislation passed by roughly 2.1%, and this trend, by itself, explains nearly 1/3 of the variation in banking legislative importance. Performing this test on our normalized metric, however, yields a coefficient of essentially zero (—0.000052) and comparably zero adjusted R^2. When considering the securities legislation in Title 15, the unadjusted version of this regression yields a coefficient of 0.018, while the adjusted version yields a coefficient of —0.0003.[32]

5.3 Metrics #2 - 4

We construct the next three metrics in a conceptually similar fashion, and provide details in the

[30] Analyzing a time series with a clear trend, without taking steps such as those we do to address that trend, also creates serious problems for the validity of most forms of statistical analyses.

[31] The Federal Reserve Act of 1913 was a monumental legislative achievement in the 20th century, but was thirty-one pages long; the Sherman Antitrust Act of 1890 reorganized the relationship between large enterprise and the US government, but was less than two pages.

[32] Adjusted R^2 on the non-normalized regression is 0.096 and for the normalized regression it is 0.046

Appendix. In brief, Metric #2 is based on citations of laws in the New York Times. Metric #3 is a variant of Metric #1, but instead of treating all citations to laws within the US Code the same, we give more importance weight to provisions of the Code that are more heavily cited by state and federal courts. The metric is thus in some ways analogous to the Google search algorithms, that rank importance of websites based on hyperlinks to them, but give more weight if the hyperlinks come from more prominent websites. Finally, Metric #4 is based purely on the frequency with which provisions of a given law is cited directly by state or federal courts.

5.4 Combining Importance Metrics

The notion of uncorrelated errors is fundamental to modern statistics and data analysis. This is the reason why, for instance, confidence in any given statistical estimate tends to increase as sample size increases. Any given observation may be prone to error, in the sense of not being representative of the true population. As long as the errors amongst observations are less than fully correlated with each other, an unbiased estimator will become more accurate as the sample size increases because observations that lead to an over-estimation of a true population value will tend to cancel out with observations that lead to an under-estimation of that true population value.

Similarly, a key to our effort to produce credible metrics of legislative importance is to combine the results of multiple metrics together. It is easy, for instance, to envision ways that particular metrics that we create could over or under-estimate the importance of certain pieces of legislation. To the extent, however, that these shortcomings are specific to a particular metric, as we combine multiple metrics together, the influence of any one type of shortcoming will tend to diminish.

In general, therefore, in the sections of this article that follows, we focus on presenting results that are from combining two or more different importance metrics. In order to create these combined metrics, we use the following procedure. First, for each individual metric, we take the sum of the importance ratings over all laws (either in Title 15 or Title 12) and then divide each individual law's importance rating by this sum.[33] This normalizes each metric so that the total importance over all laws will be one. This also lends a convenient and common interpretation to the metrics. For instance, a law with a normalized importance rating of 0.05 indicates that the given piece of legislation represents 5% of total securities or banking importance over our sample period.

After normalizing each metric, we assign, for each law, a combined importance defined by an equally weighted combination of the two or more metrics that are being combined. There is a substantial amount

[33] In some of our analyses, we use variations in the sample period of years in which we consider legislation. In others of our analyses, we use variations that include only the top *n* most important laws, for various values of *n.* In all of these scenarios, we normalize our metrics to one. Thus, in a formulation that only considers the top fifty most important laws passed between 1984 and 2011, the sum of the importance over those fifty laws will still be one.

of evidence from other fields of statistics that when combining multiple metrics, equally weighted combinations are optimal. One reason for this is that even if there were, in theory, some non- equally weighted combination that would be superior, in practice, attempting to estimate the correct weights to use is extremely difficult and tends to introduce more error than it corrects for.[34]

6 Assessing Metrics of Legislative Importance

6.1 Listings of Important Financial Legislation

Table 1 presents results for our rankings of securities legislation, based on an equally weighted combination of all four of our importance metrics. Table 2 presents results of our rankings for banking legislation. As described in the Appendix, the court citation based metrics (#3 and #4) that we develop are defined for years 1930 onwards, and thus do not cover the entirety of our sample of banking legislation. Accordingly, Table 2 presents results from an equally weighted combination of metrics #1 (US Code Citations) and #2 (NYT Citations). Tables of laws for banking legislation that consider a weighted combination over all four metrics, and thus that are restricted to the time periods those metrics are defined for, are available through our online data tools.[35]

Because there is no observable, absolute "truth" of legislative importance, against which metrics can be judged, we cannot decisively establish that a certain formulation is superior to another. Nevertheless, we believe that in general, readers will find the law rankings produced by combined metrics to be more credible those generated by the single metrics and presented in the appendix.

6.2 Comparing Our Metrics to an External Source on Legislative Importance

We provide additional validation that our metrics capture meaningful information on legislative importance by examining how closely our metrics relate both to each other and to an external source of information on legislative importance. For a source of external information, we turn to the lists of significant legislation developed by Mayhew (1991) and as updated through 2016.[36] Mayhew investigates whether Congress passes more significant legislation in periods of unified party control of government. He therefore develops lists of what he deems "important" laws passed by each Congress from 1948 to 2016. Mayhew draws these distinctions based, for instance, on contemporary press accounts of legislation and ex-post evaluation by scholars.

Mayhew's task does not perfectly mirror our own for several reasons. First, he is interested in the overall importance of legislation, rather than the importance for financial regulation. There are some pieces of legislation that are important for other areas of law (such as tax) that only impact the financial regulation

[34] For an accessible discussion of these notions, see Silver (2012).
[35] In Section 7, we also discuss results of our empirical tests of the crisis legislation hypothesis for banking legislation when using the first two metrics and the entire sample period as well as when using all four metrics and a restricted sample period.
[36] See http://campuspress.yale.edu/davidmayhew/datasets-divided-we-govern/. We are grateful to Roberta Romano for suggesting that we incorporate Mayhew's analysis into our findings.

in minor ways.

Furthermore, Mayhew does not assign a numerical significance to laws - laws are either important or not in his analysis. This has two implications. First, even amongst laws that we and Mayhew may agree are important, our metrics contain substantially more variation. In our metrics, but not in Mayhew's, laws A and B can both be important, but B can be 50% more important than A. Conversely, since our techniques are applicable to all pieces of legislation, our metrics, unlike Mayhew's designations, contain variation even amongst laws of more modest (but still non-zero) significance.

In total then, we view Mayhew as a useful complement to but not a substitute for our methods. Likewise, even if there were, for instance, perfect agreement between our metrics and Mayhew's regarding which pieces of legislation are "important," one would still anticipate substantial variation between our metrics and his because our metrics are continuous and his are binary. Despite these limitations, we find Mayhew's designations useful as a source of external comparison for our metrics.

When comparing our metrics to Mayhew's we start with a simple question. Of the laws that our metrics find most important, how many does Mayhew also consider important? For this and all other comparisons to Mayhew, we consider our metrics only over laws passed after 1947, the start date of Mayhew's metrics. For both securities and banking legislation, four of the top five most important laws that we identify are also identified by Mayhew as important. Seven of the top ten banking laws we identify as important are also considered important by Mayhew, and four of the top ten securities laws we identify as important are also considered such by Mayhew.

We next consider regressions that seek to predict the importance we assign to laws based on Mayhew's designations, and vice versa. In total, Mayhew considers as important 29 pieces of banking legislation that we consider, and 9 pieces of securities legislation. Given these, we examine a series of linear regressions of the form

$$Importance_i = \alpha + \beta * Mayhew_i + \varepsilon_i$$

Here i indexes individual laws. "Importance" represents a law's importance under one of our metrics, a is a constant, and "Mayhew" represents a binary indicator for whether a given piece of legislation was identified as important by Mayhew. To aid interpretability of results, we normalize each of our importance metrics by first subtracting their mean and then dividing by their standard deviation. Thus, e.g. a coefficient of 2.0 means that a law being designated by Mayhew as important correlates with a two standard deviation increase in one of our importance metrics.

Table 3 presents the results of these analyses for both securities and banking legislation. One interesting finding is that for both securities and banking legislation, Mayhew's ratings have the highest R^2 when predicting importance according to our combined metric. We do not consider this a precise or dispositive test. Nevertheless, it lends some credence that taking equally weighted averages over multiple metrics

achieves more accurate methods overall.

The specific adjusted R^2 values in these tests, 0.30 for securities legislation, and 0.19 for banking legislation, indicate that Mayhew's designations are able to explain roughly 30% and 19%, respectively, of the variation in our combined importance metrics. We consider these to be meaningfully large figures that lend further credibility to our metrics, particularly given the many differences between our approach and Mayhew's that tend to attenuate the relationship between our results and his.[37]

The coefficient estimates in Table 3 range in general from around 1.5 to 2.0, indicating that laws Mayhew designates as important are on average 1.5 to 2 standard deviations above average in our importance metrics. The t-statistics in the table, based on HW robust standard errors, generally exceed the 2.33 threshold for significance at the < 0.01 confidence level. We also consider logistic regressions in which we regress a binary indicator for whether Mayhew designates a law as important on a constant plus our continuous metrics of importance. In these, the robust t-statistics on our combined metrics are 4.05 for securities legislation and 6.54 for banking legislation.[38]

6.3 Correlation Between our Metrics

For a final source of insight into the information captured by our metrics, we consider the correlations between each of our four importance metrics. One reason this may be insightful is that moderately high degrees of correlation between metrics may suggest that the metrics are indeed picking up on some meaningful underlying signal, rather than, for instance, each representing simple random noise. At the same time, correlations between metrics that are at least a substantial amount below 1 may indicate some extent to which errors across the metrics are less than fully correlated. This in turn could lend credence to our approach of combining metrics. We acknowledge, however, that neither of these interpretations is precise nor dispositive.[39]

Table 4 presents results of these analyses. Over all of the specifications it considers, the average correlation is 0.59, with a minimum of 0.38 and a maximum of 0.84. Based on the considerations described above, we consider these results relatively encouraging. Nevertheless, there is no clear theoretical

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[37] Also, these estimates are likely conservative. Some of the laws that Mayhew considers important, such as the Social Security Amendments of 1983, had an impact, but only a very small one, on fields of banking or securities. As such, these designations by Mayhew result in laws that he considers important but which our metrics consider, we think rightly, to be quite unimportant when it comes to financial regulation. If we were to remove these instances from our consideration of Mayhew, the relationship between his metrics and ours would certainly increase. But, for the sake of presenting conservative estimates, and for the subjective challenges regarding which precisely amongst Mayhew's law designations to exclude, we choose instead to consider the full set of laws Mayhew designates as important, even if some are of only very marginal significance to finance.

[38] Both of these figures are for our combined metrics. As in the linear regressions, when considering these logit regressions, the t-statistics for the individual metrics are in general somewhat lower than for the combined metrics. Full details are available upon request. We choose the linear regression to present in Table 3 because of the more readily interpretable model fit statistic of adjusted R^2, something which is not directly defined for the nonlinear logit formulation. The higher t-statistics for the logistic regressions likely indicate that the nonlinear model is a better descriptor for relationship between our metrics and Mayhew's.

[39] For instance, a high correlation could simply indicate that the metrics pick up on correlated noise, with no meaningful signal. Likewise, a low correlation could simply mean that there is little to no underlying signal, and so the notion of errors in observing that signal canceling each other out would not be meaningful.

prediction regarding what would be the "optimal" degree of correlation between our metrics. Thus, there is substantial room for readers to interpret these results as they deem most appropriate.

7 Results: Testing the Crisis Legislation Hypothesis

7.1 Empirical Specification

In our empirical tests of the crisis legislation hypothesis, we focus on three key statistics: the percentage of total legislative importance passed during "crisis periods," the percentage of the total time in our sample that qualifies as "crisis periods," and the ratio between these two. In Appendix C we discuss why we prefer these simple statistics over regression analyses or other statistical tests.

We define a "crisis period" based on two specifications: first a given crisis definition, e.g. 35% or more drop in equity values, and second the time following such crises during which legislation, if passed, qualifies as crisis legislation. For example, a first-order congressional legislative period contains legislation passed following a crisis but before a new Congress has been elected.[40]

Each of the three statistics we consider gives different insight into testing the crisis legislation hypothesis. For instance, a finding that 70% of legislative importance was passed during crisis periods might at first appear relatively strong confirmation of the crisis legislation hypothesis. But, this would be less remarkable if the given definition of crisis periods encompassed 55% of the total sample period (yielding a ratio of 70 / 55 = 1.27). Similarly, a ratio of 3:1, comparing importance in crisis periods to time in crisis periods, has substantially different implications for the crisis legislation hypothesis depending on whether the ratio reflects a finding that 90% of importance is accounted for by 30% of the sample period, versus a finding that 30% of importance is accounted for by 10% of the sample period.[41]

7.2 Results

7.2.1 Defining our "Baseline" Specification

In general, we eschew arguing for a "preferred" specification for our tests, hence the creation of online tools to permit others to specify at will. Out of necessity, we do select a "baseline" specification to begin our analysis. This baseline then becomes the starting point for examining variations. We choose our baseline based on two criteria: first, a specification that supports ready comparison between securities and banking legislation, and second, a specification that yields results reasonably representative of those under an array of specifications.

Specifically, for our baseline specification, we consider second-order congressional legislation. This gives, on average, roughly three years for legislation to be passed following the end of a crisis and still

[40] See Section 3 for details on our definitions.
[41] In the later case, the results would show a substantially elevated level of legislative activity following crises, but would still suggest that these crisis periods can only account for a relatively small portion of total legislative importance.

qualify as crisis legislation.[42] Crises themselves often last for one or more years. Thus, this formulation will frequently result in four to five years from the beginning of a crisis during which new laws will qualify as "crisis legislation." This therefore gives a reasonable amount of time for Congress to pass new laws, without being overly long.[43] In general, as we will discuss, this formulation also tends to yield results that are most strongly supportive of the crisis legislation hypothesis.

Our baseline specification uses equity drops of 35% or more to designate equity crises. We consider the full sample of securities legislation, from 1932 to 2011, and the full sample of banking legislation, from 1912 to 2011. Because only our first two metrics of legislative importance are defined over the full sample period, we consider an equally weighted combination of these two in our baseline. Finally, our baseline specification considers all pieces of legislation, rather than imposing a cutoff that considers only a certain number of the most important laws.

7.2.2 Results under the "Baseline" Specification and Variations Thereof

Given these specifications, we find fairly strong support for the crisis legislation hypothesis when considering securities legislation. For instance, we find that 84.1% of legislative importance impacting Title 15 was passed during second-order congressional-legislation periods, whereas only 26.6% of time in the sample fell into these periods, yielding a ratio of importance-in-crises to time-in-crises of 3.2. If we restrict consideration to the top 10 most important securities laws, crisis periods now account for 94.6% of all securities legislation importance. Adding in our two additional metrics of legislative importance, both based on court opinion citations, reduces this but only modestly, yielding again 84.8% of legislative importance accounted for by crisis periods.

This finding is in general robust over different time periods. For instance, even if we start our sample in 1940, after the passage of key New Deal era securities laws, we still find 79.1% of legislative importance accounted for by 19.6% of time spent in crisis periods, for a ratio of 4.0.[44] We investigate the implications of modifying the crisis period - i.e. the amount of time following crises by which legislation still counts as crisis-driven. If we consider only first-order congressional legislation (starting from 1932), the ratio goes up significantly, to 5.2, although the percentage of total legislative importance explained by crisis periods

[42] Congressional terms are two years. Thus, if a crisis is equally likely to end at any point during a two-year congress, on average it will end in the middle, i.e. one year from the end. Extending the legislative period to the end of the following congress thus yields three years.

[43] Second-order presidential periods, by contrast, last on average six years past the end of a crisis. While this certainly makes it much easier for important laws to qualify as "crisis legislation," it also tends to encompass in crisis periods many years with minimal legislative activity, and likewise, to result in fairly high percentages of total US history qualifying as crisis periods. For instance, if one chooses a 30% drop in equity values as defining an equity crisis, and a second-order presidential period as the threshold for crisis legislation, then 55% of US history between 1932 and 2011 qualifies as crisis periods.

[44] These results are under the specification that considers an equally weighted combination of our first two importance metrics and only considers the ten most important pieces of securities legislation. If we use a combination of all four metrics, the ratio drops modestly to 3.2.

drops to 66.4%.[45] Moving in the other direction, if we consider second-order presidential legislation, the ratio drops notably to 2.3. In this formulation, 94.6% of importance is accounted for by crisis periods, but those periods cover 41% of the sample period.

We find somewhat less support for the crisis legislation hypothesis when investigating banking legislation. On the one hand, across nearly all of our specifications, we find an elevated incidence of important banking legislation following banking crises - i.e. we find ratios of significance-in-crises to time-in-crises above one. But, this degree of elevation is far less than it is for securities legislation, and in general, crises immediately precede half or less of banking legislative importance.

Returning to our baseline specification[46] but now applied to banking legislation, we find 35.8% of total importance accounted for by 27.5% of total time in crisis periods, for a ratio of 1.3. If we restrict comparison to the top ten most important laws, this ratio rises modestly to 1.6. If we maintain the restriction to the top ten laws, but now begin our sample period in 1940 and use an equally weighted combination of all four metrics, the ratio of importance-in-crises to time-in-crises raises to 2.3, but this is in the context of crises still accounting for only a bare majority (50.5%) of total legislative importance.

The most favorable results in support of the crisis legislation hypothesis for banking legislation are generally found by starting the sample period in 1932. This excludes from the sample the 1913 Federal Reserve Act - one of the most important pieces of banking legislation and one that was passed at some remove from prior financial crises, while including key pieces of New Deal legislation, such as the Banking Act of 1933 and the National Housing Act of 1934. Starting in 1932 and using an equally weighted average of our first two metrics yields a ratio of 1.7, though even here, this represents only a minority - 44.7%, of legislative importance, accounted for by 26.3% of the sample in crisis. If we use an equally weighted combination of all four metrics, this result is largely unchanged, with 48.1% of importance now accounted for by crisis periods. Restricting results to the top 20 laws under this formulation increases the ratio to 2.1 (55.6% of importance accounted for by crises), and restricting to the top 10 laws yields a ratio of 2.5 (66.3% of importance attributed to crisis periods).[47]

It is possible that these findings therefore offer modestly strong support for the crisis legislation hypothesis as applied to banking laws, though it would still be support far weaker than available for securities legislation. Yet, we deem it more likely they are due to the particulars of the sample selection. For instance, if we start the sample period for in 1940, rather than 1932, we get a result in which 36.9% of

[45] This is under the formulation that considers the top ten laws and the first two metrics. A weighted combination of all four metrics yields a ratio of 4.7. Using all four metrics and the top twenty laws, rather than ten, yields a ratio of 4.2.
[46] That is, the full sample period - now 1912 to 2011, an equally weighted combination of our first two importance metrics, second-order congressional legislative periods, and now banking crises, rather than equity crises.
[47] Both of these figures use the equally weighted combination of all four metrics of importance. Using other variations yields similar results, though generally modestly lower ratios.

legislative importance is accounted for by 22.2% of time in crisis periods (a ratio of 1.7).[48]

7.2.3 Distributions of Results over Wider Ranges of Specifications

The results we describe above seek to give a representative overview of the literally thousands of different specifications one could consider within our analytic framework. One approach that we take to gain a broader perspective is to consider simultaneously multiple different specifications and to compute distributions of our three key statistics over those different specifications. For this, we consider the following possibilities: equity crises can be defined as a 30%, 35%, or 40% drop in equity values, the crisis period can be first-order congressional, second-order congressional, or first-order presidential, the start year for banking legislation can be 1912, 1932, or 1940, the start year for securities legislation can be 1932 or 1940, the importance metric can be a weighted combination of all four metrics or just our first two, and the laws considered can be all laws, only the top ten, only the top twenty or only the top fifty. All of these analyses end the sample period in 2011.[49] These combinatorics yield 144 different specifications for securities legislation, and 60 for banking legislation.[50]

Figure 1 plots the distributions of the percent of importance in crises and the ratio of percent importance to percent time in crises across all of these different specifications. For securities legislation, the median across these specifications is 62% of importance in crises, compared to 41% for banking legislation. In other words, in the majority of these specifications, crisis legislation accounts for less than half of total banking legislative importance. Similarly, the median ratio across the specifications is 3.1 for securities legislation, whereas for banking it is 1.8.[51] Figure 1 shows that while there are certain specifications that provide moderately high ratios or percentages of time in crisis for banking legislation, the center of the distributions for both of these statistics is much lower than for securities.

Many of the articulations of the crisis legislation hypothesis in prior literature assert that all or nearly all important legislation follows crises. We find it almost impossible to find support for that proposition in banking law as measured by our metrics of importance. A modestly weaker formulation of the hypothesis might say that crisis legislation "dominates" a field of law. Even this is hard to justify for banking legislation given the results from our metrics. For instance, to support such a contention, we might expect to see at the very least 75% of legislative importance accounted for by crisis legislation, with crisis periods accounting for less than, ideally substantially less than, 50% of the sample period. None of the specifications we

[48] This considers all laws and a weighted average of our first two metrics of importance. The ratio drops to 1.5 if only the first two metrics are used. It increases back to 1.7 if we then restrict to the top 20 laws and goes to 1.6 when considering only the top 10.

[49] In Appendix D we consider variations that end the sample period in 1983 and that begin the sample period in 1984.

[50] The smaller number of banking legislation is because we only a have a single measure of banking crises, that defined by Reinhart and Rogoff (2009).

[51] For all of these statistics given, the means are nearly identical. Full details can be calculated by replicating these specifications using our online data tools.

consider above fits that criteria for banking legislation.[52] By contrast, 42 of the specifications fit it for securities legislation.

At the same time, if one adopts a sufficiently weak version of the crisis legislation hypothesis, namely, that there is some degree of elevation in legislative activity during periods following crises, then almost all of the plausible specifications we consider support this for both banking and securities legislation.[53]

7.3 Online Data Tools

All of the statistics and figures that we present in the preceding discussion are calculated directly using our online data tools. As such, any reader can easily reproduce them, without requiring any formal knowledge of computer coding or familiarity with the precise details of our data and algorithms. Our main goal, however, in providing these tools is to allow readers to explore our data flexibly. In this section, we briefly describe the tools and what they enable users to accomplish.

We create two complementary data tools. We refer to the first as the "individual law explorer," (currently available at http://ohlrogge.law.nyu.edu:3838/apps/Crisis_Legislation/Individual_Laws/) and to the second as the "distribution comparison tool" (currently available at http://ohlrogge.law.nyu.edu:3838/apps/Crisis_Legislation/Histograms/). Both tools allow users to choose over the range of variations in specifications that we discuss in our analyses above. In particular, users may specify the definition of financial crises, the crisis period (e.g. second- order presidential crisis-legislation periods), the start and end years for the analyses, which metrics or combinations of metrics to consider, and whether to restrict the analyses to a certain top number of laws. Given these specifications, both tools present the three key statistics we discuss above: the percentage of legislative importance passed during crisis periods, the percent of time in the sample period that qualifies as a crisis period, and the ratio of these two. present screen shots of the user interfaces for these two tools.

The individual law explorer is designed to give a micro view on a particular specification. Given a set of choices over each of the variations we consider, the law explorer will display a table of the most important financial legislation including the specific importance values assigned to each law. This allows users to gauge the extent to which the ranking and importance assigned to the laws under the given specification seem credible. Given a particular specification, the individual law explorer will also then calculate and present the three statistics we study for that specification. Finally, the individual law explorer allows users to exclude specific laws from the calculations of these statistics. Thus, for instance, if users wish to

[52] This is not to say that there is no specification that can produce this result for banking legislation. Our online data tools allow readers a great amount of flexibility, and a very small number of specifications can be found to support almost any contention. The challenge, however, is to find hypotheses that are supported widely across reasonable specifications, or to build a convincing case that the small minority of specifications that fit a particular hypothesis are actually the most theoretically correct. We welcome further efforts by readers on either of these fronts.
banking laws, we in general strive to be as charitable to the hypothesis as possible in this article. One aspect of this is to focus our inquiries for banking legislation on banking crises, which almost always yields stronger support for the crisis legislation hypothesis.

experiment with devising different versions of the crisis legislation hypothesis that exclude certain types of statutes, this tool will enable them to do so.

The distribution comparison tool, by contrast, presents a macro view on the results of our methods. On the one hand, it can be used to reproduce any given set of statistics displayed on the individual law explorer.[54] But, whereas the individual law explorer allows users to select only one specification at a time, the distribution tool is designed primarily to allow users to select multiple different specifications simultaneously. Just as in the analyses we present in Section 7.2.3, the distribution comparison tool will then consider the combinatorial possibilities amongst all of the options a user selects.

8 Conclusion

For some time, scholars have articulated a hypothesis with testable propositions: financial reform in the United States is invariably driven by financial crisis. This narrative has been articulated both by those who see crises as providing the necessary impetus to enact important (if imperfect) reforms, as well as those who see crises as leading to misguided and counterproductive laws.

Although the hypothesis rests on testable assumptions, no one has tested them. This article takes up the challenge of formally and quantitatively evaluating part of this narrative, focusing separately on securities and banking legislation. To do so, we develop a suite of novel empirical methods to measure the importance of hundreds of pieces of financial legislation based on the methodological foundations of citation indexing. While we apply these methods to testing the crisis legislation hypothesis, they could easily be adapted to test many other hypothesis in other areas of law.

For securities legislation, we find support for a robust version of the crisis legislation hypothesis. Across a range of specifications, "crisis legislation" in securities accounts for large majorities of total legislative importance, even while the periods immediately following financial crises comprise a small amount of our sample period.

For banking legislation, the picture is different. On the one hand, we consistently find evidence of elevated legislative activity in banking laws in periods following crises. But, the degree of elevation is far less than for securities laws. Very frequently in these specifications, crisis legislation can account for only half or less of total legislative importance in banking.

This work has important methodological and substantive implications for the study of the legislative

[54] One other small difference between the two tools is that as currently designed, the individual law explorer will only consider at most the top 100 most important laws according to any given specification. The distribution explorer, by contrast, has options to consider "All" laws, as well as specific numbers. The reason for this difference is simply in the user interface tools that we use. For the individual law explorer, we employ a slider bar to allow users to select any number from 1 to 100 of the top laws to consider. This gives the user a large degree of flexibility. Because the statistics presented in the distribution explorer are pre-calculated, it would be less practicable to pre-calculate them for all 100 different possible options. But, a disadvantage of the slider bar is that if we extended it to 600 to encompass all laws, it would become much more difficult to differentiate between, say, the top five versus seven laws.

process, financial crises, and the political economy of finance. Methodologically, the approach we develop here is not specific to the evaluation of the crisis legislation hypothesis: citation indexing and legislative importance are important questions for virtually every field of study that relies on legislative outputs. Substantively, there are two key projects that our work can trigger. First, the crisis legislation hypothesis requires an adjustment, in light of the divergence between capital markets and the banking system. Second—and related—there is no clear explanation in the literature for the divergence between Congress's greater relative attention to corrections in the capital markets and its more constant engagement with the banking system. Each of these questions will require further elaboration.

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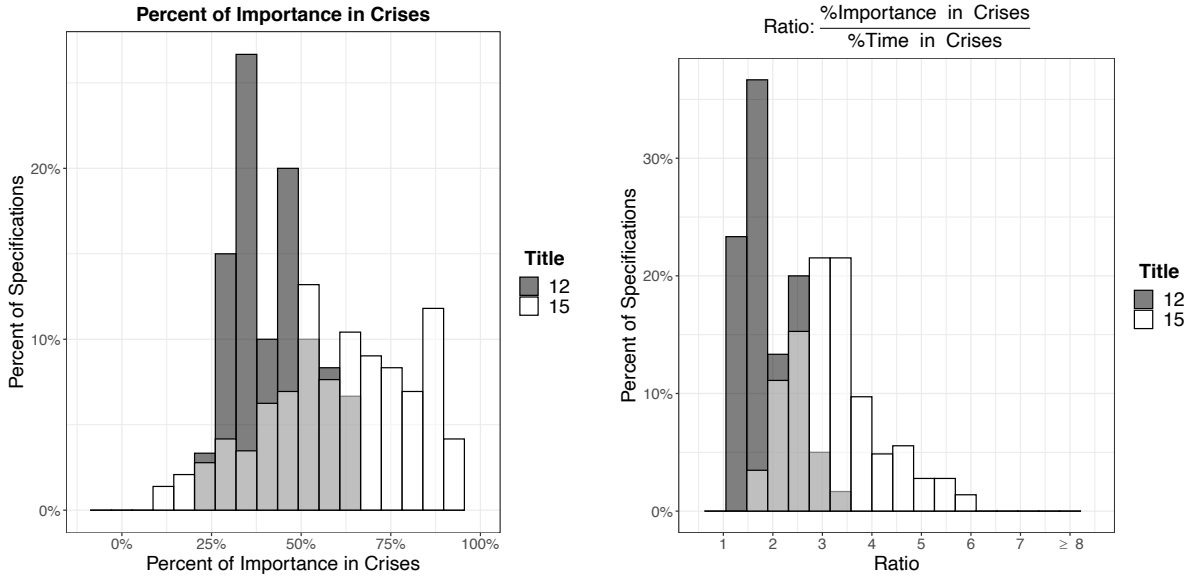


(a) (b)

Figure 1

Distributions of statistics over ranges of plausible variations. Areas shaded in the intermediate gray color indicate overlaps between the distributions of statistics for Titles 12 (banking) and 15 (securities). These two histograms calculate two of the three statistics that we define in Section 7.1 over a range of plausible specifications. We describe the precise set of these specifications in Section 7.2.3 and also provide there certain summary statistics of the distributions depicted in this figure. Each of the histograms presented here can be precisely replicated using our online data tools as described in Section 7.3.

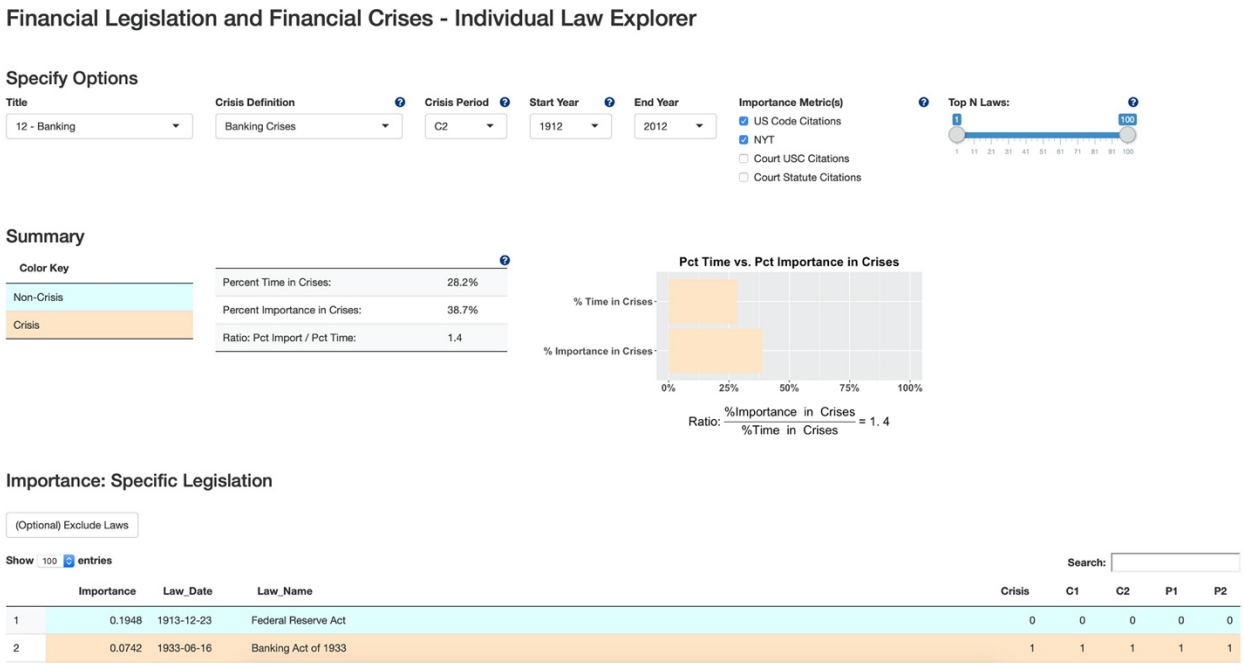


Figure 2

Online Data Tools - Individual Law Explorer.

Title 12 vs. Title 15: Comparing Results Under Ranges of Specifications

Display App Overview

Specify Options

Equity Crisis Definition
- [ ] Equity 25% Drop
- [ ] Equity 30% Drop
- [x] Equity 35% Drop
- [ ] Equity 40% Drop
- [ ] Equity 45% Drop
- [ ] Equity 50% Drop

Crisis Period
- [ ] C1
- [x] C2
- [ ] P1
- [ ] P2

Start Year Title 12
- [x] 1912
- [ ] 1932
- [ ] 1940
- [ ] 1984

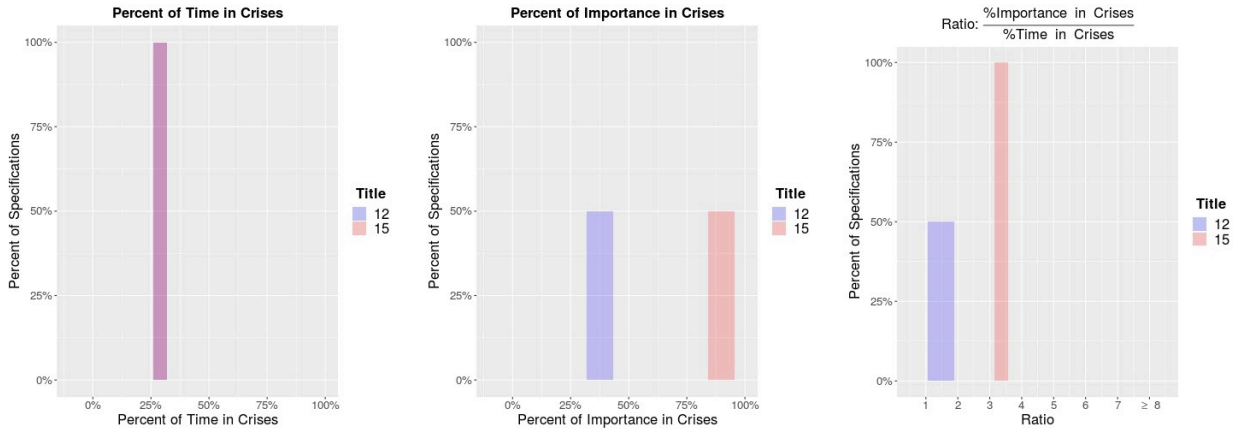
Start Year Title 15
- [x] 1932
- [ ] 1940
- [ ] 1984

End Year
- [x] 2011
- [ ] 1983

Importance Metric(s)
- [ ] US Code Citations
- [ ] NYT
- [x] US Code + NYT
- [ ] Court USC Citations
- [ ] Court Statute Citations
- [ ] All Metrics Combined

Top N Laws:
- [x] All
- [ ] 2
- [ ] 3
- [ ] 5
- [ ] 10
- [x] 20
- [ ] 50
- [ ] 100

Histograms



Summaries of Histograms

Title	Mean	Median	Max	Std Dev	N Specifications
12	27.5%	27.5%	27.5%	0%	2
15	26.6%	26.6%	26.6%	0%	2

Title	Mean	Median	Max	Std Dev	N Specifications
12	39.7%	39.7%	41.7%	2.9%	2
15	88.2%	88.2%	91.2%	4.3%	2

Title	Mean	Median	Max	Std Dev	N Specifications
12	1.4	1.4	1.5	0.1	2
15	3.3	3.3	3.4	0.2	2

Figure 3

Online Data Tools - Comparing Results Across Specifications.

Table 1
Title 15 (Securities Legislation). Equally weighted combination of all four importance metrics. This table covers all securities legislation between 1932 and 2011. Importance ratings are normalized to sum to one over all laws considered. Thus, for instance, an importance rating of 0.05 means that a given law represents 5% of all legislative importance over the given sample period. Cumulative importance measures the total importance of all laws up to and including a given law in rank. Thus, if the tenth law reports a cumulative importance of 0.50, it means that the top ten laws have together 50% of all legislative importance. This table presents only the top thirty laws by importance. For a full list of laws and importance ratings, see our interactive online data tools.

Rank	Importance	Date	Law Name	Cumulative Importance
1	0.1485	1934-06-06	Securities Exchange Act of 1934	0.1485
2	0.1190	1933-05-27	Securities Act of 1933	0.2675
3	0.0892	1935-08-26	Public Utility Holding Company Act of 1935	0.3567
4	0.0739	2010-07-21	Dodd-Frank Wall Street Reform and Consumer Protection Act	0.4307
5	0.0591	1940-08-22	Investment Company Act of 1940	0.4897
6	0.0552	2002-07-30	Sarbanes-Oxley Act of 2002	0.5449
7	0.0510	1995-12-22	Private Securities Litigation Reform Act of 1995	0.5959
8	0.0287	1998-11-03	Securities Litigation Uniform Standards Act of 1998	0.6246
9	0.0221	1964-08-20	Securities Act Amendments of 1964	0.6467
10	0.0205	1975-06-04	Securities Acts Amendments of 1975	0.6673
11	0.0197	2000-12-21	Commodity Futures Modernization Act of 2000	0.6870
12	0.0143	1987-12-04	Securities and Exchange Commission Authorization Act of 1987	0.7013
13	0.0136	1970-12-14	Investment Company Amendments Act of 1970	0.7149
14	0.0126	1933-05-27	Trust Indenture Act of 1939	0.7274
15	0.0123	1991-12-19	Federal Deposit Insurance Corporation Improvement Act of 1991	0.7397
16	0.0119	1996-10-11	National Securities Markets Improvement Act of 1996	0.7516
17	0.0081	1990-11-15	Securities and Exchange Commission Authorization Act of 1990	0.7597
18	0.0080	1990-10-15	Securities Enforcement Remedies and Penny Stock Reform Act of 1990	0.7678
19	0.0080	1988-11-19	Insider Trading and Securities Fraud Enforcement Act of 1988	0.7757
20	0.0079	1980-10-21	Small Business Investment Incentive Act of 1980	0.7836
21	0.0074	1968-07-29	Williams Act	0.7910
22	0.0070	1978-05-21	Securities Investor Protection Act Amendments of 1978	0.7980
23	0.0070	1989-08-09	Financial Institutions Reform, Recovery, and Enforcement Act of 1989	0.8050
24	0.0069	1977-12-19	Foreign Corrupt Practices Act of 1977	0.8119
25	0.0068	1978-11-06	Bankruptcy Reform Act of 1978	0.8187
26	0.0062	1935-08-23	Banking Act of 1935	0.8249
27	0.0062	2005-08-08	Energy Policy Act of 2005	0.8311
28	0.0061	1999-11-12	Gramm-Leach-Bliley Act	0.8372
29	0.0058	1984-08-10	Insider Trading Sanctions Act of 1984	0.8430
30	0.0056	1936-05-27	Unlisted Securities Trading Act	0.8486

Table 2
Title 12 (Banking Legislation). Equally weighted combination of Metric #1 (US Code Citations) and Metric #2 (NYT Citations). This table covers all banking legislation between 1912 and 2011. As such, it only uses the first two of our metrics, as Metrics #3 and 4 are defined only for the post-1932 period. Importance ratings are normalized to sum to one over all laws considered. Thus, for instance, an importance rating of 0.05 means that a given law represents 5% of all legislative importance over the given sample period. Cumulative importance measures the total importance of all laws up to and including a given law in rank. Thus, if the tenth law reports a cumulative importance of 0.50, it means that the top ten laws have together 50% of all legislative importance. This table presents only the top thirty laws by importance. For a full list of laws and importance ratings, see our interactive online data tools.

Rank	Importance	Date	Law Name	Cumulative Importance
1	0.1468	1913-12-23	Federal Reserve Act	0.1468
2	0.0561	1938-02-03	National Housing Act Amendments of 1938	0.2029
3	0.0551	1933-06-16	Banking Act of 1933	0.2580
4	0.0518	2010-07-21	Dodd-Frank Wall Street Reform and Consumer Protection Act	0.3098
5	0.0454	1935-08-23	Banking Act of 1935	0.3552
6	0.0367	1934-06-27	National Housing Act	0.3920
7	0.0273	1954-08-02	Housing Act of 1954	0.4192
8	0.0265	1989-08-09	Financial Institutions Reform, Recovery, and Enforcement Act of 1989	0.4457
9	0.0235	1948-08-10	Housing Act of 1948	0.4692
10	0.0211	1950-04-20	Housing Act of 1950	0.4903
11	0.0200	1965-08-10	Housing and Urban Development Act of 1965	0.5103
12	0.0168	1927-02-25	McFadden Act	0.5270
13	0.0146	1968-08-01	Housing and Urban Development Act of 1968	0.5416
14	0.0134	1961-06-30	Housing Act of 1961	0.5550
15	0.0131	1957-07-12	Housing Act of 1957	0.5681
16	0.0122	1979-12-21	Housing and Community Development Amendments of 1979	0.5803
17	0.0117	1982-10-15	Garn-St Germain Depository Institutions Act of 1982	0.5919
18	0.0115	1987-08-10	Competitive Equality Banking Act of 1987	0.6034
19	0.0112	1999-11-12	Gramm-Leach-Bliley Act	0.6146
20	0.0110	1951-09-01	Defense Housing and Community Facilities and Services Act of 1951	0.6255
21	0.0105	1996-09-30	Deposit Insurance Funds Act of 1996	0.6360
22	0.0102	1992-10-28	Housing and Community Development Act of 1992	0.6462
23	0.0088	1978-11-10	Financial Institutions Regulatory and Interest Rate Control Act of 1978	0.6551
24	0.0088	2008-07-30	Housing and Economic Recovery Act of 2008	0.6639
25	0.0086	1991-12-19	Federal Deposit Insurance Corporation Improvement Act of 1991	0.6725
26	0.0083	1955-08-11	Housing Amendments of 1955	0.6809
27	0.0081	1994-09-23	Riegle Community Development and Regulatory Improvement Act of 1994	0.6889
28	0.0075	1980-03-31	Monetary Control Act of 1980	0.6964
29	0.0073	1956-08-07	Housing Act of 1956	0.7037
30	0.0071	1983-11-30	Supplemental Appropriations Act, 1984	0.7108

Table 3
Relation Between our Importance Metrics and Mayhew's. Each of the rows in these tables presents the results of a linear regression of the form

$$Importance = \alpha + \beta Mayhew + \varepsilon$$

where "Importance" represents one of our metrics of legislative importance, α is a constant, and "Mayhew" represents a binary indicator for whether a given piece of legislation was identified as important by Mayhew. Since Mayhew's work spans 1947 to the present, all of these analyses cover our metrics for only that period as well. "Coef" in these tables represents the coefficient estimate on the "Mayhew" variable, and "t-stat" in the tables represents the HW robust t-stat on that coefficient. We normalize each of our importance metrics by first subtracting their mean and then dividing by their standard deviation. Thus, e.g. a coefficient of 2.0 means that a law being designated by Mayhew as important correlates with a two standard deviation increase in one of our importance metrics.

Metric	R^2	Coef	t-stat
#1: US Code	0.16	1.44	1.97
#2: NYT	0.24	1.75	1.84
#3: Court US Code	0.13	1.28	2.21
#4: Court Statute	0.28	1.88	2.35
Combined	0.30	1.93	2.43

(a) Title 15

Metric	R^2	Coef	t-stat
#1: US Code	0.17	1.71	4.08
#2: NYT	0.13	1.52	2.66
#3: Court US Code	0.09	1.25	3.69
#4: Court Statute	0.13	1.50	2.32
Combined	0.19	1.80	3.28

(b) Title 12

Table 4
Correlations Between Importance Metrics. Each of these sub-tables represents the correlation matrix between our importance metrics. Table (a) considers Title 15 (securities legislation), and all four importance metrics over the full sample period, 1932-2011, in which we consider securities legislation. For Title 12 (banking legislation), the first two of our metrics are defined starting in 1912, whereas the second two are defined only starting in 1932. Thus, Table (b) considers, for Title 12, the correlation between Metrics #1 and 2 over the whole sample period, from 1912-2011, whereas Table (c) considers, for Title 12, the correlation between all four metrics from 1932-2011.

	US Code	NYT	Court US Code	Court Statute
US Code	1.00			
NYT	0.84	1.00		
Court US Code	0.42	0.47	1.00	
Court Statute	0.73	0.79	0.61	1.00

(a) Title 15: 1932-2011 (All Metrics).

	US Code	NYT
US Code	1.00	
NYT	0.77	1.00

(b) Title 12: 1912-2011 (Metrics 1,2).

	US Code	NYT	Court US Code	Court Statute
US Code	1.00			
NYT	0.59	1.00		
Court US Code	0.59	0.38	1.00	
Court Statute	0.52	0.42	0.53	1.00

(c) Title 12: 1932-2011 (All Metrics).

Appendix

A. Metrics #2 – 4: Construction

Metric #2: Law Citations by the New York Times

Our next metric draws upon a completely different type of citation: references to laws made in *The New York Times*. We choose the Times because it is a prominent national newspaper of record for the duration of our sample period. To make the computation of this metric practicable, we focus on the one-month (31 calendar day) period following the passage of each law.[55] During that period, for each of the laws identified in our prior metric, we search the historical archives of the New York Times to identify all articles that reference that law.

The New York Times (NYT) metric is the exception to our effort to standardize the metrics and computations used in this article. As we discovered when initially attempting to craft this metric, there is no simple or standardized way that a given piece of legislation is referenced in the NYT. For instance, some NYT articles directly reference the "Federal Reserve Act." Other articles, by contrast, refer to it by names such as the "Glass-Owen Act/' the "Currency Bill," the "Money Bill" and many other variations. Thus, while it would be far simpler and easier to search only for the most common title by which a bill is referred to in modern literature, this has the potential to yield badly skewed results based on the arbitrary condition of how standardized a bill's name was at the time of its passage.

To confront this challenge, we adopted a more manual process for uncovering the pertinent articles in the NYT. Our procedure begins by searching the NYT for the most common name or names associated with a law, as, for instance, given in the OLRC's popular name table. The articles returned in this fashion will frequently use multiple different methods for referring to the law. We then use these to generate new search terms.

From here, we expand the searches further, investigating the content of the law, both based on reviewing secondary sources regarding the law and based on information in the articles we have found regarding the law. For instance, many articles about the Dodd-Frank Act focus on the Consumer Financial Protection Bureau (which the Act created), and Elizabeth Warren, who was appointed to head the bureau. We thus use information from these investigations to generate further search terms. Finally, we use a set of general search terms that we have found through experience are often useful for picking up references to legislation not otherwise captured. For instance, articles on legislation frequently mention the name of the US president who signed the bill, with this name occurring in the article near the word "sign" or some variation thereof. Similarly, we use searches for terms such as "bank," "stock," "finance" near other terms such as "reform," "legislation," "mandate," and so forth.

Through all of these search procedures, we use ProQuest's search code syntax that enables us to avoid the same article being returned on multiple searches.[56] This greatly reduces the amount of material that needs to be reviewed, thereby enhancing the efficiency and accuracy of the process.

We initially developed these search procedures ourselves. We then worked to train a team of research assistants to implement them. We provided the research assistants with detailed instructions and feedback on their work. To ensure accuracy, we required that each research assistant be able to complete at least three consecutive laws with results that matched what we had obtained doing our own searches before we would begin using that research assistant's work in generating our metrics. We also reviewed the set of search terms used by every RA on every law, and made suggestions for any they might have missed.[57] Finally we manually reviewed every newspaper article returned by the research assistants in order to validate that they

[55] See our discussion in Section 5.2 regarding our focus on the contemporaneous importance of legislation.

[56] In particular, we utilize the NOT statement to exclude from each new search any articles that met the criteria of any prior searches.

[57] Interestingly, as a practical matter, the RAs almost never found new hits based on these additional suggestions, thus indicating that they had done a thorough job through their initial searches.

indeed did pertain to the laws in question.[58] A full set of articles identified for each law is available upon request.

Given these specifications then, we simply measure the importance of each piece of legislation based on the number of NYT articles that cite it in the thirty-one days following its passage.[59] We investigate whether these importance metrics based on NYT citations exhibit the same secular trend that the US Code metrics do, thus potentially requiring a similar normalization procedure. In fact, although we find that laws get longer and more complex with time (producing a secular trend in our first metric), NYT articles about laws do not, nor do they become systematically more or less numerous. In particular, when we regress log importance on year (using the same specifications described above), we find a coefficient of only —0.0002 (i.e. 0.02% decline in importance per year) for Title 12, and of —0.00035 for Title 15, with adjusted R^2 values of 0.01 and 0.028 respectively. Thus, we do not employ any normalization for our NYT based metric.

Our next two metrics draw in citation information from another new source, this time, federal and state court opinions obtained from the Free Law Project's database.[60] This database covers over 1 million cases up to the end of 2018, which is when we last accessed the data for this project. Coverage of US Court cases in this database is very close to comprehensive for later periods but is sparser in earlier periods. For instance, the very first court case to cite provisions of Title 12 of the US Code does not appear until 1927, and the next several years after that are relatively sparse. For what we describe as modern securities legislation, which began with the Congress elected in 1932 and its passage of the Securities Act of 1933, this is not a major problem. By the 1930s, there were a substantial number of cases citing both Title 15 and Title 12.

Thus, we are able to use metrics that draw on court opinions for the full time period we analyze for securities legislation. For banking legislation, by contrast, these metrics are not meaningfully defined for laws such as the 1913 Federal Reserve Act. For consistency across banking and securities legislation, we choose 1932 as the start date for applying court opinion-based metrics to Title 12 as well.[61]

The first of our importance metrics that draw on judicial citations is inspired by the component of Google's search algorithms that weights links more heavily if they are made by a more prominent website. We adapt this principle to create, as our third metric, a modified version of our Metric #1 (as described in Section 5.2). In Metric #1, we simply count the total number of sections of the US Code that cite to a given law in their source credits, thus weighting each section equally. A potential concern with this approach is that some sections of the US code are more important than others, and thus, a law that modifies an obscure and unimportant section is probably less significant than a law that modifies a prominent one. Thus, for Metric #3, we seek to use court case citations to sections of the US code to determine which are the most important sections.

Specifically, for each law, we count the number of judicial opinions that cite a section in Title 12 or 15 that the law amended, introduced, or repealed. Thus, if a law only impacts sections of the US Code that are effectively irrelevant for the purposes of writing judicial opinions, then it would receive no importance under this metric. Conversely laws that impact frequently cited provisions of the US Code receive higher importance under this metric. With over one million cases in the Free Law Project to search, we accomplish these computations based on custom written software, again based on regular expressions, that we use to comprehensively mine the court cases for citations to the U.S. Code. Because of the diversity of citation

[58] In general, we only eliminated a small number of articles in this way. The eliminations were usually situations in which the article referenced activity by federal regulators that occurred near the time of a law's passage but that was in response to prior legislation enacted by Congress. Our training of the RAs stressed the value of returning over-inclusive, rather than under-inclusive results, as we much preferred to leave these more difficult judgments to ourselves. In a small number of cases, laws contain a mixture of content, some of which does not pertain to financial reform. For instance, the Crime Control Act of 1990 contained an important component of the legislative response to the Savings and Loan Crisis, creating, for instance, new mechanisms by which bank employees could bring whistleblower claims against their employers based on violations of federal law. Yet, this Act also contained many other provisions, dealing, for instance, with gun-free school zones, that clearly are not pertinent to financial legislation. In these cases, we only consider those articles that directly relate to financial reform.

[59] We do not, therefore, attempt to rate articles based on their length, depth of treatment, or other factors.

[60] See https://free.law/

[61] In Section 7 we discuss further details on how the time periods these metrics are defined for relate to the results of our analyses.

formats employed by different courts over different time periods, the development and honing of this software required considerable time.[62]

Just as legislative length and complexity have increased over time, requiring normalization of our first metric, so too has the number of judicial opinions citing Titles 12 and 15 risen over time, requiring normalization of this metric. For each law, we consider the ten years following its passage.[63] For each of these years, we measure the total number of judicial opinions that cite Title 12 or 15 and calculate the fraction of those opinions that cite sections introduced or amended by the given piece of legislation. We then take the average of these fractions over all ten years. As with our first metric then, this ranges from a value of 1, which would indicate that every single court case dealing with Title 12 or 15 cites provisions impacted by a given law, and 0, which would indicate complete irrelevance of a law as far as court citations are concerned.

Metric #4: Direct Judicial Citations

Our Metric #3 uses judicial citations, but still draws upon citations of legislation in the US Code as well. Our fourth and final metric, by contrast, makes no use of citations from the US Code, and uses judicial opinions in a way distinct from Metric #3. When a court opinion references statutory law, it may do so in different ways. In almost all cases, a court will reference the version of that law codified in the US Code. It is these citations that Metric #3 uses. In some instances, however, a court will also directly cite to the original law. Our metric #4 makes use of the direct citations to laws that appear in judicial opinions, as given by references to the statute at large citation or the public law number of a law. As with Metric #3, we write custom software to mine the million cases in the Free Law Project database, covering the many different formats in which these citations may appear.

Under this metric, a law's importance is defined by the number of unique court cases that cite directly to it within ten years of the law's passage. In calculating this, we consider only cases that also cite to some provision of either Title 12 or 15 (depending on which type of legislation we are evaluating). The purposes behind this is to address legislation that may impact, for instance, both banking and tax. We only want to ascribe banking significance based on cases that interpret banking law. This parallels the approach we take with US Code citations - considering only the impact of a law on Title 12 or 15, rather than the total number of citations to it that appear anywhere in the US Code.

After we count the number of cases within ten years of a law's passage that directly cite to that law and to Title 12 or 15 of the US Code, we normalize, dividing by the total number of cases that cite to any provision of Title 15 or 12, respectively, within that ten-year period.[64] Thus, for instance, if every single case that cites to Title 12 directly references a given piece of legislation, then that law would receive the highest possible importance rating under this metric, which is 1.

Metrics #3 and #4 complement each other in some respects, with each containing desirable features that help to address the other's potential weaknesses. A scenario of potential concern with Metric #3 is a law that makes many trivial modifications to various sections of the US Code. The US Code source credits, upon which Metric #3 draws, cite all laws that make any modification to a given section of the Code, thus not directly discriminating between fundamental and superficial changes. A trivial law such as this would be far less likely to be cited directly within a court opinion, and thus such a law would score relatively low on Metric #4.

Metric #4, however, also has its limitations. A scenario for concern here is a piece of legislation that modifies many components of the US Code apart from those titles pertaining to banking or securities legislation.[65] In this situation, when a court opinion cites directly to that legislation, it may be ambiguous whether it really reflects the importance of the law vis a vis financial legislation or vis a vis some other area

[62] Details, include the complete code that we used, are available upon request.

[63] If less than ten years is available, we use the amount of time available and scale all calculations accordingly.

[64] To fully clarify, we compute these metrics separately for securities and banking legislation. Thus, for securities legislation, we consider all cases that cite to the securities chapters in Title 15. For banking legislation, we consider all cases that cite to the banking provisions of Title 12.

[65] The Crime Control Act of 1990, discussed in Section 5.3

of law. By only considering court cases that also cite to some component of Title 15 or Title 12, we take significant steps to alleviate this concern. But, these may not fully resolve the concern. Under Metric #3, by contrast, any provisions of a law that influence the US Code outside of Titles 15 or 12 will be ignored in creating the metric, thus alleviating this concern.

A final potential advantage of Metric #3 over #4 is that there is more total data available to generate Metric #3. The reason for this is that nearly all cases that deal with federal legislation will cite to the US Code, whereas only a subset of these will directly reference a given law.[66] With a larger pool of cases to draw on, therefore, Metric #3 may offer reduced variance. At the same time, citations directly to a law, rather than just to its codification, may indicate that the law is particularly important for the resolution of a case, thereby potentially favoring Metric #3. Therefore, rather than attempting to make a judgment that one of these judicial citation-based metrics is clearly superior, we present both as complements to each other, and give readers through our online data tools great flexibility in examining how results vary depending on the metric used.

B. Dates of Financial Crises

In this appendix, we list the date ranges for the financial crises identified under our various specifications. For banking crises, Reinhart and Rogoff (2009) simply designate years as banking crises, rather than specifying particular months. For our peak-to-trough equity crisis definition, by contrast, we identify specific months for start and end dates.

Banking Crises

- 1907
- 1914
- 1929-1934
- 1984-1992
- 2007-2011

Equity Crises, 50% Peak-to-Trough Threshold

- 1930-12-01 to 1934-01-01
- 1938-03-01 to 1938-04-01
- 2009-02-01 to 2009-03-01

Equity Crises, 45% Peak-to-Trough Threshold

- 1930-10-01 to 1934-01-01
- 1938-03-01 to 1938-06-01
- 1974-09-01 to 1974-10-01
- 2002-09-01 to 2002-10-01
- 2009-01-01 to 2009-04-01

Equity Crises, 40% Peak-to-Trough Threshold

- 1930-09-01 to 1934-01-01
- 1937-12-01 to 1938-06-01
- 1942-04-01 to 1942-05-01
- 1974-09-01 to 1974-10-01
- 2002-09-01 to 2002-11-01
- 2008-11-01 to 2009-07-01

Equity Crises, 35% Peak-to-Trough Threshold

- 1907-11-01 to 1907-12-01

[66] To some extent, conventions for whether a court opinion will cite to the US Code, to a piece of legislation directly, or to both, are set by individual judges and courts. Frequently, however, this is left to a judge's case by case discretion. We do therefore observe some variation from year to year in the total number of citations directly to laws, as used in Metric #4. But, we do not observe a consistent secular trend in this variation. We also do not observe substantive differences amongst, for instance, state vs. federal courts, in how frequently they cite directly to laws. Furthermore, the normalization that we use in creating this metric will address at least some remaining potential concerns regarding variation amongst courts in their citation practices.

- 1930-06-01 to 1934-01-01
- 1937-11-01 to 1938-07-01
- 1942-02-01 to 1942-08-01
- 1974-08-01 to 1975-01-01
- 2002-07-01 to 2003-07-01
- 2008-10-01 to 2009-08-01

Equity Crises, 30% Peak-to-Trough Threshold

- 1907-10-01 to 1908-04-01
- 1914-10-01 to 1914-12-01
- 1917-11-01 to 1918-01-01
- 1921-06-01 to 1921-10-01
- 1929-11-01 to 1934-01-01
- 1937-10-01 to 1938-10-01
- 1941-11-01 to 1942-10-01
- 1970-06-01 to 1970-07-01
- 1974-07-01 to 1975-03-01
- 1987-11-01 to 1987-12-01
- 2001-09-01 to 2003-12-01
- 2008-10-01 to 2009-11-01

Equity Crises, 25% Peak-to-Trough Threshold

- 1907-09-01 to 1908-05-01
- 1914-08-01 to 1915-01-01
- 1917-11-01 to 1918-08-01
- 1920-12-01 to 1921-12-01
- 1929-11-01 to 1934-01-01
- 1937-10-01 to 1938-12-01
- 1940-05-01 to 1943-01-01
- 1948-02-01 to 1948-03-01
- 1970-05-01 to 1970-08-01
- 1974-05-01 to 1975-05-01
- 1987-11-01 to 1988-01-01
- 2001-08-01 to 2004-02-01
- 2008-10-01 to 2010-03-01

C. Empirical Specification - Additional Details

We choose not to pursue any kind of regression analyses or other more complicated statistical methods. In short, we do not believe these capture any useful information not covered in the summary statistics we describe above. Likewise, many of the premises behind these techniques do not fit our analytic situation. In regression analyses, the underlying assumption is that one is drawing limited samples from an infinite population and using information from the samples to make inferences about the population. The uncertainty in the analyses, as represented for instance by the confidence intervals on parameter estimates, is premised on the question of whether the limited sample is representative of the infinite population, or if, by random chance, the sample happens to be substantially atypical of the whole population.

This premise does not fit our analytic situation. We observe the entire population of financial laws passed over the prior century in the United States. Consider a concrete example that contrasts our situation with more typical econometric formulations. In a typical econometric analysis, one might seek to estimate the impact of a job training program on, say, one hundred workers who participate in it. These one hundred workers are simply a sub-set of the larger population of workers who did or at least in theory could receive the training program.

Suppose the econometrician calculates a coefficient estimate of close to zero for a variable associated

with the job training program. This near-zero coefficient estimate might indicate that the training program has no impact on participants. But, it is also possible that the workers selected were, simply by random chance, unusually unresponsive to the program, and that a different sample would respond differently. The confidence intervals calculated on the given parameter estimate would reflect, conditional on a set of statistical assumptions, how likely it is that the workers in the sample were substantially less responsive than the population of potential workers as a whole.

Our analytic situation is quite different.[67] If one observes no discernible impact of a training program on one hundred participants, one might still very reasonably contend that it is quite possible an effect would be seen on another or a larger sample of workers. By contrast, if the best that could be said for the crisis legislation hypothesis is that it is not supported by the actual history of US financial legislation over the past one hundred years, but that it might be supported over the next one hundred years or more, then the theory becomes stripped of essentially all meaning.

This discussion is not to say that there is no element of uncertainty in our calculations. Quite the opposite is true. But, the source of uncertainty in our analytic situation is not based on questions of whether our sample is representative of a larger population. Instead, it is based primarily on uncertainty as to whether we are accurately measuring legislative importance and appropriately defining financial crises. This type of uncertainty cannot be captured by traditional statistical tools such as confidence intervals and markers of statistical significance. Instead, the uncertainty in our calculations is best captured by viewing how our analytic results vary based on different definitions of legislative importance, financial crises, crisis periods, and so forth. Thus, in the ensuing discussion of results, and in particular through our suite of online data tools, we emphasize investigations that consider how the key statistics that we calculate vary across a range of plausible specifications.

D. Analysis Results and Modern Periods

D. 1 Analyses Only Considering Modern Periods

How do the results that we present in Section 7.2 vary if we only consider modern legislation, starting in 1984? (we choose this because it is the start date of the eight-year-long banking crisis period identified by Reinhart and Rogoff (2009)).

For banking legislation, when we run our baseline specification,[68] starting in 1984 instead of 1912, the ratio of percentage of importance in crises to percentage of time in crises is actually unchanged - the result is 1.4 under both specifications. But, for the full sample, from 1912 to 2011, this ratio comes from 39% of importance being accounted for by 28% of time in crises. By contrast, for the period from 1984 to 2011, this ratio comes from 82% of importance being accounted for by 57% of time in crises. Adjusting our importance measure to use an equally weighted combination of all four metrics leaves this statistic unchanged.

For securities legislation, we see, over the 1984 to 2011 period, 60.6% of legislative importance accounted for by 28% of time in crises, for a ratio of 2.2. This is a reduction in the ratio of 3.2 found by running the securities specifications over the full period from 1932 to 2011.

How shall one interpret these results? On the one hand, the ratio of 1.4 for banking legislation over this period may be seen as indicating that the same conclusions we draw for our main analyses of banking law also apply to this period. But, the picture may be muddier than that. The 82% of banking importance accounted for by crisis periods may seem in some respects to be fairly strong confirmation of the crisis legislation hypothesis for banking during this period. Yet, the fact that 57% of this period qualifies as a second-order congressional crisis-legislation period according to our specifications means that it is less remarkable to find a moderately large majority of legislation accounted for by crisis periods.

We express no opinions regarding the interpretation of the results for securities legislation over the 1984

[67] For a discussion of these topics by a team of pre-eminent modern empiricists, see Abadie et al. (2017).

[68] This is an equally weighted average of the first two metrics, which we choose as the baseline because these metrics are defined for our full sample period. See Section 7 for more details on the selection of this baseline.

to 2011 period. There is much that could be investigated or discussed here, but we leave it as a topic for future research.

D.2 Analyses Excluding Modern Periods

Another way to consider time variation in ways that go beyond what we treat in the main text is to consider analyses that stop the sample period in 1983 - that is, to exclude the modern period that was the focus of the prior discussion. This is potentially more fruitful because it still leaves a relatively large sample period.

For banking, our baseline ratio of 1.4 increases modestly to 1.7 when restricting to the 1912 to 1983 period, although the total amount of legislation attributable to crises declines from 39% to 27%. For securities legislation, our baseline ratio of 3.3 also increases modestly to 3.7 when restricting to the 1912 to 1983 period, with now 92.6% percent of total importance accounted for by 26% of time in crises. Overall, we interpret these results as broadly similar to our results that extend to 2011. That is, we do not see evidence that the 1984 to 2011 has an outsize role in driving our conclusions for either securities or banking legislation.