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Regulatory novelty after financial crises: Evidence from international banking and securities standards, 1975–2016

Stefano Pagliari [iD]

Department of International Politics, City, University of London, London, UK

Meredith Wilf [iD]

Graduate School of Public and International Affairs (GSPIA), University of Pittsburgh, Pittsburgh, PA, USA

Abstract

Financial crises are often presented as triggers for important innovations in international regulation of financial markets, but existing evidence for this claim primarily derive from the analyses of individual initiatives, assessed against noncomparable benchmarks. In order to provide systematic evidence of financial crises' impact on international financial regulatory change, this paper develops a novel text-as-data approach to measure regulatory novelty. We use this approach to analyze the full population of international banking and securities standards between 1975 and 2016. Contrary to theoretical expectations, our empirical findings indicate rules designed by international banking and securities regulators following financial crises are on average as likely to build on existing international regulations as those designed before a crisis. We also find that international banking rules published after the 2008 Global Financial Crisis are an important exception.

Keywords: financial crisis, financial regulation, international standard-setters, regulatory novelty, text-as-data.

1. Introduction

Financial crises have long been recognized within the political economy literature as important catalysts for economic policy reforms at the national and international levels. Over the years numerous studies have theorized how crises alter the political economy in ways that enable economic reforms; for instance, a crisis may weaken powerful opponents to regulation or provide a window of opportunity for policy entrepreneurs to promote regulatory change. Paradoxically, while existing studies find that financial crises trigger policy reforms in areas as diverse as macroeconomic adjustments (Walter 2013; Frieden 2015), capital account liberalization (Pepinsky 2012), and trade policy (Ballard-Rosa *et al.* 2018), there exists scholarly disagreement about the effect of financial crises on one of the policy areas more directly related to these events: the design of financial regulatory policies.

Scholarship documents that it is often in the immediate aftermath of a financial crisis (rather than before) when financial reforms are more likely to be introduced both at the domestic level, as well as at the international level (within international standard-setting bodies). Although high-profile international regulatory reforms such as the Basel Agreement are known responses to the crisis, scholars vary in their evaluations of to what extent international financial reforms negotiated in the immediate aftermath of a financial crisis mark breaks from past policies or, rather, incrementally build upon them. For instance, a few studies emphasize that the 2008 global financial crisis (GFC) led to novel international reforms to regulate global financial markets (Pagliari 2012; Baker 2013; Wilf 2016). In contrast, other works highlight the incremental nature of many reforms (Moschella & Tsingou 2013) and conclude that the crisis led to largely "status quo" – rather than novel – policies (Helleiner 2014).

The persistent disagreements among scholars regarding the nature of international regulatory change after financial crises are often amplified by two common research design characteristics. First, insights about international financial regulations often analyze one, or a few, rules. It is often unclear how to aggregate findings across

individual studies. Second, existing studies often assess regulatory change against benchmarks that are not readily comparable to the regulatory initiatives. As a result, it is often difficult to generally characterize the regulatory response and to evaluate the general effect of the financial crisis on the agenda of international standard-setting bodies.

This paper takes a different approach. Rather than focusing on one specific international regulatory initiative, this paper analyses the full population of international financial standards from two of the oldest and most significant international standard-setting bodies – the Basel Committee on Banking Supervision (BCBS) and the International Organization of Securities Commissions (IOSCO) – from 1975 through 2016. We use quantitative text analysis to develop a data-driven, quantitative measure of the regulatory novelty of the rules issued by these two international standard-setting bodies across-time. Using the textual similarity of each new international rule compared to all rules previously published by the same regulatory authority, we measure the extent to which each new international financial regulatory initiative builds upon or departs from, existing initiatives.[1] Regulatory initiatives that build upon existing regulations have relatively similar word patterns to one or more existing regulations; in contrast, rules that regulate new areas of the financial sector, or that introduce new regulatory approaches, have word patterns that are less similar to all existing regulations.

When we statistically test the hypothesis that post-crisis periods are moments when international standard-setting bodies adopt particularly novel regulatory approaches, two main findings emerge. First, in contrast to our theoretical expectation, rules designed by international banking and securities regulators following financial crises often have a regulatory novelty that is not higher, on average, than for international rules written before financial crises. Said differently, in the aftermath of a crisis, international standard-setting bodies are often as likely to build on and adapt existing international regulations as they are in the pre-crisis period. This is consistent with authors who emphasize that international financial regulatory policymaking is often incremental in nature. Second, international banking rules published after the GFC are an important exception. Following the 2008 crisis, new international banking standards designed by the Basel Committee display especially high levels of novel content as compared to the agenda adopted by this body before the crisis. Together, our basic theoretical expectation that major financial crises are major breaking point in the agenda of international standard-setting bodies and lead to especially high levels of novelty in their rule-making does not generally and empirically hold.

The paper continues as follows. Section 2 reviews existing literature and current debates about the connection between financial crises and international financial regulatory change. It explains how scholarly insights have been limited by a lack of comparable indicators across reforms. Section 3 outlines our approach to measure regulatory change after a crisis. Section 4 analyzes the international banking and securities standards that have been negotiated in the aftermath of the late 1990s' Asian Financial Crisis and the late 2000s' Global Financial Crisis. Section 5 concludes with a discussion and further implications.

2. Financial crises and international regulatory change

2.1. Theoretical insights
Scholarship often characterizes financial market regulation as a policy domain with high barriers to change. Financial regulatory policies often impose concentrated, observable costs on regulated firms. Therefore, during normal times, policymakers seeking to strengthen regulations typically face opposition from powerful, vested interests that seek to limit the regulatory burden of new rules, and includes financial firms (Lall 2012; Young 2013) and other, non-financial groups (Pagliari & Young 2014). Although regulatory changes that correct market failures may be supported by the public at large (Chaudoin & Wilf 2019; Young & Yagci 2019), the technical complexity of the issue and the collective action problems associated with regulating finance means that the public rarely mobilizes to demand financial regulations. As a result, policymakers' efforts to challenge regulatory opposition are unlikely to be rewarded during normal times (Aizenman 2009).

Financial crises are often identified within this literature as moments when obstacles to regulatory change are most likely to be overcome. First, major financial crises have often the effect of revealing limitations of existing regulatory policies and may create windows of opportunities for norm entrepreneurs to promote new regulatory ideas and approaches (Baker 2013). Second, financial crises are moments where the standard equilibrium – of high mobilization against and low mobilization in favor of, regulation – is most likely to be interrupted. During

financial crises, the costs of the failure of regulatory policies to keep up with financial sector innovation become clear to the general public. As the financial regulatory policy gains salience, policymakers face domestic pressure to initiate new regulatory initiatives from voters as well as from groups normally not engaged in this policy domain (Oatley & Nabors 1998; Singer 2007; Pagliari & Young 2016). Simultaneously, the political capital of the financial industry and its capacity to oppose regulatory changes are often challenged in the aftermath of crises (Young 2013).

Moreover, in an era of increasingly mobile capital, unilateral regulatory responses create a regulator's dilemma, where increased regulatory stringency will increase financial stability but competitively disadvantage domestic financial firms vis-a-vis foreign firms (Kapstein 1989). As a result, after a crisis, national regulators who face national pressures to increase regulatory stringency have more incentives to coordinate regulatory responses with foreign counterparts in order to level the international playing field (Kapstein 1989; Oatley & Nabors 1998; Singer 2007). For instance, the BCBS has emerged as the primary site to coordinate banking regulations in response to the return of international banking crises in the aftermath of the end of the Bretton Woods exchange rate system (Kapstein 1989; Goodhart 2011). This was followed by the creation of other standard-setting bodies such as the IOSCO coordinating securities regulations, the International Association of Insurance Supervisors coordinating best practices among insurance supervisors, and the International Accounting Standards Board coordinating national accounting standard-setting bodies (Singer 2007; Buthe & Mattli 2011).

2.2. Empirical limitations

Although financial crises are commonly understood as the most likely triggers for important expansions in the agenda of international standard-setting bodies such as the BCBS and IOSCO, the extent to which new rules will break new ground and depart from existing ones remains elusive. Empirical works on this topic–those that investigate the impact of crises on international regulatory reforms–have reached vastly different conclusions. Some empirical works find that financial instability results in a major international organization and international rule changes. For instance, the 1988 Basel Capital Accord that harmonizes minimum capital requirements for internationally active banks emerged out of national and international political dynamics triggered by the Latin American debt crisis (Oatley & Nabors 1998). Other studies, instead, emphasize that not every crisis is followed by major reform. For instance, Singer's (2007) detail show the 1987 US stock market crash highlighted the interconnectedness of securities markets but failed to generate an international securities agreement comparable to the Basel Capital Accord for international banks.

Moreover, within related literature that analyzes the character (rather than causes) of post-crisis international regulatory reforms, significant disagreement remains. For instance, while some scholars have described the East Asian financial crisis of 1997–1998 as a turning point in international financial regulation given the expansion in the scope of regulatory cooperation to cover new sectors (Walter 2008), other scholars have argued that the set of changes represented only "modest" change compared to the extent of the crisis (Soederberg 2003, p. 391).

And, similar disagreements exist about how to interpret the wave of international financial regulatory reforms negotiated in the aftermath of the 2008 GFC. The scale of the GFC that began in 2007 had no equivalent in the post-Bretton Woods era. For some, the crisis led to the creation of important new regulatory initiatives, the emergence of innovative regulatory approaches, and, more broadly, marked a significant turning point in the international regulatory architecture (Pagliari 2012; Baker 2013; Wilf 2016). Others, instead, describe regulatory changes triggered by the crisis as, at best, tweaking the pre-crisis international financial architecture without challenging the existing policy paradigm (Moschella & Tsingou 2013; Helleiner 2014; Fioretos 2016).

Two traits of many existing analyses help explain scholars' vastly different conclusions about how to characterize post-crisis international regulatory reforms. First, most studies either analyze one reform or compare a few reforms. Early scholarship on international financial regulation focused on the 1988 Basel Capital Accord and utilized in-depth case studies (Kapstein 1989; Oatley & Nabors 1998). A small-n approach remains dominant, even though the number and scope of international regulations have greatly expanded throughout the 1990s and beyond. Many studies of the regulatory response to the 2008 GFC analyze one or few selected initiatives such as measures introduced after the crisis to regulate hedge funds (Helleiner & Pagliari 2009), derivatives (Knaack 2015), resolution regimes for too-big-to-fail financial institutions (Quaglia 2017), and shadow banking

(Ban *et al.* 2016). This focus has the advantage of providing an in-depth understanding of the nature and determinants of individual initiatives. However, given the large number and diversity of existing international regulatory initiatives that have emerged in recent years, it has become more difficult to generalize findings or assessments of the overall character of international regulatory reforms from individual studies.

Second, a variety of benchmarks are used to evaluate international regulatory change. Take, for instance, the Basel III banking standards, which are arguably the linchpin post-GFC efforts to increase the stability of international banks. Some scholars argue that Basel III was a success. Drezner points to the relatively short negotiation time of Basel III (2 years) compared to the previous Basel II (6 years) (Drezner 2013), and Wilf (2016) provides stock price evidence that equity investors perceived Basel III to increase regulatory stringency. For other scholars, Basel III was a limited response. Lall (2012, p. 609) argues that international regulators moved "from failure to failure," and Admati and Hellwig (2013), p. 180) argue that Basel III minimums, although an increase from previous standards, remain "outrageously low." As a result, attempts to evaluate the nature of post-crisis international reforms rely mostly on very different benchmarks that are often not readily comparable across regulatory initiatives.

In sum, while a large literature has identified financial crises as the most likely catalyst for competing benchmarks that cannot be applied across different reforms. How can we assess the overall impact of crises over international regulatory change? The next section outlines a unique, data-driven approach to analyze international regulatory change that will be used to test the main hypothesis that post-crisis periods are moments when international standard-setting bodies adopt novel regulatory approaches.

3. A text-based measure of regulatory novelty

This section describes how we conceptualize and measure international financial regulatory change. Two aspects distinguish our approach from existing studies. First, in contrast with analyses of one or a few individual reforms, our approach includes the entire population of rules designed by two important international standard-setting bodies. This provides a bird's-eye view of patterns of regulatory change. Second, we use quantitative text analysis to arrive at an objective, data-driven measure of the regulatory novelty of each rule within the population.

3.1. Regulatory novelty: Conceptual definition

To explore regulatory change across a range of financial sector actors and rules, we need a suitable measure. Existing literature commonly evaluates post-crisis regulatory reforms against a set of subjective expectations about what regulatory outcomes could have been expected. For instance, Moschella and Tsingou (2013, p. 2) argue that "the process of international financial reform has fallen short of initial (and proclaimed) expectations of rapid and revolutionary transformation." However, because both the root cause of the crisis and the expected regulatory response is often highly contested, it is often unclear what should be the appropriate baseline.

In this paper, we compare the content of each new international regulation against all regulations previously written by the same international standard-setting body. Such an approach is relational and lies in contrast to a researcher defining a specific regulatory outcome that should have been expected. By comparing a rule with all past rules by the same standard-setter, we aim to measure the level of "regulatory novelty" of each standard, defined as the extent to which a new international regulatory initiative builds upon or departs from previous regulations. From this perspective, "regulatory novelty" overlaps with the notion of "incrementalism" in policy change, which captures the extent to which decision-makers respond to new problems by primarily engaging in a local search for options rather than introducing novel grand designs (Lindblom 1959). The concept is used in the recent scholarly analysis to describe post-crisis international financial regulatory reforms (Helleiner 2012; Moschella & Tsingou 2013; Fioretos 2016).

3.2. Measuring regulatory novelty: Operational definition

Existing studies that compare the degree to which new international financial standards depart from previous ones typically involve in-depth, qualitative analyses of hand-picked pairs of regulatory initiatives, such as comparing Basel II Agreement with its predecessor Basel I (Tarullo 2008), or Basel III with Base II (Lall 2012; Admati &

Hellwig 2013). This paper's approach complements case-specific studies by comparing a new standard with the entire population of previous regulatory initiatives by the same standard-setter. Specifically, we measure "regulatory novelty" as the degree to which a new international rule's text is most similar to previously published rules by the same international standard-setting body. The main assumption behind this approach is that vocabulary differences in any two international regulations capture differences in the extent to which they build upon or depart from each other. Two dimensions are particularly likely to drive differences in the vocabulary used by the same regulator: the regulatory scope and the regulatory approach. The first dimension captures the specific set of markets or institutions that are the primary target of regulatory intervention. All else equal, a new regulatory initiative that targets markets or institutions that have so far remained outside the regulatory perimeter will display more regulatory novelty than will a regulatory initiative that seeks to revise previous international rules targeted at the same market actor. For example new international rules targeting for the first time shadow banking institutions or financial benchmarks can be understood to have a greater regulatory novelty that international standards revise rules surrounding already-regulated institutions such as commercial banks or insurers. The second dimension of regulatory novelty concerns the type of regulatory instruments adopted. All else equal, a new international rule that introduces new approaches to regulate a given market or institution is more novel than a regulatory initiative that simply re-calibrate existing regulatory tools. For example international standards introducing new tools such as liquidity and leverage requirements to the regulation of internationally active banks can be understood to have greater regulatory novelty than standards tightening or loosening the capital requirements already imposed upon these institutions.

In both cases, we expect that this novelty will be reflected in the vocabulary used by regulators. For example the first time that hedge funds or credit rating agencies are regulated, or the first time that liquidity (rather than capital) requirements for banks are introduced, vocabulary will differ from all other rules; this low similarity with all existing rules captures high regulatory novelty. In contrast, a new international rule that directly builds upon a previous international rule, or that incrementally revises an existing standard, will share a high percentage of meaningful words in common with those relevant, past rules. That is high text similarity, with one or more previously issued international financial standards is a good proxy for a new regulation that exhibits low regulatory novelty.

To measure the extent to which the text of a new international initiative is similar to the text of a broad range of existing rules, we use a text-as-data approach (Grimmer & Stewart 2013) and measure the cosine similarity across different rules. Cosine similarity is a bag of words approach to text-similarity that collapses the word content of a document into a vector of wordcounts over m-dimensions, where each dimension represents a specific word (Mihalcea *et al.* 2006; Huang 2008). The location and sequence of words do not affect this value. Within political science, cosine similarity has been recently used to compare document similarity among legislation (Garrett & Jansa 2015), parliamentary speeches (Martocchia Diodati *et al.* 2018), and bilateral tax treaties (Arel-Bundock & Lechner 2018).

This measure is particularly suitable for our analysis for three reasons. First, while "substring matching" methods such as those employed in plagiarism detection software are better suited to identify cases where new rules directly reuse text from past rules, our approach allows identifying the topical similarity of two texts written independently (Wilkerson *et al.* 2015; James *et al.* 2020). Second, unlike other "bag of words" approaches such as Word score that compares the distribution of words against an anchor document (Laver *et al.* 2003), our approach to measuring regulatory novelty does not require the researcher to select reference documents to guide the analysis. Third, cosine similarity provides a standardized measure that is easier to interpret across multiple documents. Between any two document texts, the measure is bounded between 0 and 1. Two rules with high cosine similarity (near 1.00) have similar document words and relative word densities, while two rules with low cosine similarity (near 0.00) have fewer common words and more dissimilar word distributions.[2]

To measure the regulatory novelty of a given international standard, we want to know how distinct the new rule is compared to all previous rules by the same standard-setter. We start by identifying a population of international standards set by a given regulator. For each rule we identify the previous international standard with the highest cosine similarity that is the standard that shares the most similar word densities with all previously published rules by the same regulator. We call this measure "Maximum Cosine Similarity" (MaxSim). A formal

definition, along with empirical examples that build intuition about the measure's construction, may be found in Appendix A.

3.3. Data

We analyze the set of international financial regulations that have been written by the two oldest and most established international standard-setting bodies. Rules written by the BCBS are the set of international banking regulations, and rules written by IOSCO are the set of international securities regulations. The unit of analysis is an international standard, which is a document written and publicly posted by an international standard-setting body. As defined by the Financial Stability Board, standards may include statements of principles, best practices, and/or guidelines.

While existing studies of BCBS and IOSCO rules typically focus on selected, high profile regulatory initiatives, we analyze each group's entire population of publicly available international financial regulatory standards. We collect all the documents available on the "publications" page of each organization's website.[3] We coded the sub-set of publications on each page that constitute international standards; one document is one international standard.[4] The BCBS and IOSCO have incentives to make agreed-upon international standards publicly accessible, and, where documents have been updated over time, both original and revised versions of documents are available. This process resulted in a set of 184 BCBS international standards that span the years 1975–2016 and 303 IOSCO international standards that span the years 1989–2016.[5]

Figure 1 graphs the annual count of new international bank and securities rules. The number of new international rules spikes in the aftermath of the financial crisis (the gray areas). This is consistent with both general theoretical expectations that post-crisis periods have increased the likelihood of being a period of new regulatory cooperation (Singer 2007), and conventional wisdom about the post-GFC period, in particular, as one with many new rules.

Rather than the frequency of new international rules, however, we are interested in the rules' level of regulatory novelty, proxied for by textual similarity. The next section illustrates and validates our approach using this data from international banking and securities standards.

3.4. Illustration and validation

We use the r package *quanteda* (Benoit *et al.* 2018) to compute cosine similarity. We pre-process each text by stemming and removing punctuation and stop words as defined by *quanteda*. Our analysis is lexical, such that
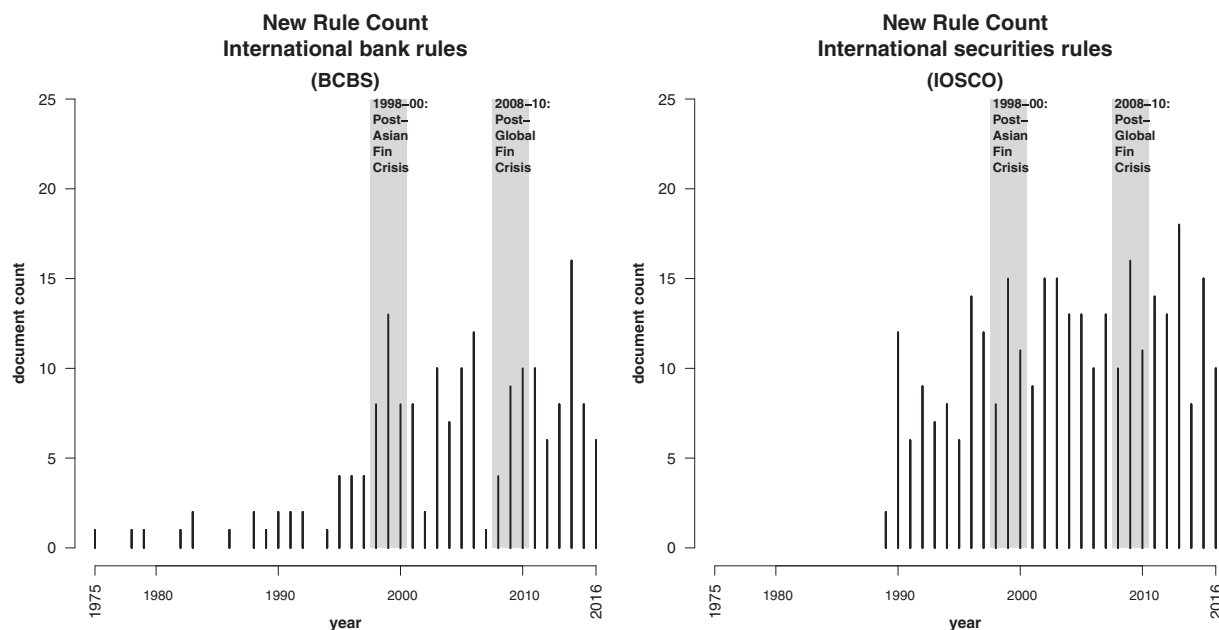

Figure 1   The annual count of new banking (left) and securities (right) international standards, 1975–2016.

synonyms are treated as distinct terms. These decisions are appropriate given the data at hand, which define regulatory rules and principles; precise terminology is essential, and, should an organization use new terms for existing concepts, this represents a change in regulatory approach that is of interest.

As an initial check that our measure of regulatory novelty identifies important and expected variation, we consider a selection of international standards for which qualitative literature indicates the rule is either especially novel or especially derivative.

Figure 2 displays the full set of cosine similarity values with all other international rules by the same regulator for two international securities (IOSCO) rules (top row) and two international banks (BCBS) rules (bottom row) written in the post-GFC period.[6] The two graphs to the left are those that the literature identifies as known revisions, and therefore we expect high MaxSim, indicating low regulatory novelty. The two graphs to the right are those that the literature identifies as novel post-GFC regulations, and therefore we expect low MaxSim, indicating high regulatory novelty.

The top-left graph of Figure 2 shows the 2008 IOSCO standard concerning credit rating agencies. In this case, the GFC led international regulatory authorities to closely look at the role of rating agencies, and IOSCO updated a previous set of recommendations that it had published in 2004 (in orange) in the aftermath of the Enron scandal. The specific regulatory provisions of the 2008 rule–addressing conflict of interests and the poor historical
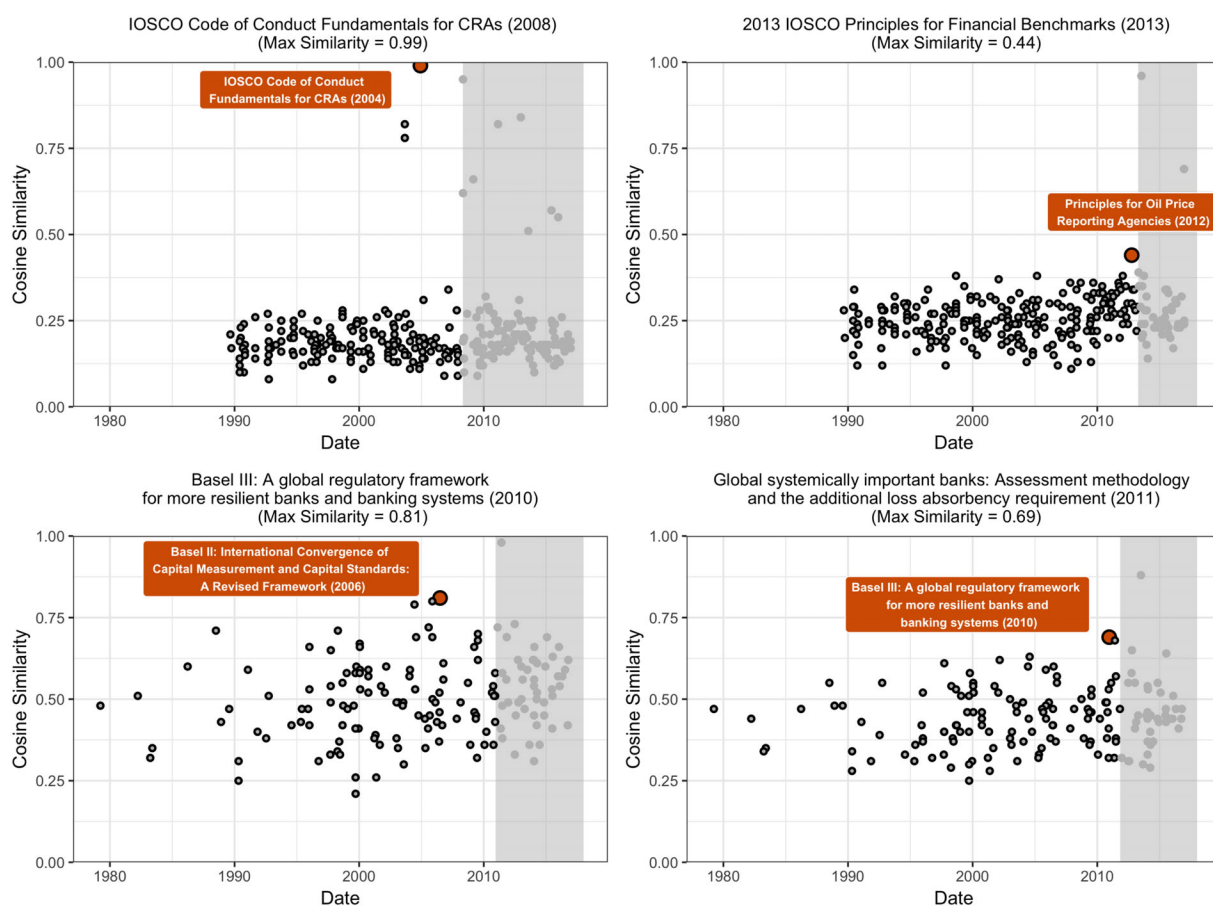

Figure 2 Identifying Maximum Cosine Similarity among all cosine similarities; examples from two IOSCO (top row) and two BCBS (bottom row) post-Global Financial Crisis rules. Each graph plots cosine similarity between one international standard and the text of every other final document by the same regulator. MaxSim$_i$ (orange dot) is the highest cosine similarity among all previously written, pre-crisis rules. Consistent with substantive knowledge that left graphs are known incremental reforms, and right graphs are known to introduce new regulatory tools, MaxSim for each left graph is higher than for each right graph.

performance of rating agencies – did not significantly depart from the 2004 initiative (Pagliari 2012). Consistent with the literature, the graph shows that MaxSim is very high (0.99 out of 1.00 max) for this rule.

In contrast, the top-right graph of Figure 2 shows a 2013 IOSCO standard concerning "Principles of Financial Benchmarks." This international rule tackled a wholly new issue that emerged after it was uncovered, in 2012, that the London Inter-Bank Offered Rate (LIBOR) index had been manipulated (Dao *et al.* 2016). The highest cosine similarity to "Principles of Financial Benchmarks" is a loosely related 2012 set of "Principles for Oil Reporting Agencies" (in orange). As such, MaxSim is relatively low for this standard (0.44), consistent with substantive knowledge. The important comparison is that the known IOSCO rule revision (regarding credit rating agencies) has a relatively low measure of regulatory novelty and the known IOSCO regulatory expansion (regarding financial benchmarks) has a relatively high measure of regulatory novelty.

The bottom-left graph of Figure 2 displays a cosine similarity between Basel III and all other BCBS international rules. Basel III sets minimum capital regulations for internationally active banks and directly builds upon its predecessor agreement, Basel II (Wilf 2016).[7] Thus, not surprisingly, the MaxSim is relatively high for Basel III (0.81).

Finally, the bottom-right graph of Figure 2 displays cosine similarity between Globally Systemically Important Bank (G-SIB) capital charges – a 2011 regulation on the largest international banks – and every other BCBS international rule. The G-SIB rule is the BCBS's main post-GFC regulatory attempt to deal with too-big-to-fail banks; the BCBS required especially large, "systemically important" financial institutions to hold additional regulatory capital. Consistent with substantive knowledge that this is a new regulatory tool that expanded upon existing approaches to bank regulation (Helleiner 2014), the standard has a relatively low level of MaxSim (0.69) with all previous rules, indicating relatively high regulatory novelty. The important comparison is that the known BCBS rule revision (Basel III) has a relatively low measure of regulatory novelty, and the known BCBS regulatory expansion (regarding systemically important banks) has a relatively high measure of regulatory novelty.

We additionally validate our measure of novelty by comparing levels of MaxSim among documents that are and are not known revisions of previous documents. Figure B1 shows the distribution of MaxSim for documents that are known revisions of previous documents (dark black, solid line) as compared to non-revision documents (light black, dotted line). Mean MaxSim of international rules known to be revisions is nearly one (indicating lower levels of novelty), while non-revision documents have lower average levels of MaxSim (indicating higher levels of novelty).

3.5. Limitations

Although the above approach provides a new perspective to evaluate regulatory change, it is important to note that this paper's focus on regulatory vocabulary is unlikely to map onto certain dimensions of regulatory change discussed within the existing literature.

First, our measure observes and analyzes the extent to which the text of new standards builds upon or depart from existing published initiatives; in doing so, it focuses uniquely on what is on the books and takes this observed data as given. One limitation of this focus is that proposed rules that did not become an international standard because of the lack of agreement among regulatory authorities (Kapstein 1989; Singer 2007) remain invisible to the project. In addition, unwritten norms and informal conventions could theoretically substitute for regulatory text. This blind spot could affect the results of the analysis as the formalization of existing conventions could produce reforms that are only "novel" on paper. Second, the extent to which a new international standard builds upon or departs from previous rules does not necessarily match the actual impact that this change will have over market actors (Wilf 2016; Winecoff 2017). For instance, both a regulatory initiative that requires a 10% minimum international bank capital and a revision of the same standard that doubles the minimum requirement to 20% would share the most relevant terms but would have a very different impact over the regulated entities. Moreover, in some cases seemingly small regulatory adjustments may have important unintended, long-term consequences (Moschella & Tsingou 2013; Grabel 2018). Instead of attributing a particular value to each initiative, our statistical analysis places equal weight on every international standard. This is consistent with the purpose of our analysis of analyzing the full population of international standards, future research could weight these rules to differentiate their significance.

Third, the soft-law nature of international financial standards means that the impact of these standards ultimately depends on the way they are implemented domestically across different jurisdictions (Newman & Posner 2018). The existing literature highlights how countries often implement the same set of internationally-agreed commitments after a crisis in very uneven and distinct ways (Walter 2008; Helleiner *et al.* 2018). Nonetheless, an extensive literature details how international financial standards have wide-ranging, empirical effects; they act as focal point regulations for domestic regulatory reforms in industrialized and emerging markets (Zaring 1998), influence domestic political battles over the design of regulatory policies (Newman & Posner 2018), and affect market actors' valuation of regulated firms (Wilf 2016.

Fourth, by comparing the extent to which the text of new standards build upon or depart from existing published initiatives from the same standard-setting body, our approach does not capture instances of forum-shifting, whereby an issue is moved toward a new standard-setting body (e.g. the establishment of the Financial Stability Board in the aftermath of the GFC) or policy diffusion whereby a seemingly novel standard is actually copied from a different standard-setting body.

With these caveats in mind, the next section turns to statistical analysis to test our hypothesis that post-financial crisis periods are associated with international regulatory change.

4. Correlates of regulatory novelty

Because this study is interested to examine the impact of crises on the overall regulatory agenda of international standard-setting bodies – rather than the impact of crises on individual regulations – we select crises on the basis of their real-world significance as well as their importance in the context of the literature on international financial reforms. In the post-Bretton Woods era, it is possible to identify three main international financial crises, which directly affected a large significant number of countries: the 1980s debt crisis, the late 1990s' Asian Financial Crisis (AFC), and the late 2000s' GFC. Of these three crises, we omit the 1980s debt crisis because there are not enough BCBS pre-crisis observations, and IOSCO was established after the 1980s crisis outbreak.[8]

We use our validated measure of regulatory novelty to analyze whether reforms introduced in the aftermath of financial crises display especially high degrees of regulatory novelty. Pre-crisis levels of regulatory novelty become the benchmark against, which to determine whether post-crisis regulatory novelty is especially high or low.

Figure 3 plots international rules by publication date (*x*-axis) and MaxSim (*y*-axis) for international bank regulators (BCBS, left graph) and international securities regulators (IOSCO, right graph). Rules with relatively high levels of MaxSim are those that build upon previous rules, while rules with relatively low levels of MaxSim indicate relatively novel rules. Figure 3 shows that BCBS and IOSCO standards widely vary in regulatory novelty. At many times, including the post-GFC period, new rules are a mix of both incrementally updated, pre-crisis initiatives (relatively high MaxSim) and new issues and approaches (relatively lowMaxSim).

4.1. Data and statistical model

We move from descriptive statistics to statistical analysis. The unit of observation is an international standard. After missing data, a set of 183 BCBS (banking) rules from 1978 to 2016 and 302 IOSCO (securities) rules from 1989 to 2016 compose the dataset.

We operationalize two dependent variables. The first dependent variable is *Rule Novelty*, measured by MaxSim (described above). Again, this captures MaxSim between the international standard and all previously published international rules by a given regulator (BCBS or IOSCO). Because the dependent variable is a continuous value bounded between 0 (low MaxSim/high novelty) and 1 (high MaxSim/low novelty), we use a beta regression model (Ferrari & Cribari-Neto 2004; Cribari-Neto & Zeileis 2009).[9] For ease of interpretation, the complement value (1-MaxSim) enters into the analysis, such that higher values indicate higher levels of novelty.

A second dependent variable is a *Highly Novel Rule*, a binary measure that takes the value of 1 when MaxSim is in the lowest rolling quartile, and 0 otherwise. Observations that take a value of 1, therefore, have especially low MaxSim (lower than or equal to the first quartile value of all previous rules), indicating a rule that is
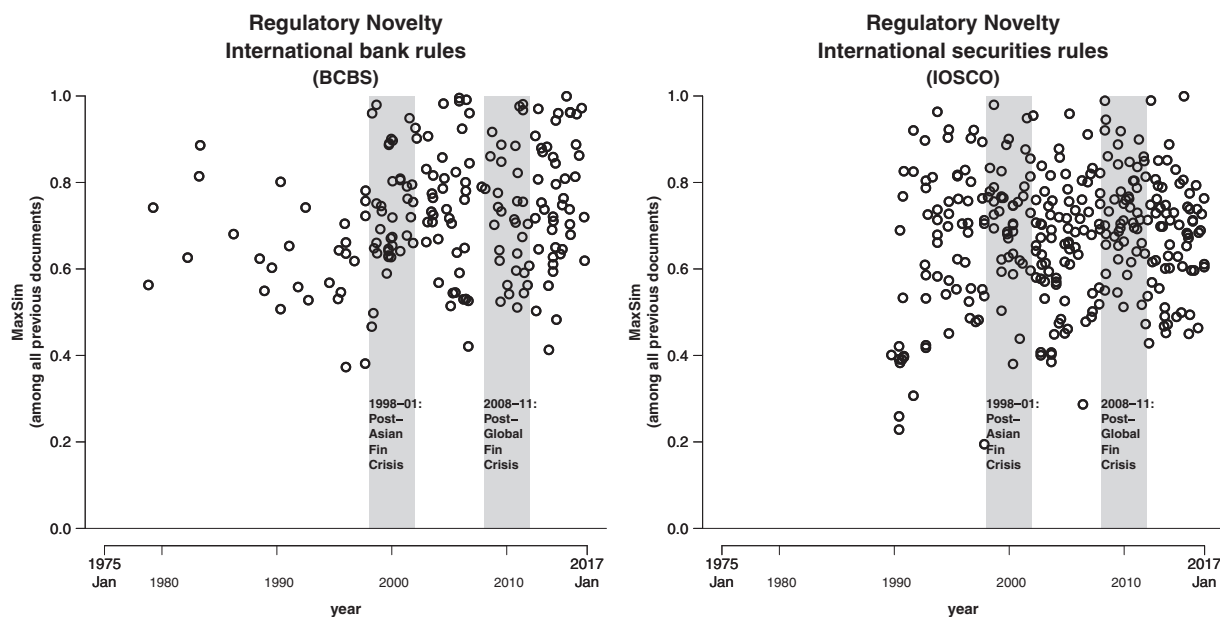
Figure 3 Maximum Cosine Similarity (MaxSim) for BCBS rules (left) and IOSCO rules (right). Each dot is an international standard, plotted by publication date (*x*-axis) and its Maximum Cosine Similarity to all previous rules (*y*-axis).

especially unlike existing rules.[10] We expect higher levels of the variable *Rule Novelty*, and a higher likelihood of a *Highly Novel Rule* during post-crisis periods.

The explanatory variable of interest is a crisis indicator that takes a value of 1 for years after the initial crisis outbreak. Baseline analysis uses a four-year post-crisis period, (1998–2001 for the AFC and 2008–2011 for the GFC). This is a reasonable time in which to observe new rules that emerge in reaction to crisis; in robustness checks, we show that results are not sensitive to this specific choice. We expect a positive and statistically significant coefficient, which would indicate higher average levels of regulatory novelty in post-crisis periods as compared to each pre-crisis period.

Finally, we control for variables that might affect an international standard's level of regulatory novelty. We first add an indicator (*Revision Rule Indicator*) for new rules that explicitly update or revise a previous regulation. These are rules that BCBS or IOSCO decide to reconsider and re-write. By definition, such a document is likely to be similar to the text it revises and, therefore, to have a relatively high MaxSim, indicating low novelty. We control for document length, which we operationalize as the logged value of total words in a document after cleaning (*Ln(Document word count)*). We add a control indicator for co-authored documents (*Co-authored documents*); these are co-authored by multiple international standard-setting bodies.[11] We are agnostic about the direction of any effect, but think it plausible that these documents may address a different set of issues, and therefore use different languages than, initiatives written solely by the BCBS or solely by IOSCO. Finally, for *Rule Novelty* estimates, we add a control for the logged count of previous documents with cosine similarity values (*Ln (Previous doc ct)*); the greater number of previous final documents that exist when a rule is written, the more likely there might be one document that a new rule expands upon.[12]

In regressions of *Highly Novel Rule*, the dependent variable is based on a rolling MaxSim that implicitly controls for this across-time change. In robustness checks, we show that results are robust too, and are not driven by, the specific decisions associated with model selection, crisis dates, and post-crisis period lengths.

We estimate the following regression equation to test whether post-crisis periods are associated with higher levels of regulatory novelty:

$$Novelty_i = \alpha + \beta_1 \, Post \, Crisis \, Period_i + \beta_j X_{ij} + s_i \qquad (1)$$

where *Novelty$_i$* measures regulatory novelty (either *Rule Novelty$_i$* or *Highly Novel Rule$_i$*) of international rule *i*, *Post Crisis Period$_i$* is an indicator for an international standard written in post-crisis periods (1998 and after for

AFC, and 2008 and after for GFC), and X_{ij} is a matrix with a set of j control variables, and s_i is a normally distributed error term.

4.2. Results

Table 1 reports in the top half of the estimates of regulatory novelty within international banking rules written by the BCBS (top half) following the GFC (Models (1) and (2)) and following the AFC (Models and (4)). The bottom half reports instead of the same results for international securities rules written by IOSCO following the GFC (Models (5) and (6)) and following the AFC (Models (7) and (8)). In each set of these four sets, the first model presents beta regression estimates of the bounded, but a continuous measure of *Rule Novelty$_i$* (which takes values between 0 (low novelty) and 1 (high novelty)), and then logistic regression estimates for the binary variable *Highly Novel Rule$_i$* (which takes the value of 1 when MaxSim is especially low (such that novelty is especially high)).

Table 1 Correlates of international regulatory novelty: Dependent variable is, alternatively, *Rule Novelty$_i$*, analyzed with beta regression, or, an indicator for *Highly Novel Rule$_i$*, analyzed with logistic regression. The explanatory variable of interest is the post-crisis period

International bank (BCBS) standards

D.V.	Rule Novelty (beta reg)	Highly Novel Rule (logistic reg)	Rule Novelty (beta reg)	Highly Novel Rule (logistic reg)
Regression model	(1)	(2)	(3)	(4)
Crisis Period				
Post-Global Fin Crisis (*2008+*)	0.339** (0.140)	1.515** (0.589)		
Post-Asian Fin Crisis (*1998+*)			−0.715*** (0.211)	−2.384** (0.995)
Controls				
Document length (ln)	−0.288***	−0.881***	−0.229***	−0.887
Revision doc ind.	−0.950***	−1.218*	−0.705***	−0.029
Co-authored doc ind.	0.234*	0.319	−0.033	0.482
Previous documents (ln)	−0.091		0.278**	
Constant	1.928***	5.707***	0.680	6.377
Observations	139	129	65	55
Years	1978–2011	1990–2011	1978–2001	1990–2001
Log Likelihood	119.515	−56.596	56.490	−17.298

International securities (IOSCO) standards

D.V.	Rule Novelty (beta reg)	Highly Novel Rule (logistic reg)	Rule Novelty (beta reg)	Highly Novel Rule (logistic reg)
Regression model	(5)	(6)	(7)	(8)
Crisis Period				
Post-Global Fin Crisis (*2008+*)	−0.109 (0.109)	−0.261 (0.556)		
Post-Asian Fin Crisis (*1998+*)			0.126 (0.139)	0.163 (0.899)
Controls				
Document length (ln)	−0.172***	−0.963***	−0.273***	−1.404***
Revision document ind.	−0.980***	−16.471	−1.029***	−17.404
Co-authored doc ind.	−0.099	−0.783	0.033	−17.032
Previous documents (ln)	−0.181***		−0.349***	
Constant	1.697***	6.538***	3.035***	9.113**
Observations	238	228	108	98
Years	1989–2011	1990–2011	1989–2001	1990–2001
Log Likelihood	167.280	−71.374	90.224	−18.286

Significant at <1 percent (***), <5 percent (**), and <10 percent (*).

The top half of Table 1 indicates that regulatory novelty is especially high for bank rules in the aftermath of the GFC (as compared to before the crisis), but especially low in the aftermath of the AFC. The post-GFC variable in Models (1) and (2) is positive and statistically significant, indicating that bank rules written in the years 2008 through 2011 – as compared to all bank rules written through 2007 – have higher average levels of *Rule Novelty* (Model (1)), and are, on average, more likely to be a *Highly Novel Rule* (Model (2)). This controls for characteristics of each rule (document length, and whether it is revised or co-authored), and for Model (1), additionally controlling for a number of previous rules.

In contrast, however, we found that post-AFC rules did not display higher regulatory novelty than in the pre-crisis period. The post-AFC variable in Models (3) and (4) is negative and statistically significant, indicating that bank rules written in the years 1998 through 2001 – as compared to all bank rules written through 1997 – have lower levels of *Rule Novelty* (Model (3)), and are less likely to be a *Highly Novel Rule* (Model (4)).

The bottom half of Table 1 indicates that the regulatory novelty of securities rules displays high levels of variation. In the aftermath of both the GFC and the Asian Financial Crisis, new rules' regulatory novelty is not especially high nor low. The post-GFC variable is statistically insignificant in both Models (5) and (6), indicating that securities rules written in the years 2008 through 2011 display levels of *Rule Novelty* and rates of *Highly Novel Rule* that are neither especially high nor especially low as compared to the set of securities rules written through 2007. Moreover, the post-GFC coefficient estimates are negative. This indicates that data slightly trends toward relatively lower levels of novelty, rather than the expectation that a major crisis would lead to higher novelty. Similarly to Models (5) and (6), the post-AFC variable in Models (7) and (8) is statistically insignificant, indicating that levels of *Rule Novelty*, and the likelihood of *Highly Novel Rule*, for securities rules written between 1998 and 2001 are neither especially high nor low as compared to the set of securities rules written through 1997. Together, the novelty in securities rules shows high levels of variation and does not display the expected trend toward regulatory novelty in the aftermath of major crises.

The estimated effect magnitude is plotted in Figure 4, which displays predicted probabilities for the *Highly Novel Rule* regressions (Table 1, Models (2), (4) (6), and (8)).[13] Holding other variables at their sample means, the expected probability that a new banking rule written in the aftermath of the GFC is highly novel is 42%, up from 14% prior to the GFC (top left graph). In contrast, the top right graph shows that bank rules in the aftermath of the Asian Financial crisis were much less likely to be highly novel (3% likelihood from 1998 through 2001, as compared to 25% prior to 1998). Securities rules (bottom graphs) do not change much from pre- to post-crisis periods. The bottom-left graph shows a slight decrease in the expected probability of highly novel securities rules written after the GFC (from 13% prior to 2008 to 10% between 2008 and 2011). The bottom right graph shows the expected probability of a highly novel securities rule slightly increases from 4% prior to 1997 to 5% between 1998 and 2001.

Figure 5 summarizes the overall empirical findings. For international bank rules, we find an increase in regulatory novelty for rules written just after the GFC (Table 1, Models (1) and (2)), but a decrease in regulatory novelty for rules written just after the AFC (Table 1. In the securities rules, we find high variation in regulatory novelty and no clear trend in either the post-GFC or post-AFC periods (Table 1, Models (5) through (8)). We next discuss robustness checks and the broader significance of these findings.

4.3. Robustness checks

These findings are robust to a number of alternative specifications and operationalizations. First, the choice of beta regression does not drive statistical results. An alternative to beta regression, a log-transformed dependent variable regressed in an OLS model, exhibits identical estimate signs, and statistical significance (Table B1). In addition, findings are not driven by the choice of a post-crisis period of 4 years; post-crisis periods as short as 3 years (1998–2001, and 2008–2011) and as long as nine years (1998–2006, and 2008–2016) lead to similar findings (Tables B1 and B2, respectively). For international securities rules for the 9-year post-crisis period, the estimated coefficient for the post-GFC period becomes positive (flips signs) but remains statistically insignificant; all other post-crisis indicators retain the estimated sign and statistical significance at less than 10% confidence. One could argue that the post-GFC period should begin in 2009 rather than 2008; using an alternative GFC start date of 2009 maintains especially novel bank rules and high variation in the novelty of securities rules (Table B2). The
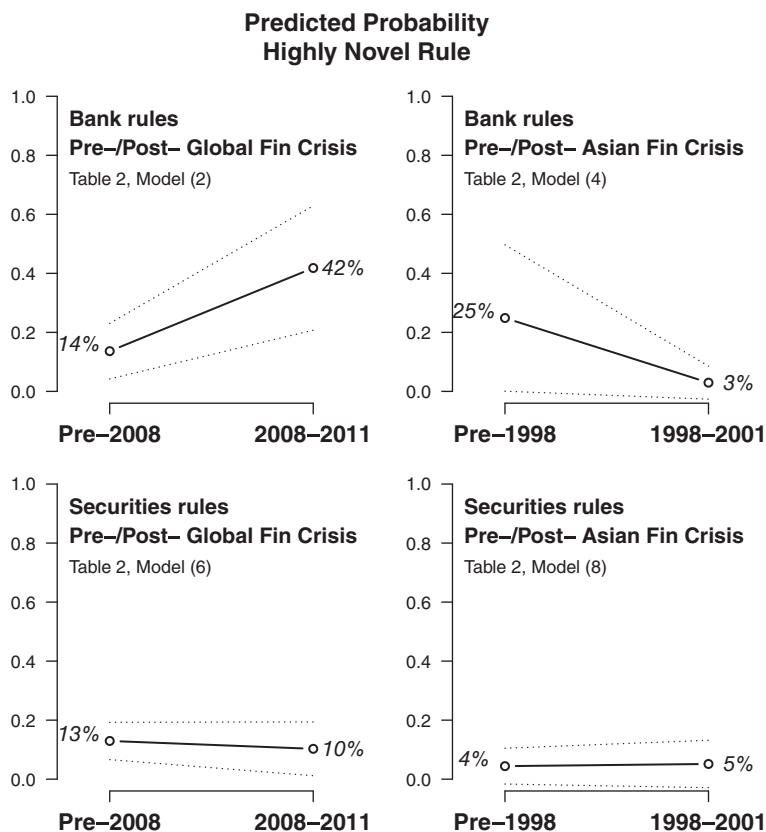
**Predicted Probability
Highly Novel Rule**

Figure 4   The estimated substantive effect, *Highly Novel Rules$_i$*: These graphs show the predicted probabilities of new rules being *Highly Novel Rules$_i$*, holding other variables at their sample mean levels. Based on Table 1, Model (2), (4), (6), and (8); estimates from predict function in R. Figure B2 displays estimated substantive effect for *RuleNovelty$_i$* (Table 1, Model (1), (3), (5), and (7)).

estimated coefficient for the post-GFC securities rules becomes positive (flips signs) but remains statistically insignificant. Finally, including co-authored documents in the baseline sample does not drive the key results; excluding these observations from the sample leads to consistent estimate signs and statistical significance (Table B3). Together, we have confidence in the statistical findings.

4.4. Discussion

We theoretically expected post-crisis periods to be moments when international standard-setting bodies adopt novel regulatory approaches. Our empirical results (summarized in Figure 5) surprisingly found that only

Figure 5   Robustness checks

international bank rules in the aftermath of the GFC exhibit the expected trend. While, the existing literature has largely focused on the 2010 Basel III international standard, which revised the 2004 Basel II agreement as to the linchpin of the post-GFC international rules (Admati & Hellwig 2013), our results suggest that the broader range of BCBS's post-GFC rules as a whole deviated to a greater extent from existing rules compared to the standards designed by the same body in previous periods.

While the BCBS's post-GFC rules are consistent with expectations that post-crisis periods are moments when regulatory organizations are likely to write novel rules, the response of the same standard-setter to AFC does not. Instead, we find a decrease in regulatory novelty for rules written just after the AFC. While the existing literature emphasizes the many regulatory innovations associated with Basel II renegotiation (Lall 2012), international bank standards written during this period as a whole display especially low levels of a regulatory novelty than those negotiated before the crisis, suggesting that bank regulators during this period largely built upon existing rules' scopes and approaches.

What explains these findings? In this concluding section points toward different ways in which these results support or challenge the insights coming from existing literature regarding the determinants of regulatory change in international finance.

First, our empirical analysis has shown that there is variation in the level of regulatory novelty associated with different crises. From a political economy perspective, the origin, severity, and type of crises will shape the incentives faced by policymakers in different countries to promote or oppose broad regulatory change (Simmons 2001; Drezner 2007; Helleiner 2014). For instance, IPE scholars have theorized that the distribution of market power in international finance means that crises originating in core countries are more likely to generate international regulatory cooperation than those originating in the periphery (Simmons 2001). This explanation is consistent with the lack of an increase in regulatory novelty after the AFC, which originated in emerging markets, thus creating incentives for core countries that had been affected only indirectly to promote their existing policies onto emerging markets in order to minimize adjustment costs for their firms (Drezner 2007). On the contrary, the fact that the GFC originated in the US and engulfed the world's main financial centers gave incentives to policymakers in these countries to internationalize the novel rules designed domestically in order to avoid putting their firms at a disadvantage against foreign competitors (Helleiner 2014).

At the same time, the focus on the origin and nature of the crisis cannot explain the different reactions to banking and securities regulators to the GFC. The fact that the GFC involved a number of non-bank financial institutions (including money market funds, repo markets, OTC derivatives counterparties, and securitized assets), which fall under the remit of securities regulators and only indirectly under bank regulators' jurisdiction, suggests that especially high regulatory novelty should be found in international securities rules rather than international bank rules.

Second, our finding that different international regulatory bodies react differently to the same crisis calls for greater attention to how the institutional features a regulatory body such as membership, mandate, and internal structure may mediate its responsiveness to a crisis (Woyames Dreher 2020). For instance, the explicit prudential mandate to preserve financial stability that is at the core of banking regulation could explain how the rules from the BCBS displayed greater regulatory novelty after a financial crisis that threatened the stability of global banking system compared to IOSCO, whose members' mandate tend to prioritize preserving market integrity and protecting investors.

Moreover, since decisions within international standard-setting bodies such as the BCBS and IOSCO are taken by consensus, the scope and composition of the membership can be expected to influence the capacity of organizations to deviate from the status quo and the approach taken (Moschella & Tsingou 2013). The lack of statistical effect for international securities after both financial crises could reflect the relatively large membership of IOSCO and its wide-ranging regulatory issues; with a large membership and many issues, it may be difficult to observe statistically significant average data trends in regulatory novelty. However, statistical findings persist when controlling for rules written by specific IOSCO committees (e.g. Technical Group, Emerging Markets Group) and when dropping the rules written by the Emerging Markets Committee, which might address a different set of issues than the other rules (Table B4). Within international bank rules, the BCBS expanded its membership in 2009 to all G20 countries; theoretically, the changing composition of regulators comprising the BCBS could change modal member preferences, resulting in new ideal point policies (Downs et al. 1998) that are

expressed as novel regulations. In practice, however, existing studies suggest that officials from the original BCBS members drove the post-crisis BCBS agenda, with only limited input from new BCBS members (Walter 2016).

This point highlights the importance of looking beyond the formal institutional characteristics of regulatory agencies. Different studies have theorized how the process of setting international standards in finance is influenced by informal characteristics of the individuals that populate these bodies, such as regulators' shared mindsets, technical training, and normative orientations shaping (Porter 2003; Mügge 2011; Moschella & Tsingou 2013; Seabrooke & Tsingou 2014; Tsingou 2015). As a result, while financial crises may trigger new regulatory initiatives, continuity in the internal operation of the standard-setting process is likely to bias regulatory change toward incremental adjustments upon the existing rules (Helleiner 2012; Moschella & Tsingou 2013). From this perspective, our findings concerning the higher novelty associated with banking standards after the GFC provide some support for the notion that the Basel Committee has witnessed from 2008 onwards a rapid ideational shift driven by "an insiders' coup d'état" (Baker 2013), which have promoted new ideas and approaches such as the rise to prominence of macroprudential ideas.

While a more complete theoretical explanation of what factors mediate the impact of crises on regulatory novelty remains outside the scope of the paper, in the conclusion we suggest a few potential pathways for scholars to test these approaches more systematically by building upon the data and approach outlined in this paper.

5. Conclusion

Although financial crises are most likely moments when financial regulatory concerns elevate to the top of the international public policy agenda, much is still unknown about crises' systemic effects on international financial regulatory cooperation. This paper provides a unique perspective of the population of international bank and securities rules with a specific focus on across-time regulatory novelty. Our empirical findings indicate that international standard-setting bodies often do not write novel regulations during post-crisis moments at an especially high rate compared to non-crisis moments. This ran counter to theoretical expectations that post-crisis moments would be characterized by high rates of regulatory novelty. Simultaneously, an important exception is evidence of high regulatory novelty in international bank rules following the 2008 GFC. This shows that campaigns of many new rules that display regulatory novelty are possible, even if they should not be taken as given.

This paper provides systematic evidence of financial crises' impacts on international financial regulatory change. Two major contributions emerge from this work. First, while existing literature provides many insights about specific international financial regulatory reforms – often highlighting failures and successes–the collective character of international financial regulation has remained elusive. This is the first study to assess regulatory change across the entire population of international standards that have emerged to coordinate financial regulatory policies since the 1970s.

Second, this paper incorporates, for the first time, a text as a data approach to understand the evolution of international financial regulatory policies. This paper contributes to the literature by developing a unique approach to measuring the regulatory change that can be used within other contexts outside of finance. We join a growing list of scholars who use text as a new source of data and insights into areas of international political economy as varied as bilateral investment treaties (Arel-Bundock & Lechner 2018), preferential trade agreements (Allee & Lugg 2016), and central bank preferences (Baerg & Lowe 2020).

This paper complements existing case-based analyses of international financial regulatory reform by providing the broad context – the full population of international rules – within which each case falls. A theoretical explanation to inform the surprising key empirical findings is left for future analyses. In particular, the approach and data identified in this study provide a potential pathway that future studies could follow to more systematically test the large set of accumulated theories about the determinants of regulatory change. We suggest here a few potential avenues. First, while the characteristics of a crisis can be expected to influence the regulatory response, the focus of our analysis on two crises selected on the basis of their "systemic" nature and the significance for the literature prevents us from systematically testing this. Further research should build upon our analysis to incorporate a broader range of crises and other market shocks (e.g. scandals) and investigate their impact across the population or subset of reforms. Second, while our focus on just two standard-setting bodies limits our capacity to test the impact of different institutional design features over the response of a regulator to the crisis, further

research could probe this by expanding this approach developed in this paper to a broader range of regulatory bodies, both at the international and domestic level. Third, further work could build upon recent empirical innovations within this literature which has tracked the career histories (Seabrooke & Eleni 2020), educational background (Chwieroth 2009) and hierarchies (Ban & Patenaude 2019) among the individuals working within regulatory bodies and explore how these relate to the patterns in regulatory change across the population of reforms highlighted by our study.

In addition, further research may consider extending this approach to analyze other types of textual evidence to capture additional dimensions of regulatory change that remain outside of the purview of the paper. For instance, while our corpus has investigated exclusively the text of existing regulatory standards, a different data sample that captures other textual sources such as minutes, speeches, journalistic accounts could be the basis for interesting future research that applies beyond the analysis of the rules on the books. Further work could build upon our approach and extend it to the work of domestic regulatory agencies to investigate variation in the way countries respond to crises beyond the focus on a few specific flagship domestic reforms that are common in the existing literature. Finally, while this paper has focused on the level of novelty in the rules by the same single standard-setting bodies, further work could expand the population-level type of analysis developed in this paper to other standard-setting bodies and to investigate the interaction between different regulators.

Acknowledgments

Endnotes

[1] Throughout the paper, the terms "international regulation", and regulatory "initiatives", "rules", "standards", and "reform" are used interchangeably to describe best practice documents that are formally written and published by international standard-setting bodies.

[2] These are standardized by document and are not affected by document length. In regression analysis, we additionally control for cleaned document word count.

[3] BCBS (https://www.bis.org/bcbs/publications.htm) and IOSCO (https://www.iosco.org/publications/?subsection=public_reports).

[4] For international banking regulations, these were documents that the BCBS coded as "Standards" or "Guidelines" or "Sound Practices"; we excluded BCBS publications categorized as: "Implementation reports", "FAQs", "Consultative", "QIS", "Working Papers", "Newsletters" and "Other". For international securities regulations, standards were the documents that IOSCO coded as "Final report" type, excluding the "Implementation" category; we excluded IOSCO publications categorized as: "Consultation report", "Preliminary report" and "Other".

[5] BCBS was established in 1974, and the first available document is in 1975; IOSCO was established in 1983, and the first available document is 1989. The baseline statistical analysis runs through 2011, and includes 139 international bank (e.g. BCBS) rules and 238 international securities (e.g. IOSCO) rules. In robustness checks, a maximum of 183 BCBS rules between 1978 and 2016 and 302 IOSCO rules between 1989 to 2016 enter into analysis; the earliest observation from BCBS and IOSCO each fall out of the analysis because there are no previous documents and Maximum Cosine Similarity is therefore undefined.

[6] To provide data transparency, Figure 2 includes cosine similarity between the rule of interest and all rules by the same regulator; however, as described above, in our measure of novelty, only rules written prior to the rule of interest will ever enter into selection of Maximum Cosine Similarity.

7   Though, Basel III is widely acknowledged to introduce new regulatory approaches (such as liquidity and leverage ratio minimums) to complement existing regulatory approaches (focused on regulatory capital minimums). The new approaches – liquidity and leverage minimums, among others – are broadly discussed in the 2010 Basel III rule and detailed within subsequent, separate BCBS rules.

8   The BCBS began as a consultative organization such that there are only six BCBS regulations prior to the onset of the 1982 Latin American debt crisis.

9   An alternative, OLS model using a logit-transformed dependent variable does not change the substantive results.

10   Given the rolling measure, in each corpus (BCBS and IOSCO) we omit the ten earliest observations (which have only a very small sample against which to determine whether the rule is or is not "highly novel"). For this reason, model estimates of *Highly Novel Rule* are based on samples with ten fewer observations and later sample start dates.

11   12% of BCBS and 19% of IOSCO rules are coauthored; excluding these documents from the sample does not change substantive results.

12   Logged values capture the assumption that when many previous documents exist, the marginal effect of one additional new document is small, but there is a greater overall probability of a similar previous document.

13   Estimated effect magnitudes for *Rule Novelty* regressions (Table 1, Models (1), (3), (5),and (7)) have substantively consistent results and may be found in Appendix B2. We display predicted probabilities in the main text because this is a commonly used quantity with an intuitive interpretation.

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Supporting information

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Appendix S1. Supporting information.