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ON THE RELATIONSHIP BETWEEN FIRMS AND THEIR LEGAL ENVIRONMENT:

THE ROLE OF CULTURAL CONSONANCE

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**ON THE RELATIONSHIP BETWEEN FIRMS AND THEIR LEGAL ENVIRONMENT:
THE ROLE OF CULTURAL CONSONANCE**

ABSTRACT

In this study, we seek to reconcile diverging dominant views on the relationship between firms and their legal environment by offering a cultural contingency perspective. We begin by accepting the notion that a new law will likely exert a powerful influence on targeted firms and that firms' strategic responses include efforts to shape the impact of the new law. However, we suggest that the success of such response will be contingent on the degree of cultural consonance of firms' strategic responses and the dominant cultural context at that time. We elaborate this view in our detailed qualitative and quantitative analyses of the automotive Safety Act of 1966 and the response by targeted firms. We provide evidence showing that the changes in the degree of cultural consonance of firms' strategic response and the predominant cultural beliefs/values explain both the early failure of firms' efforts to shape the impact of the law in the mid-1960s and the later success by the end of the 1970s. We highlight how firms' cultural context provides both a constraint and an opportunity for firms seeking to shape legal environmental pressures, and we conclude by discussing the implications of our dynamic contingency perspective for research on law, culture, and strategy.

How a new law is likely to influence – and be potentially influenced by – firms is one of the central questions of organizational theory (Selznick et al. 1969, Short and Toffel 2007, Sine and Lee 2009, Sutton et al. 1994). Evidence of the impact of new laws on business is significant. For example, research has shown that new legislation contributed to the rise of internal labor markets (Baron et al. 1986), spurred the development of large corporations (Roy 1997), influenced the adoption of new management models (Guillén 1994, Kalev et al. 2008), and created novel market opportunities (Hiatt et al. 2009, Sine et al. 2005). A new law not only sets the rules of the game for its target firms, or industries, but also represents the structural incarnation of cultural beliefs, values, and norms (Baron et al. 1986) that, for example, define myths and expectations about consumption (Rao 1998), the competitive environment (Sine and Lee 2009), or people’s equality at work (Dobbin 2009).

Organizational theorists have analyzed the relationship between the legal environment and firms from the standpoint of two (largely opposing) perspectives that can be labeled as the *compliance* versus the *capture* perspective. The compliance perspective, which blends insights from institutional theory and the sociology of law, brings attention to the coercive power of legal mandates (DiMaggio and Powell 1983). Once a new law has passed, the State can simply impose compliance on other subordinate societal entities (Steinmetz 1999, p. 8) because of its redistributive capacities and formal authority (Tilly 1992). This perspective views firms as needing to comply with new legal mandates to maintain legitimacy in their environment (Mizruchi and Fein 1999, Scott 2008), with compliance requirements motivating organizational responses that can range from substantive (Edelman and Petterson 1999, Sine et al. 2005) to symbolic or ceremonial (Huising and Silbey 2011, Kellogg 2009). In other words, the compliance perspective has generally conceptualized the legal environment as exerting significant coercive and/or normative pressure on firms.

In contrast, the *capture perspective*, found in research in sociology, strategy, and economics, de-emphasizes the power of legal constraints and instead highlights how firms, through their control of extensive economic resources, essentially “capture” the political process in favor of business interests (Burriss 2001, Domhoff 1998, Kolko 1963) through lobbying, campaign contributions, and legal action

(De Figueiredo 2009, Holburn and Vanden Bergh 2014, Mizruchi 1992, Shaffer et al. 2000). This perspective personalizes legal and regulatory forces, focusing on the exchange between politicians (seeking resources and votes that powerful business firms can provide) and firms (seeking favorable policies and a privileged role in influencing rule-making; Becker and Stigler 1974, Pelzman 1976, Stigler 1971). As a whole, the capture perspective emphasizes why firms' material resources (Dreiling 2000) grant them significant power in shaping legislation and regulation to their advantage (Hiatt and Park 2013, Ingram and Rao 2004).

While the compliance and the capture perspectives provide a vivid contrast in their alternative conceptualizations of the organization/legal environment relationship, we suggest that an exclusive focus on either firms' lack of power (compliance perspective) or firms' greater power (capture perspective) risks advancing a view of business in the legal environment that is either over-socialized or under-socialized (Granovetter 1985). Indeed, researchers have noted the decidedly mixed evidence on new laws' influence on firms, and firms' potential influence on such laws (Mizruchi 2004, Perrow 2005, Walker and Rea 2014). Even a cursory look at the past forty years of history in the U.S. provides many examples of powerful industries' defeats in the legal sphere – such as the passing of landmark legislation like the Clean Air Act, the Tobacco Control Act, or the Motor Vehicle Safety Act – as well as of corporate influence over legislation (e.g. Delmas et al. 2015). Recent reviews conclude that despite evidence of firms' active role in defining the rules of the game (Hiatt and Park 2013, Oreskes and Conway 2010), it is not clear when firms' strategies in their legal environment are effective and what accounts for such effectiveness (Funk and Hirschman 2015, Walker and Rea 2014).

In this study, we seek to offer an original contribution that reconciles the mixed empirical support of these two dominant, and opposing, theoretical perspectives in two ways. First, we suggest that rather than debating or seeking evidence for the compliance vs. capture view of relationship between firms and their legal environment, it is useful to reconsider this power relationship as likely undulating over time, whereby new laws trigger strategic responses by targeted firms, which can affect both the implementation of the law and possible changes in the law. Second, we also advance the notion that an important force

responsible for this undulation is the degree of cultural consonance between firms' strategic responses to new laws and the cultural context. In other words, we address changes in the balance of power between these firms and their legal environment over time, and suggest that firms' success in tipping the balance of power in their favor will be critically contingent on the extent to which firms' strategic response to a new law is (or is not) harmonious with the cultural context at that time. Our use of the term cultural consonance parallels its use in anthropology (Dressler et al. 2005) to assess the extent to which an actor's beliefs or behaviors mirror those that held more widely in the culture in which that actor is embedded. Because of its emphasis on the alignment of firms' espoused beliefs with societal expectations (and the differential organizational outcomes that result when consonance is high versus low), consonance differs from the neighboring concept of resonance, which implies an audience's experience of deeper personal connection (Giorgi 2017, p. 716) with a particular message or strategy. Our use of the term cultural context is intended to reflect widely-held social beliefs, myths, stories, and values at a particular historical juncture (Benford and Snow 2000, Giorgi and Weber 2015, Ingram and Silverman 2016), and we consider how cultural context also changes over time.

The empirical context for our qualitative and quantitative analyses is the fifteen-year period (1965-1980) associated with the introduction and the implementation of a new U.S. law known as the National Traffic and Motor Vehicle Safety Act of 1966 ("the Safety Act"). We selected this historical case because, as we will discuss, it presented a setting in which the legal environment exerted considerable pressure for compliance among automobile firms and, in turn, the automobile industry exerted pressure on governmental decision makers to limit the law's impact by demanding the inclusion of cost-benefit analysis (the process by which the benefits to consumers of new safety features had to be assessed in light of such features' costs to manufacturers) in the evaluation of automobile safety. We discuss why the shifting U.S. cultural context over this period helps explain differences in cultural

consonance, i.e., why firms' effort to influence the law that initially failed in the mid-1960s later succeeded in shaping safety regulations¹ by the end of the 1970s.

As we discuss in detail in subsequent sections, our analysis shows that corporate influence over the legal environment in the automobile industry depended on the degree to which corporate efforts were culturally consonant with the broader cultural context in which these efforts were embedded – in particular, widespread beliefs and myths about the role of business in society. Despite the automobile industry's extensive economic resources and connections with Congress, a profound distrust of corporations (Gabriel and Lang 2015) underpinned the rise of the consumer movement in the 1960s – also referred to as “consumerism”² – and limited firms' agency in shaping the new law. In the 1970s, the cultural context shifted away from consumerism in favor of a more positive view of business as a motor of economic growth and wealth – a shift further supported by widespread perceptions of deteriorating economic conditions (Vogel 1989), limited energy resources, and loss of U.S. competitiveness in the global marketplace. As the harmonization of the changing cultural context and automakers' claims in support of cost-benefit analysis increased, this growing cultural consonance allowed such claims to resonate more positively with Congress, public opinion, and the courts. In this way, cost-benefit analysis attained broad acceptance, serving to effectively transform the law's original meaning – from ensuring every citizen's moral right to safety – to a pragmatic calculation of the costs and benefits associated with safety features (Mashaw and Harfst 1990).

As noted above, we see our study, with its theoretical emphasis on cultural consonance and its detailed qualitative and quantitative findings, as providing an important contribution to the literature on firms in their legal environment by providing a pathway for reconciling the historically dominant and

¹ In the U.S., Congress passes national laws, also referred to as acts; after the passing of a law, its mandate is often carried forth by a regulatory agency, which is empowered to promulgate regulation.

² The term consumerism was used at the time to refer to the advocacy of the rights and interests of consumers; currently, the term mostly refers to an excessive preoccupation with the acquisition of consumer goods.

opposing compliance and capture perspectives. Our study suggests that the merit of both of these perspectives can be retained if one reconsiders the relationship between firms and their legal environment as an undulating movement of relative power over time. Moreover, we introduce the mechanism of cultural consonance to explain the magnitude of the undulation in this power relationship. In the sections below, we begin by situating our intended contribution within the existing literature on firms and the law, and then discuss our empirical setting, methods, findings, theoretical insights, and implications for future research.

FIRMS AND THEIR LEGAL ENVIRONMENT: COMPLIANCE OR CAPTURE?

The Compliance Perspective

The legal environment can significantly shape firms' strategies, structures, and practices (e.g., Dobbin 2009). Given the State's coercive power (Kalev et al. 2008), firms are expected to comply with the law and to pursue organizational activities in ways that avoid legal liability, often leading to substantial changes (Kelly and Dobbin 1999). New laws often result from activists' struggles to pressure legislators to take action in favor of a particular cause (Schneiberg and Bartley 2001), such as workplace fairness (Edelman and Petterson 1999), customer protections (e.g., Soule and King 2006, Soule and Olzak 2004), or the sustainable use of natural resources (Oreskes and Conway 2011). Activists have frequently aimed at shaping the legal environment as a way to realize significant social, economic, and cultural transformations because laws and regulations define rights, and regulate intra- and inter-organizational interactions (Van Dyke et al. 2004).

Once a new law has passed, research has shown that firms enjoy agency only at the level of implementation within their organizational boundaries, as they comply along a spectrum from the purely symbolic to the substantive. When managers perceive regulations as obstacles to their pursuit of organizational objectives (Cook et al. 1983), as conflicting with their professional identities (Binder 2009, Rao et al. 2003), or as inconsistent with existing beliefs and norms (e.g., Edelman 1990, 1992), they may engage in merely symbolic compliance (Zajac and Westphal 1994). For example, in the context of implementing safety mandates, front-line managers often struggle to satisfy legal requirements (Huisig

and Silbey 2011), or fail to communicate their practical knowledge to top management, hence limiting the chances of improving implementation (Gray and Silbey 2014). Because of these challenges, compliance is only loosely coupled with the law and a function of, for example, management styles and local organizational cultures (Gherardi and Nicolini 2002). Even within the same industry, organizations' compliance may vary from substantive to symbolic, depending on employees' interests and their opportunities for mobilization (Kellogg 2009). In sum, new laws and regulations do not automatically lead organizations to change their internal practices (e.g., Binder 2009), and within organizations, "things never quite work out as they ought when legislation is translated into administrative enforcement" (Huising and Silbey 2011, p. 17). Internal organizational processes determine how—and to what extent—organizations actually comply with new laws.

A related strand of studies emphasizes the ambiguity and/or incompleteness of laws (Edelman 1992), because they identify broad and general objectives, but do not specify how to translate these legal objectives into practice. Consequently, when a new law is introduced, firms turn to professions—particularly human resources and legal professions—to interpret legal mandates and to develop implementation processes, including hiring policies, evaluation procedures, or the creation of new organizational roles that signal compliance (Dobbin and Kelly 2007). Although the professions' interpretations may not correctly capture the law's original intent (Edelman 1992), research shows that lawyers and judges infer an organization's compliance with the law by the mere existence of certain organizational procedures and structures, such as grievance or anti-harassment policies (Edelman et al. 2011). As organizations heed the professions' interpretations rather than legislators' intent, the law becomes endogenous because it is partly defined within the arena that it seeks to regulate (Edelman et al. 1999, Talesh 2009). For example, because the Civil Rights Act of 1964 lacked clear rules and regulations that could be easily converted into organizational practices, organizations relied on the interpretations of personnel experts, who, in the early 1970s, essentially "invented" equal opportunity programs, defining the practices of anti-discrimination in everyday organizational life (Dobbin 2009).

In sum, the compliance perspective portrays the law as a source of coercive (Hiatt and Park 2013, Mizruchi and Fein 1999), or at least normative (Dobbin 2009, Edelman 1992) pressure with which firms need to comply. Yet by focusing on legal constraints and the challenges of implementation within organizations, research from the compliance perspective glosses over how the balance of power between firms and their legal environment can be purposively tipped in favor of firms (e.g., Bonardi and Keim 2005, Schneiberg and Bartley 2001).

The Capture Perspective

The capture perspective – a label that we use to indicate a broad stream of research rooted in economics, strategy, and sociology (for recent reviews see Dal Bo 2006, Hart 2004, Hillman et al. 2004, Walker and Rea 2014) – notices instead that firms can “capture” and define their legislative environment, especially when they unify their efforts (Burris 2001, Domhoff 1998, Kolko 1963). Firms’ power stems from their extensive resources, which “nullify or crowd-out the resources of other societal interests” (Dreiling 2000, p. 21). Capture perspective research offers significant insights into the tools (Hillman and Hitt 1999) that businesses can deploy to influence formal legal institutions, such as lobbying, campaign contributions, capture of regulatory enforcement, and legal action. Below we briefly review research on some key tools for firms’ agency, and then discuss their outcomes in shaping the law or its application.

Lobbying is a well-documented tactic that firms and industry associations (Spillman 2012), such as the Business Roundtable and the Chamber of Commerce (Mizruchi 2013), use to secure favorable treatment (Hansen et al. 2005, Hansen and Mitchell 2000, Laumann and Knoke 1987), for instance, against labor unions, taxes, or requirements for public disclosures (Mizruchi 2013, Palmer et al. 1995, Vogel 1989). This political strategy can amount to a considerable expenditure for firms and trade associations. For example, in 2008 the U.S. Chamber of Commerce spent more than \$60 million lobbying against climate change legislation (Delmas, Lim and Nairn-Birch 2015).

Many empirical studies from the capture perspective have also examined firms’ campaign contributions (e.g., Mizruchi 1992) to PACs and super-PACs (Hadani and Schuler 2013) as financial incentives aimed at “buying legislation” (Milyo et al. 2000). In addition to targeting influential

lawmakers, firms can leverage their financial resources to create pro-corporate grassroots movements (Walker 2012, 2014) or engage in public opinion campaigns. For example, agri-business firms garnered public support for genetically modified organisms by mounting campaigns aimed at the general public to influence the U.S. Department of Agriculture's approval of this technological innovation (Hiatt and Park 2013). Further, the tobacco, chemical, and energy industries coopted a few prominent scientists' support to reshape public perceptions and policy decisions about health risks and global warming (Oreskes and Conway 2011).

In certain instances, firms successfully target regulatory agencies and the courts to change the enforcement rules rather than directing their efforts at legislatures. For example, by offering regulators very lucrative jobs (Etzion and Davis 2008) or building upon existing ties with regulatory officials (Rao and Giorgi 2006), firms can influence administrative agencies' translation of laws into practice and capture the regulatory process (Carpenter and Moss 2013). Another documented pathway to favorably shape legal implementation is through the deployment of lawsuits and *amicus curiae* (Collins 2004, De Figueiredo 2009) that divert regulatory agencies' resources away from rule-making.

All of the studies referenced above highlight that firms deploy extensive resources to secure positive outcomes in the legal and regulatory arena (Mizruchi 2013, p. 271). No strong evidence, however, has shown that these political tools ensure firms' success in influencing the legal environment. For instance, it is not clear whether campaign contributions can significantly affect political outcomes (Delmas et al. 2015, De Figueiredo 2002), especially since large corporations often hedge their bets with bipartisan contributions (Walker and Rea 2014). Similarly, lobbying is now considered a routine strategy that does not guarantee corporate players' success in influencing policymaking (Bonardi and Keim 2005).

In sum, a consensus is emerging among scholars that corporate expenditures such as lobbying, campaign contributions, legal battles, and public opinion campaigns are not definitive indicators of firms' influence over their legal environment, as some question whether "the wealth generated by business alone is sufficient to win political battles" (Walker and Rea 2014, p. 284). As a result, prominent scholars have called for a closer examination of *how* and *in what context* firms deploy their strategies of influence

(Bonardi and Keim 2005, Culpepper 2010, Perrow 2005). In this paper, we take a historical approach to examine firms' responses to a new law to capture the dynamic interplay of legal constraints and firms' ability to shape their legal environment.

THE EMPIRICAL SETTING: THE INTRODUCTION OF THE SAFETY ACT OF 1966

The issue of automobile safety harks back to 1902, when the trade magazine *Horseless Age* called for national government standards to regulate vehicle safety. In the 1920s Commerce Secretary Herbert Hoover fostered the elaboration of the "Three Es" approach to safety as a function of drivers' Education, the Enforcement of a uniform vehicle code, and highway Engineering. Yet until the mid-1960s safety was not a salient issue in public discourse or for car companies, which, in their advertisements, competed on improved speed, horsepower, and styling. For example, Ford's introduction of the first Safety Car in 1956 was seen as a marketing failure and consolidated an industry-wide belief that "safety doesn't sell" (Eastman 1984).

In 1965, a then-unknown young lawyer, Ralph Nader, published *Unsafe at Any Speed: The Designed-in Dangers of the American Automobile*, an exposé of the automobile industry. In this book he introduced a new framing of safety as a function of car design, building on medical research in epidemiology (Haddon et al. 1964), which in the 1950s had shifted attention away from the cause of the accident (drivers' inattention or badly maintained roads) to the cause of the injury (the contact between the passengers' bodies and the vehicle's components). This new conceptualization of safety implied that cars could be re-designed to limit the impact of accidents on their passengers. Nader focused on the design limitations of General Motors' (GM) Chevrolet Corvair, depicted as "one of the greatest acts of industrial irresponsibility in the present century" (Nader 1965, p. 8) and blamed the industry for millions of deaths. Nader argued that the private regulation approach to safety had failed (evidenced, for instance, by GM spending less than one percent of its profits in 1964 to fund automobile accident research) and that only a new law could ensure every citizen's "right to safety" (Viscusi et al. 1995) by forcing the auto industry to devote more resources to the manufacturing of safe cars.

The book's initial sales were modest. While the public did not immediately take notice of Nader's book, its chief target, GM, did. Worried about litigation that would challenge the Corvair's safety, GM hired private detectives to follow Nader to unearth information that might discredit him. When journalist James Ridgeway published the story about GM's investigations in *The New Republic* in 1966, Senator Ribicoff (D-Connecticut) summoned GM president, James Roche, to provide an explanation for his company's harassment. After Roche's apology, Nader's book became an overnight bestseller, turning car safety into an issue of national concern (Luger 2000).

METHODS

Setting and Case Selection

To explore how firms can influence their legal environment and what accounts for the State's receptivity to corporate influence, we undertook a historical analysis of automakers' responses to the Safety Act of 1966. Our analysis starts in 1965, when the automobile safety controversy began, and concludes in 1980, when significant changes in safety regulations had occurred. Historical methods are particularly appropriate when the research question aims to shed light on actions embedded in a context (Ingram et al. 2010, Ingram and Rao 2004). Temporal distance from the events of interest enables researchers to more easily move "between the particulars of the moment and the larger structural, cultural, and technological milieu that unfolds over longer time periods" (Hargadon 2015, p. 125), allowing for "greater breadth" and a "historically informed understanding" (Rao 1998, p. 921) of organizational actions that unfolded over an extended period of time (Tilly 1995). Additionally, the historical relevance of these events provides us with extensive documentation of the various actors' perspectives and actions from multiple data sources, which allowed for data triangulation (Tilly and Goodin 2006). In sum, this case met the criteria for a revelatory case in which the processes of theoretical interest were "transparently observable" and could be thoroughly reconstructed (Eisenhardt 1989).

Data Sources

We collected data from a variety of sources, including congressional hearings, annual reports, advertisements, and newspaper and magazine articles. Table 1 contains an overview of the data sources.

[TABLE 1 ABOUT HERE]

Our data collection started with congressional hearings from 1965–1980 in the *LexisNexis Congressional* database, totaling almost 14,000 pages of transcripts. Hearings include testimonies, dialogue, and data tables. Actors’ testimonies in hearings are often scripted, yet they represent an opportunity for representatives of different groups—e.g., firms, consumer activists, and experts—to have their point of view heard. In this instance, all the major U.S. automakers were equally represented in the hearings. Although congressional hearings do not capture other influence tactics, such as lobbying, these data provide a reasonable proxy for the focal actors’ response to the new law. Additional data was derived from the annual reports of the four major U.S. automakers (GM, Ford, Chrysler, and AMC) from 1965–1980, retrieved from the database *ProQuest Historical Annual Reports*, to capture firms’ official interpretations of regulatory changes for their shareholders (Greenwood et al. 2002).

Furthermore, to capture the auto industry’s communication with its customers, we scanned and collected 367 car advertisements from 1965–1980. We searched in the library for print ads in publications from the time period and decided to focus on car magazines, such as *Road and Track*, *Car and Driver*, and *Motor Trend*, to increase the chances of finding auto-related ads. Other primary data sources included audio recordings of Oval Office meetings between Nixon and auto executives in 1971, which were obtained from the Nixon Presidential Library and Museum, as well as the regulatory agency’s analyses, which were retrieved from its online archive. Additionally, we collected and analyzed all the “interpretation letters” (n=502) submitted between 1965 and 1980 to the regulatory agency by various stakeholders (automakers, suppliers, unions, senators, and highway patrol agencies), as well as associated replies by its Chief Counsel. Finally, we included newspaper and magazine articles (n=950) over the analysis period, as well as books and governmental reports from *LexisNexis Congressional Database*. We also reviewed auto safety articles published in professional and academic journals.

Data Analysis

To analyze our data we relied on a “concurrent triangulation strategy” (Creswell 2003) that featured a triangulation of qualitative and quantitative analyses (an historical case study coupled with

computational quantitative text analysis) to develop grounded theorizing (Bail 2014). This approach results in “well-validated and substantiated findings” (Creswell, 2003, p. 213) by analyzing the same data using different methodological techniques, a process that allows researchers to cross-validate findings (Greene et al. 1989, Morgan 1998, Steckler et al. 1992) and “offset[s] the weaknesses inherent within one method with the strengths of the other” (Creswell, 2003, p. 213).

Qualitative content analysis. We applied a historical case study analysis (Ingram et al. 2010, Ingram and Rao 2004) to develop theory regarding how and when firms can be effective in influencing their legal environment. To generate theoretical insights, we followed a three-step approach. First, following the precepts of grounded theory building with historical cases, we developed a basic narrative of facts pertaining to changes in legislation/regulation and automakers’ responses to such changes (Hargadon 2015, Hargadon and Douglas 2001, Leblebici et al. 1991). Through constant comparison – the iterative process of collecting and analyzing data – we became intrigued by how the same strategy that firms deployed to mitigate the impact of the new law (the inclusion of cost considerations in the assessment of safety) initially failed but later succeeded in the mid-1970s, resulting in a transformed legal environment. Our historical approach allowed us “not to search for the single set of causal forces responsible, but rather to see the variety of forces acting for and against the outcomes that ultimately prevailed” (Hargadon 2015, p. 125). Second, to elaborate on what accounted for firms’ eventual success in shaping their legal environment, we proceeded to build a more detailed chronology of events – critical incidents (e.g., Garud and Rappa 1994, Gehman et al. 2013) that affected the safety debate in the field (e.g., gasoline prices and transportation costs, or the political composition of Congress). This chronological structure allowed us to “break down big events into causally connected sequences of events, and examine each link in the chain” (Tilly 1995). For an overview of these events see Table 2.

[TABLE 2 ABOUT HERE]

Finally, building on our chronology, we identified “precipitating events” (Gehman et al. 2013, p. 89) – highly significant incidents that provided an impetus or opportunity for change within the field (Ansari et al. 2013) – such as the passing of the Safety Act in 1966, or the energy crisis of 1973. A focus

on these precipitating events led us to inductively identify three main phases in our narrative. For each phase, we mapped the key actors (e.g., automakers) that played a role in defining safety. In conducting this analysis, we were careful to obtain accurate data, favoring contemporaneous sources when possible, and to validate the data using multiple sources (Farjoun 2002).

Alternating between our chronological account, the precipitating events, the actors involved, and firms' actions, we constructed "interim narratives" (Gehman et al. 2013) to examine how these actions were linked. For example, we produced a narrative on firms' legal actions after the Safety Act was introduced. We then considered how these legal battles related to our account of auto executives' participation in congressional hearings, in which firms' representatives publicly argued for a delay in regulatory requirements. We also developed a narrative on consumerism to consider the evolving cultural context in which firms' actions were embedded. These interim narratives highlighted the multi-level nature of firms' strategies, ranging from very practical inquiries regarding how to apply safety standards (e.g., in interpretation letters) to broader ideological claims regarding U.S. competitiveness to Congress; the analysis also revealed a non-linear and cumulative process of exerting influence over the legal arena. We recognized a pattern in carmakers' actions through these narratives, which guided the aggregation of these interim accounts into historical "phases," which amounted to an overall narrative (Pentland 1999) of firms' responses to their legal environment over time.

Quantitative content analysis. To triangulate the results of our historical case study, we employed computational text-mining methods to identify "deeper patterns or structures of meaning" (Mohr et al. 2013, p. 676), thus complementing traditional "qualitative" text analysis (Mohr et al. 2013). Given that computer-aided content analysis includes a wide array of methodologies, our specific research design considerations were: (1) to provide synthesis and analytical insightfulness, and (2) to account for multi-level effect, since our analysis spans across societal, field, and industry levels of analysis (thus overcoming a common limitation of organizational analysis; Thornton and Ocasio 2008). Our design considerations led us to choose three computer-aided techniques: semantic network analysis, topic modeling, and Google N-grams.

Semantic network analysis: tracking the industry’s understanding of safety. Our theoretical and empirical interest centers on the organizational responses to the introduction of a new law. For this reason, we chose to use semantic network text analysis (Popping 2000) to illustrate in detail how the automakers’ conceptualization of safety changed between 1965 and 1980. This method is the cornerstone of our quantitative approach, as it reflects the core interest of this paper (organizational responses).

To capture how the industry “talked” about safety, we used automakers’ annual reports, in which firms made sense of challenges and opportunities for their shareholders. Structural network methods have proven to be powerful analytical tools in revealing the content and evolution in actors’ logics, categories, and, more generally, cultural systems (Jones et al. 2012). To generate semantic networks, we relied on the AutoMap software package. Network text analysis hinges on the principle of creating networks of words, in which meanings can be inferred from the co-usage among concepts (Carley 1994, Jones et al. 2012). Within such networks, nodes are concepts and ties represent how frequently two linked concepts co-occur within a specific text window (Appendix A details our procedure step-by-step). We used this technique to reveal how automakers (a) employed different safety-related concepts and (b) changed these semantic associations over time. Given our focus, we analyzed the ego-networks of “safety” (i.e., the associations of “safety” with other concepts) and focused on only the strongest (most frequent) associations among concepts. To further simplify interpretation of the maps, we circled clusters of words related to theoretical concepts using a clustering analysis performed with UCINET (Borgatti et al. 2002).

Topic modeling: field-level changes in cultural context. While our paper is centered on the responses of the regulated organizations, we still want to account for change at other levels in which automakers were embedded. Given the availability of a large volume of unstructured texts (84 annual reports, 25 congressional hearings, 950 newspaper articles – approximately 20,000 pages in total), a network-based approach to study symbolic change at levels above the organization would not have been feasible. We employed topic modeling to analyze and label the emergence and diffusion of topics across time and key actors (the automotive companies, the State, and the media) because this method is particularly suited to highlight patterns of meaning in a large corpus of texts and show changes in culture

across time (Mohr et al. 2013, p. 675; Bonilla and Grimmer 2013, Miller 2013, Mohr and Bogdanov 2013). Topic modeling is also a great complement to network text analysis because it treats texts as “bags of words” (Giorgi and Weber 2015) that loosely co-occur within documents, and are identified in a probabilistic fashion (unlike network text analysis’ more deterministic approach to meaning that highlights co-occurrences within a text). The juxtaposition of the two allows us to offer a more encompassing view of the evolution of meanings at the field level, while at the same time detailing the specifics of the automakers’ point of view. Table 3 provides a list of the topics extracted by our model; Appendix A provides a detailed explanation of the analytical procedure used to extract them.

[TABLE 3 ABOUT HERE]

Google’s N-grams: societal-level changes in cultural context. Finally, we employed Google’s N-gram Viewer to follow macro cultural changes that related to issues of auto safety to offer a synthetic, birds-eye view of societal changes. Google’s N-gram Viewer uses a subset of the entire Google Books corpus (500 billion words from 5 million books) to extract changes in the frequencies of a set of words (also known as an n-gram) through time. In particular, we focused on the 3-gram term “Cost Benefit Analysis” because of its centrality in our qualitative analysis. The N-gram Viewer traces how this term was used in published sources for any year and how such usage changed across different periods. Such an approach lies at the core of “culturomics,” the science of exploring temporal changes in cultural trends by analyzing large corpora of digitalized texts (Michel et al. 2011).

FINDINGS

In analyzing the influence of the law on firms and firms’ responses to change in their legal environment, we distinguished three main phases in the narrative: phase 1 (1965-1966) witnessed the emergence of activism in support of a new definition of safety and the passing of new legislation; phase 2 (1967-1972) was characterized by intense regulatory activity and firms’ compliance with the new legal mandates; and phase 3 (1973-1979) saw a re-emergence of firms’ strategies to influence their legal environment, centered around the inclusion of cost considerations in the evaluation of safety.

Phase 1 – Firms’ failure to influence their legal environment (1965-66)

Before Nader's safety controversy, the auto industry's engagement with the State had consisted of discreet, private negotiations with Washington (Vogel 1989). According to commentators at the time, automobile executives were caught off guard by the "mounting political pressures for government intervention advanced in the name of public interest" because such executives were "the products of a system that discouraged attention to matters outside the technical purviews of their job" (Cordz 1966, p. 117). Although firms' top managers initially dismissed the rising consumer movement as a fad (Nader 1965), they decided to present a unified front in the 1965 and 1966 Congressional hearings. To oppose the introduction of new legislation, automakers claimed that safety considerations had to be balanced in light of their costs and make sense "from a commercial standpoint in a competitive marketplace" (Claybrook and Bollier 1985, p. 94). Since the primary "responsibility of auto manufacturers was to stay in business by responding to the desires and demands of the motoring public" (Federal Role in Traffic Safety 1965, p. 659), the industry argued that government mandated safety devices would impose an economic burden on consumers, stripping them of their freedom of choice (Federal Role in Traffic Safety 1965, p. 673).

Despite the industry's opposition, in 1966 Congress unanimously passed the Safety Act, which authorized the federal government to set and regulate standards for motor vehicles (Mashaw and Harfst 1990). Congress openly rejected the industry's cost-conscious arguments because, as Senator Ribicoff put it, the goal of the new law was to ensure every citizen's right to safety independent of individual preferences:

In other words, the argument is that safety doesn't sell; that the public is not ready for it; that the public is indifferent; that the public does not want it – it does not really hold. [...] The question is not does he want them. This to me is a shocking thing, the attitude that was developed yesterday and here by you [i.e., industry executives]. In other words, what is your responsibility to produce a safe car? (Federal Role in Traffic Safety 1965, p.675)

To translate the Safety Act into actionable guidelines that would drive technological advancements, a new governmental agency – the National Highway Traffic Safety Bureau, renamed the National Highway Traffic Safety Agency (NHTSA) in 1970 as part of the Department of Transportation – was established with a twofold mission: order recalls of defective cars and set safety standards for all motor vehicles. A recall is a request for the return of a product that is suspected of being faulty or dangerous;

before 1966, the automakers had conducted ad hoc recalls when motorists happened to bring their cars in to the dealers. After 1966, NHTSA was in charge of investigating, ordering, and widely publicizing recalls. Safety standards – engineering standards that a vehicle must meet in order to be certified for sale – represented the real novelty in the agency’s mandate. At the time, lawmakers envisioned an engineering utopia in which cars would be safe irrespective of their drivers (Mashaw and Harfst 1990) and believed that NHTSA’s standard setting would “channel the creative energies and vast technology of the automobile industry into a vigorous and competitive effort to improve the safety of vehicles” (The Senate Commerce Committee Report for the Traffic Safety Act of 1966). Under the new law, safety was the overriding consideration in the issuance of new standards (Federal Role in Traffic Safety 1965), marking a significant failure of firms’ efforts to include cost considerations in rule-making.

Phase 2 - Firms’ compliance with the new law (1967–1972)

The introduction of a new law and of a new regulatory agency had a dramatic effect on the auto industry’s practices and outcomes. Automakers engaged in substantive compliance because, as Henry Ford II put it, “if we can’t meet them [the new safety standards] when they are published, we’ll have to close down” (Claybrook and Bollier 1985, p. 97). In 1967, NHTSA mandated 30 new safety standards geared at increasing vehicles’ crashworthiness by introducing, for instance, laminated windshields to absorb head impact shocks and enhanced door locks to keep occupants from being ejected from cars. Although the added safety features were largely invisible to car buyers, they amounted to an additional \$170 per car in 1968. These compliance costs kept increasing, reaching \$291 in 1973, and severely affecting U.S. automakers’ cost structures and profitability, as indicated by Figure 1.

[FIGURE 1 ABOUT HERE]

Car advertisements also reflected this period’s emphasis on safety. From 1966 to 1972, almost forty percent of ads prominently featured safety (compared with a mere 11% in the 1955–1965 period). Competition also triggered this emphasis; for instance, in the early 1970s, Volvo ran an advertising campaign entitled “It shouldn’t take an act of Congress to make cars safe” to stress its long-standing

commitment to safety. Even in their letters to shareholders, the automakers noticed how the legal environment had radically changed:

In the past, our success has depended primarily on our response to the test of the marketplace. In the future, we shall be severely tested by the need to respond at the same time to the requirements of the market and the requirements imposed by the Federal government's safety and air pollution regulations. The enactment of the National Traffic and Motor Vehicle Safety Act of 1966 was an event of far reaching implications for your company and the entire motor vehicle industry (Ford Motor Co. 1967: 3)

Despite feeling “buffeted, beleaguered, and threatened by the changes” (Gioia 1992, p. 380), the automakers engaged in substantive compliance with the new legal demands.

Deflecting blame. Automakers also adopted the new law's definition of safety as car design, while attempting to deflect the blame for car accidents. They did so by claiming the new legally sanctioned definition of safety as part of their tradition and by treating the two previously conflicting approaches to safety (the Three Es vs. car design) as complementary. A semantic network analysis based on firms' annual reports highlights this change in the regulated firms' repertoire. Figure 2a displays the semantic network of U.S. automakers between 1965 and 1966, while Figure 2b captures semantic associations with safety from 1967 to 1972.

[FIGURES 2a-2b ABOUT HERE]

A comparison of the two semantic networks reveals striking differences. Before the new law, automakers employed the word safety as a generic qualifier to describe marketed cars, alongside terms such as equipment, feature, and quality. After 1967 the semantic network of safety became more sophisticated, suggesting a greater centrality of this concept in automakers' discourse. The semantic network presented in Figure 2b features the new definition of safety and its alignment with the automakers' tradition, as evidenced by the frequent association of the word “continue” with safety. In addition to emphasizing their continuing efforts in the sphere of safety, automakers deflected the blame that Nader had cast on the industry as the reckless culprit for millions of deaths by bringing attention to the concept of *traffic* safety, which combined Nader's definition of safety as car design with the traditional Three Es' approach, as the example below suggests:

The company, from its beginning, has been vitally concerned with the entire field of *traffic safety*, not only in the design and building of safer vehicles but also in programs promoting *better highway design, driver improvement, vehicle inspection and other programs aimed at a total approach to safety*. The company will, both through its own engineering and research and through cooperative efforts with the National Traffic Safety Agency, work for reasonable and practical solutions to problems of *traffic safety*. (American Motors Corp. 1968; emphasis added)

This example, among others, highlights automakers' attempts to turn vehicle safety into a mere subset of traffic safety. Consistent with these findings, the semantic network used at the time – represented in Figure 2b - reveals a stronger link between *safety, drivers/occupants, and education/information*, subtly suggesting that drivers' lack of driving skills and education were problematic for safety.

In sum, by 1972, the State's power of coercion over automakers seemed to be strong and well-established, as evidenced by NHTSA's ability to increase mandatory equipment in cars, and the passing of the Motor Vehicle Information and Cost Savings Act in 1972, which was seen as “another significant victory for the American consumer” (Nixon 1972).

Phase 3 – Firms' influence in re-defining safety (1973-1980)

Yet starting in 1973, NHTSA's ability to enforce new standards faltered. Figure 1, which documents the stalling (1973-75) and then declining (1976-1980) costs of safety equipment, provides evidence of legal mandates' waning impact on automobile firms. Whereas such costs increased by approximately 58% in the first five years of NHTSA's operations, they only increased by 1% over the following five years. By the 1980s, most of NHTSA's standards (43 out of 50, or 86%) had been promulgated between 1966 and 1972, suggesting a significant shift in the agency's rulemaking power after those initial years.

Our empirical analysis shows that, between 1973 and 1980, carmakers were successful in influencing their regulatory environment by fostering the introduction of a new analytic tool (Jarzabkowski and Kaplan 2015, p. 537; Kaplan and Jarzabkowski 2006, p. 202) to evaluate safety standards: Cost-Benefit Analysis (CBA). By resonating with the cultural context at the time, CBA succeeded in transforming the law's original “safety per se” approach and NHTSA's regulatory focus.

Below we detail firms' specific tactics to spur the adoption of CBA and describe the outcome of this analytic tool. Finally, we discuss the role of the broader cultural context in favoring firms' influence on the application of the new law.

A new analytic tool: Cost-benefit analysis. Originally devised by the Army Corps of Engineers to justify investments in particular projects (Porter 1996), CBA became central to automakers' corporate communications to shareholders (as visualized in Figure 2c) as a neutral tool that would provide a clearly defined procedure to justify and evaluate NHTSA's safety standards and de-politicize standard setting. Many critics of CBA at the time pointed out that, by transforming qualitative values, such as people's health and quality of life, into quantitative distinctions that could then be compared with automakers' costs (Bermiss et al. 2014, p. 591), this analytic tool greatly discounted the value of health and human life (Bobbit and Calabresi 1978). In the words of Joan Claybrook, NHTSA's administrator between 1977 and 1981, CBA was "no substitute for the complex moral and scientific considerations that must inform regulatory judgment. Despite their apparent objectivity, numbers and dollars are like shadows: they give a fuzzy approximation of regulatory benefits but they do not capture the essence of the benefits, which are distinctly qualitative" (Claybrook and Bollier 1985, p. 125). In the following paragraphs, we identify two sets of tactics through which automakers fostered the introduction of CBA as part of NHTSA's rule-making process: tactics targeted *directly* at the regulatory agency or *indirectly* through Congress and the courts.

Direct targeting of the regulatory agency. To directly stall NHTSA's work, automakers inundated NHTSA with clarification letters, requests for meetings, and phone calls. Our analysis of the clarification letters received by NHTSA³ shows that automakers' requests for technical clarifications increased by 500% between 1973 and 1980 compared with the previous six years and often included a

³ To explore automakers' tactics to stall rule-making and overturn the balance of power, we analyzed automakers' 469 clarification letters sent to NHTSA between 1967 and 1980. We analyzed the letters in two manners. First, we read all of them in order to get a contextual understanding of their content and their usage. Second, we coded them to trace the evolution of main themes using two trained coders. From this analysis, we noted an increase in the number of clarification requests and in the use of cost-benefit analysis as a way to question the legitimacy of NHTSA's rulemaking (e.g., Hiatt and Park 2013).

cost rationale for a particular standard's implementation. For instance, in November 1979, AMC sent a clarification letter to NHTSA asking whether it would be admissible to remove the lap-belt buckle switch from its safety belts. In the letter, AMC reminded NHTSA that removing the switch would reduce costs by an estimated \$1.50 per vehicle, resulting in "industry-wide potential savings of \$15 million per year." This specific proposal was rejected, but it led to cost-based amendments to other standards. Similarly, in a January 1976 letter to NHTSA, Chrysler noted that a potential rulemaking delay could cost the company in excess of \$600,000 in wasteful research and development. Thus, NHTSA administrator Richard Dyson provided Chrysler with a written assurance that the previous standard would be delayed to avoid unnecessary costs. In sum, automakers' constant petitions for amendment, interpretation, or waiver of existing rules diverted the agency's resources away from the rulemaking process and brought attention to the cost-implications and lack of precision of new standards.

Indirect targeting of the regulatory agency: Congress and the courts. In Congress, automakers expressed a concern about a "total safety" approach – the regulation of safety without cost considerations – which had negative repercussions on the U.S. economy (e.g., Air Bag Conversation 1971). Although carmakers continued to embrace the law's definition of safety as car design and expressed their adherence to government mandates, they also labeled safety standards as a "risk to the U.S. economy" (Ford Motor Co. 1979) because regulation diverted economic resources away from more pressing societal issues, such as unemployment, inflation, and the loss of U.S. competitiveness in favor of Japanese automakers. As shown in firms' semantic network (Figure 2c), the words "economy," "public," and "industry" became more central to automakers' safety-related discourse, highlighting the issue's embeddedness in the macro-environment, as well as the direct link between higher costs, public interest, and regulations.

[FIGURE 2c ABOUT HERE]

In the 1973 congressional hearing on the mandatory inclusion of seatbelts and airbags, Ford openly argued for calculating "the costs of restraint systems relative to the resulting benefits." A few years later, GM's chief economist, Henry Duncombe, calculated that regulatory costs amounted to \$6 billion a year, with "only little knowledge of whether the benefits, to individuals or to society as a whole,

would exceed the costs” (The Automobile Industry and its Impact upon the Nation’s Economy 1975, p. 43). GM and other automakers requested a pause in safety requirements to “give the Government and the industry time to evaluate fully the cost effectiveness of regulations—existing and proposed—and to find better ways of meeting Government requirements” (The Automobile Industry and its Impact upon the Nation’s Economy 1975, p. 49). In addition to industry representatives and Republican congressmen, union leaders were also sympathetic to the industry’s concerns, as the quote below from the president of the United Automobile Workers exemplifies:

The automobile industry is at its most critical impasse since before World War II. The automobile industry has asked for a 5-year pause in additional emission requirements, and we are essentially supporting them in that [...] To put this in national context, the unemployed in the four auto companies constitute over three-tenths of one percent of the entire U.S. labor force. [...] The fundamental need in our economy is to assure full employment, and that won’t happen all by itself. (The Automobile Industry and its Impact upon the Nation’s Economy 1975)

Automakers further challenged the procedural elements of NHTSA’s standard setting in a series of legal cases. For example, the *H&H Tire Co v. DOT* decision put a substantial burden on NHTSA to demonstrate that new regulations were cost-effective. This case referred to Standard 117, a rule regarding the performance requirements for retreaded tires. The Seventh Circuit struck down the agency’s rulemaking because Standard 117 had not been shown to be “economically feasible” (Mashaw and Harfst 1990, p. 94). Similarly, the *Chrysler v. DOT* decision regarding Standard 208 (airbag installations) placed an enormous burden on the agency to develop test specifications if new technologies were to be required in regulation. Since the agency needed on-the-road evidence of safety effects before it could regulate, it was nearly impossible to require the adoption of any new technology. NHTSA was thus caught in a catch-22; the courts did not support ambiguous rules – rules that did not offer precise estimates of costs and technical requirements for automakers – yet NHTSA could not be specific without adequate data on the technology that it wanted to regulate. These data were not available, as automakers would not introduce new equipment without a rule requiring the addition of new safety features.

These two cases, among others, pushed the perception that NHTSA’s regulations were costly and unnecessary. Frequent litigation forced NHTSA to devote resources to these challenges, slowing down its

rulemaking process significantly; by the mid-1970s, new standards had a gestation period three times as long as the initial standards (Mashaw and Harfst 1990, p. 78). As an NHTSA's administrator put it, cost-benefit analysis had become a "political subterfuge" (Claybrook and Bollier 1985, p. 130).

Outcome: Firms' success in influencing regulation. The automakers' push for the introduction of CBA contributed to a significant change in the regulation of safety laws. By the end of 1970s, the language of cost-benefit analysis had become standard practice for evaluating NHTSA's proposed and final regulations, shifting from a total safety approach to a de-radicalized, cost-conscious conception of auto safety. Our topic modeling analysis—performed on automakers' annual reports, congressional hearings, and newspaper articles—revealed that U.S. automakers championed cost-benefit considerations, which became pervasive across the different stakeholders in the auto industry. In all three instances, the topics centered on the "safety-as-design" concept became less prevalent during the 1973–1980 period compared with the 1966–1972 (Figure 3a); moreover, topics that highlighted the importance of cost-benefit considerations, economic restrictions due to NHTSA's regulations, and increasing imports and gas prices became much more frequent (Figure 3b). This switch was perhaps most dramatic when the analysis was solely focused on congressional hearings: 1973 marked an abrupt change in the discourse and relevance of the two approaches to safety— from an overriding to a relative consideration (Figure 3c).

[FIGURE 3a, 3b and 3c ABOUT HERE]

Automakers' direct and indirect tactics against NHTSA not only resulted in a series of amendments (e.g., 18 amendments of Standard 121) and regulatory notices, but also put NHTSA under severe scrutiny and criticism in Congress, fundamentally undermining its credibility as a regulatory agency. The following quotation by an executive at a truck manufacturing company exemplifies this change:

We think that it is timely for Congress to review the performance of the National Highway Traffic Safety Administration in connection with their regulatory record on the 121 brake standards. We believe that a review of the record in this matter will disclose that NHTSA has, first, not followed the statutory mandate laid down by the Congress and, second, that it has created procedural confusion and, third, that it has deceived Members of Congress and the public, and fourth, that it has failed to disclose the important data and, fifth, that it has never adequately defined safety, or clearly marked out its objectives. Finally, and most importantly it has endangered the users of our public highways. [...] Perhaps the most fundamental problem with NHTSA is its failure to define safety problems and then act to correct those problems without creating counterproductive side

effects. (National Traffic and Motor Vehicle Safety Act Amendments 1976, p. 4)

Originally established to set appropriate vehicle safety standards, by 1980 NHTSA had become a rather ineffectual agency that was limited to enforcing recalls, without the clear ability to set a forward-looking technological agenda to improve vehicle safety (Mashaw and Harfst 1990). An investigation of federal regulation by Congressman John E. Moss's (D-California) Subcommittee on Oversight and Investigation found that the increased pressure on NHTSA to produce cost-benefit justifications for safety rules led to the abandonment or postponement of several safety rules. For example, in 1976, NHTSA's Associate Administrator, Robert Carter, reported that he had ordered the abandonment of a 1971 proposal to require the installation of rear under-ride guards on trucks, after an economic analysis predicted that the costs would exceed the benefits (Regulatory Reform 1976).

In sum, CBA had a transformative effect on firms' regulative environment, and became so deeply entrenched that even a safety violation scandal such as the Ford's Pinto case did not undermine its application. In response to the challenge from more compact European and Japanese cars, in 1970 Ford introduced the Pinto, a small car whose fuel tank could rupture when struck from the rear at a relatively low speed. Modifications to the tank to avoid the fire cost only \$11 per car to install, but Ford used CBA to justify the decision not to introduce the modifications. Despite images of Pinto's fires proliferating in the media (Gioia 1992, p. 381) and a public uproar led to the discontinuation of this particular model, the CBA principle that led to the incidents was no longer under scrutiny. In the following paragraphs, we use our data to argue that the automakers' effectiveness in the third phase hinged on a significant change in the broader cultural context.

An important contingency: The cultural context (1965-1980)

The empirical evidence emerging from our analysis suggests that firms' effectiveness in influencing their legal environment hinged on the degree to which their strategies were culturally consonant with a changing cultural context. Because cultural context can be quite a broad concept (Benford and Snow 2000, Giorgi and Weber 2015, Ingram and Silverman 2016), we focused on the beliefs, myths, and values that were most relevant to the auto safety debate, which in this case was the rise

of Consumerism in the 1960s and the anti-Consumerism movement of the 1970s. Consumerism hinged on a distrust of big business, the belief in individual consumers' rights to safe and durable products, and in mobilization for new consumer protection legislation (Herrmann 1970). Often sparked by journalistic exposes of the dangers of widely used products or natural resources (such as Rachel Carson's *Silent Spring*, published in 1962), consumerism campaigns identified over-powerful and immoral corporations as the enemy (Gabriel and Lang 2015: 180-3), aimed at introducing regulation to increase standards of business conduct, and were backed by shifting coalitions of activists, labor organizations, consumer cooperatives, credit unions, and consumer education organizations. At the political level, the success of the Civil Rights movement, President John F. Kennedy's Consumers' Bill of Rights (1962), and President Lyndon Johnson's "Great Society" speech in 1965 contributed to beliefs about progress and rising quality of life. At the technological level, the space race fostered the myth that firms possessed the capabilities to design and manufacture completely safe products (Mashaw and Harfst 1990).

Yet by the 1970s, the anti-business attitudes of consumerism started being interpreted as un-American (Rao 1998). In the media, consumerism became tainted as an adversarial culture that could not jolt the nation's economy. Rising oil prices, inflation rates, the loss of U.S. competitiveness in the global marketplace, and unemployment rates led Congress to hold hearings on the economy's ability to sustain growth and increase employment (United States 1976). In these hearings, the auto industry's role in stimulating the nation's growth was broadly acknowledged. The auto industry, previously blamed for millions of deaths, was instead portrayed as a victim of costly regulation, as the quote below exemplifies:

A consensus appears to be developing that regulatory costs have indeed suffocated Chrysler and damaged the auto industry's competitive structure. This growing consensus is supported by recent findings of four consulting groups, two of which prepared reports for the Federal Government and one for Chrysler. Even the General Accounting Office has gotten into the act. Federal law requires that all automobiles built after Sept. 1, 1983 be equipped with passive seat belt restraints or air bags, yet the G.A.O. has questioned the airbags' effectiveness and said they would cost as much as \$580 a car, rather than the \$112 quoted by the highway safety administration. It's pretty clear by now that it's easier to write a law than it is to build an automobile (The New York Times 1979).

This criticism was at times directly targeted at NHTSA. For example, Standard 101, which required "controls in passenger cars to be located within the comfortable reach of a fifth percentile adult female

restrained by lap and upper torso restraint seat belt” (Mashaw and Harfst 1990, p. 75-76), became the object of ridicule in newspapers for its pedantic language. Although the number of consumer complaints concerning safety defects and demand for recalls had steadily increased throughout the 1970s (Mashaw and Harfst 1990), NHTSA’s rules were often derided in the media as unnecessary and excessive. This discursive shift is reflected in a Google N-gram analysis on sources published between 1966 and 1980, as reported in Figure 4.

[FIGURE 4 ABOUT HERE]

The Google N-gram’s comparison of “auto safety” and “cost benefit analysis” reveals a dramatic change in the prominence of these two topics around 1973, as the latter started to appear more frequently than the former in published texts. Moreover, while auto safety continued being an important topic of discussion, its discussion started to be much more frequently paired with cost-benefit considerations. These changes represented a substantial shift in the cultural context surrounding the automakers, which aligned automakers’ cost-driven claims on safety with the prevailing discourse, beliefs, and understanding. Below we discuss how the cultural context differs from the economic and the political contexts. We then examine potential alternative explanations for our findings.

Cultural vs. economic context. The energy crisis of 1973 contributed to widespread perceptions of a deteriorating economy, which, at the time, consolidated opposition to the tenets of consumerism. A change in cultural context, however, should not be seen as the inevitable outcome of changed economic conditions, for at least two reasons. First, mainstream newspaper and magazine articles had opposed the values and beliefs of consumerism before the energy crisis (e.g., *The New York Times* 1971). Second, research shows that economic challenges do not necessarily explain a rise in pro-business sentiments (Weiss 1967). For example, economic challenges have been invoked to explain the rise of consumerism in the 1900s, 1930s, and 1960s (Herrmann 1970, p. 55). In our case, we believe that widespread perceptions of economic stagnation helped solidify a shift in the cultural context away from the consumerism of the 1960s. In sum, economic stagnation cannot account per se for the shift to pro-business beliefs and values.

Cultural vs. political context. It is important to note that the evolving cultural context did not neatly align with the political context of the 1970s. While Nixon (1969-1974) was a Republican with a decisively pro-business orientation, the composition of Congress throughout the 1970s still favored Democrats in both houses of Congress, and more than sixty consumer activists were given major positions in the Carter administration (Vogel 1989). For instance, in 1977, Joan Claybrook, who had worked with Nader to introduce the Safety Act of 1966, was appointed as the new NHTSA administrator. The agency quickly issued a new set of standards, which, for example, prevented tampering with odometers, extended steering column protections, and improved frontal crash protection, as all these factors had been proven as effective to save lives (Passive Restraint Rule 1977). However, Congress was no longer unanimous in accepting a “per se” safety argument, as the statement below suggests:

Regulation is a necessary and proper responsibility for Government to protect the consumer. No one can dispute this, nor the basic overall need for the presence of Government. The only question is to what degree and at what cost. We will never achieve a risk-free society due to our resource and technical limitations. Society's job and the legislator's job as the public's representative is to define the minimum acceptable risks to health, safety, and the environment for the American people. (Cost of Government Regulation to the Consumer 1978, p. 2)

Despite a political environment favorable to activists and liberal policies, the cultural context in the 1970s had shifted away from the ideals of consumerism, creating an opportunity for firms to find new cultural consonance between their efforts to shape the legal environment and the changed cultural context.

Alternative Explanations

While our use of extensive qualitative and quantitative data provides us with confidence in our findings, we also consider the possibility of two alternative explanations. First, we consider the notion that perhaps NHTSA reached beyond its original mandate and lawmakers felt the need to rein it in after an initial push in mandating safety equipment. To fully consider this alternative, it is important to clarify NHTSA’s original 1966 mandate. The agency was given wide power to promote the development of new safety and crash-avoidance technologies through rulemaking. The agency was not simply tasked to enforce technological best practices, but to actively promulgate laws to drive the development of new,

innovative safety technology. Under these premises, it is difficult to believe that NHTSA actually overreached its mandate, especially considering that the first waves of safety standards (before 1973) required either small, incremental improvements, or simply mandated technology that was already widely available in the market, usually sold as optional. Indeed, the first batch of standards (1966-1967) was toned down after widespread protest from the automotive industry, due to the lack of preparation time given to the producers to adapt to them. The second generation of standards (13 new rules) was not any more radical than the first batch; it mandated common, though optional features such as theft protection, head restraint, safety belts, and steering blocks. Despite being technologically modest innovations, estimates suggest that the newly mandated featured made cars on average 30% safer (Crandall et al. 1986). Comparing the modest innovation results to NHTSA's wide original mandate, it is hard to believe they overreached and their power needed to be curbed.

A second alternative explanation is that NHTSA's demands for safety features pushed the industry to its technological limits, hence prompting an obvious switch in the agency's focus to recalls. In this case, one might expect a much slower progression in safety development after 1973. However, a closer assessment of the technological trajectory of the industry suggests otherwise (Holt 2005). In 1971, NHTSA published a far-reaching technological plan ("Program Plan for Motor Safety Standards") to describe its vision for standards to be promulgated in that decade. The plan included technological advancements such as airbags, radar brakes, periscopes, alcohol interlocks, and speed limiters, all of which promised to drastically reduce traffic fatalities by half by 1980. While some of these technologies required development, others were readily available. For example, the airbag, which experts consider (together with safety belts) as the most efficient safety device in the history of the automotive industry (Holt 2005), had been prototyped over a decade earlier in 1953, but only became a mandatory component for cars in 1998 (Kent 2003). An estimate by NHTSA in 1969 suggested that the airbag alone would have saved between ten to twelve thousands lives per year, more than all the previous forty-nine rules of the agency summed together (Mashaw and Harfst 1990). Other devices, such as ignition interlocks (briefly marketed in 1974 by General Motors) and automatic belt systems (developed by Volkswagen in 1975)

were also readily available to improve cars' safety. American automakers consistently lagged behind Volvo (and other European brands) in introducing the latest development in seat belt technology (Johnnesen 1984), again suggesting that it was not a technological barrier that prevented NHTSA from introducing new standards. Together, all these examples show that technology development and availability could not account for a relaxing in legal requirements starting in the mid-1970s.

THEORIZING FIRMS' INFLUENCE IN THEIR LEGAL ENVIRONMENT

We have provided evidence describing how the relationship between automakers and their legal environment can be seen as an undulating balance of power over time, suggesting that compliance and captive perspectives can both find support in the same relationship when studied over time. Specifically, we show that what had been initially strong environmental pressure for firm compliance later gave way to automakers' finding greater influence over their legal environment, and that this differential success was due to shifts in firms' cultural context over time. In this way, our cultural contingency perspective synthesizes and reconciles the two historically dominant and opposing views on the organization/legal environment relationship, i.e., the constraining power of the legal environment (compliance) vs. the privileged position of firms in shaping rule-making (capture).

Fundamentally, our perspective takes seriously the cultural context of political struggles, suggesting that changes in cultural context present a blend of opportunities and constraints for contestation and effective influence. Our study shows that when regulatory demands are consonant with the dominant cultural context, firms' level of compliance will be higher, *ceteris paribus*. However, changes in the broader cultural context (largely due to exogenous forces) may provide firms with opportunities to deploy strategies of influence that, if consonant, allow firms to shape the legal environment to their advantage. Our emphasis on cultural context as changing over time also suggests, in terms of analytical generalizability, that the process described above can repeat itself. Figure 5 summarizes our theoretical view of this process.

[FIGURE 5 ABOUT HERE]

In Figure 5 we situate the three historical phases identified in our findings as elements contributing to an ongoing cycle of contestation and settlement/resettlement between firms and their legal environment. We label our three inductively derived phases as: *theorization* – a period characterized by efforts to justify or oppose the introduction of new legal constraints; *compliance* – a phase in which a settlement has been reached and firms abide to the translation of law into actionable standards; and *transformation* – a phase characterized by firms’ successful efforts to change the meaning and application of the law. While our study’s detailed historical coverage ends in 1980, our Figure 5 also indicates that after the transformation phase (1973-1980), a new settlement was reached in favor of firms with the deregulation of the 1980s. Our phases reflect a more circular – rather than linear – process to emphasize the likely ongoing relevance of cultural context, whereby changes in cultural context could again shape renewed contestation, renewed opportunities for cultural consonance, and thus changes in the balance of power between firms and their legal environment. Below we briefly discuss each phase and the role of cultural consonance in shaping the effectiveness of influence attempts.

Theorization. In the first phase, the issue of safety was defined or framed (Mahon and Waddock 1992) in conflicting ways by activists and automakers – respectively, as a function of car design or of the Three Es. While activists demanded the introduction of a new law to drastically reduce car accidents, firms opposed new legislation because of economic considerations (Gioia 1992). Contrary to the predictions of the capture perspective, firms’ extensive resources did not ensure success in the legal sphere. The outcome of this contestation phase between automakers and activists (and legislators) was the introduction of a new law and the creation of a new regulatory agency, with the mandate to set safety standards without explicit consideration of the costs tied to regulation. We find that a consumerist framing was culturally consonant with the cultural context of the 1960s: Lyndon Johnson’s ideals of the Great Society, the successes of the Civil Rights Movement, a burgeoning distrust in firms’ behavior (Gabriel and Lang 2015), and myths about the affordances of technology after landing a man on the moon (Mashaw and Harfst 1990). Automakers’ cost-based arguments lacked cultural consonance, and instead appeared greedy and out-of-touch.

Compliance. Once the new law was passed, the emphasis shifted to NHTSA’s translation of the letter of the law into actionable standards. By offering a common framework to which actors needed to abide, the introduction of a new law sets the rules of the game (Huising and Silbey 2011, Kellogg 2009) and the automakers indeed succumbed to the coercive power of the law by introducing changes in vehicle design that significantly affected their cost structures and profitability. Although the automakers embraced a “total safety” approach that neutralized blame and negative perceptions (Anteby and Molnár 2012), and some opposition to consumerism started to emerge during this phase (The New York Times 1971), firms’ compliance with legal mandates fostered a period of “settlement” of the issue of safety – the restoring (albeit temporary) of a “generalized sense of order” (Fligstein and McAdam 2011, p. 10) that occurs when an issue is no longer object of contention.

Transformation. In the third phase, firms were able to transform the meaning and application of the law through the introduction of a new analytic tool, CBA, which shaped the regulatory agency’s rule-making focus and power. Rather than rejecting the definition of safety as car design, CBA was presented as a tool that would rationalize the regulatory process and control the costs of regulation (Posner 2001) in the name of public interest. While the industry’s demands of a cost-conscious definition of safety had failed in the mid-1960s, they succeeded in the mid- to late 1970s because CBA was now more culturally consonant with the changed cultural context, which rejected the tenets of consumerism and instead emphasized fear of unemployment and beliefs that laxer regulation would restore economic prosperity.

DISCUSSION

By showing how cultural consonance exerted a strong and dynamic effect on the balance of power between firms and their legal environment, we offer a pathway for reconciling the two historically dominant and opposing perspectives of firms and the law (compliance versus capture). Our historical approach contextualizes (Ingram et al. 2012, Ingram and Silverman 2016) both the legal pressures for compliance and firms’ push against compliance, and it illuminates the role of cultural consonance in contributing to the differential effectiveness of firms’ strategies of influence. We analyzed how the change from one cultural moment to another, i.e., the dominance of the consumer movement in the 1960s

and the anti-consumerism wave of the 1970s, provided firms an opportunity to shape the impact of a new law through increased cultural consonance.

This study adds to research on the role of powerful actors in their environments in organization theory (Barley 2007, 2010, Clegg et al. 2006, Perrow 2005, Zald and Lounsbury 2010), as well as research on the capture perspective (Burriss 2001, Walker 2009, 2012, Walker and Rea 2014) by investigating alternative ways that firms can pursue political or nonmarket strategies to influence regulatory decision making (Davis 2005, Lee 2009, Shaffer et al. 2000). Prior research emphasized the importance of *material* resources (Dreiling 2000, Oliver 1991, Oliver and Holzinger 2008, Pfeffer and Salancik 1978) to alter the rulemaking process, for example, through legal action or connections to members of the political elite (Rao and Giorgi 2006). Throughout the time periods of our study (1965-1980), the automobile industry commanded significant material resources (in 1966 the Big Three's revenues amounted to 11% of the nation GDP, employing over 13 million workers), enjoyed political connections, and presented a unified front in fighting off the threats of its new legal environment. Yet all these factors were not sufficient predictors of firms' success in securing favorable outcomes (Walker and Rea 2014). We contribute to this line of research by showing that when firms deploy strategies that are culturally consonant with widely accepted repertoires of beliefs and understandings, such strategies will enable firms to exert effective influence on their legal environment. Our analysis of the process by which firms gain influence over regulatory activity provides a richer understanding of firms' political strategy and their impact on the law. By doing so, we respond to a call for more research that offers evidence of firms' involvement in the political process and of political outcomes, i.e., "how business mobilizes and what it gets when it does" (Walker and Rea 2014, p. 284).

With respect to the compliance perspective, we see our analysis as contributing to the neo-institutionalist understanding of the law's impact on organizations, which has been criticized for its tendency to treat the law simply as a coercive force that sets rules to which firms must conform (Hiatt et al. 2009, Hirsch and Lounsbury 1997, King et al. 2010, Marquis and Huang 2009). The first two phases of "theorization" and "compliance" reflect the dominant thinking in this perspective, according to which

federal law typically establishes broad guidelines for behavior; administrative agencies set practical rules and guidelines; and corporate actors respond by designing compliance strategies. This chain of events underlies the institutional pillar of coercive influence on organizations (Mizruchi and Fein 1999), which accounts for a settlement or truce within a field (Litrico and David 2016). Yet “transformation” in the legal sphere can occur when firms actively target formal State institutions, such as the courts and regulatory agencies, to introduce favorable change. Our study shows the role of firms’ strategies of influence – such as lawsuits, requests for clarifications, or smearing campaigns in Congress and in the media – in constraining an administrative agency’s ability for rulemaking. This finding is important to shed light on the firm/legal relationship because it shifts the attention from the compliance perspective’s almost exclusive focus on “policy making by legislators” to “policy implementation by regulatory agencies” (Hiatt and Park 2013, p. 932).

We also bring attention to the implication of analytic tools (Kaplan and Jarzabkowski 2006), such as cost-benefit analysis, in guiding the translation of the law into practice. These seemingly neutral tools can have subversive effects on a regulatory agency’s ability to carry forth the original legal mandate because they embody a new technology of rationality (March 2006). In this case, while the original legislation intended to ensure safety per se, the adoption of CBA implied a more limited view of safety as a benefit that had to be balanced in light of its costs to manufacturers. Analytic tools can therefore be seen as an important way in which firms and industry groups engage in political struggle, manage uncertainty (e.g., Gargiulo 1993), and redefine their legal constraints. These arguments also have significant implications for the current analysis of legal implementation in institutional approaches. Research on legal endogeneity has noticed that compliance is partly influenced by the institutional field that the law intended to regulate. This is because firms conform not to the law itself – which is relatively ambiguous – but to the recipes of compliance developed by the professions (Dobbin 2009, Edelman 2007, Edelman et al. 1999, Edelman et al. 2011, Edelman and Stryker 2005, Talesh 2009). We contribute to this line of work by showing the strategic efforts of firms to channel the process of legal implementation to their advantage through a direct engagement with the courts, Congress, public opinion, and agencies.

While the capture perspective implicitly assumes that firms are skilled at crafting strategic actions to successfully shape their legal environment, it should be noted that our contingency perspective, with its emphasis on cultural consonance, is more agnostic on the issue of skill versus luck (Kahneman 2011). Cultural consonance occurs when there is harmony between firms' actions and the cultural context in which the firms are embedded, and this harmony can be attained via careful deliberation or simply good fortune. Our analysis suggests that the changes in cultural context that occurred were largely exogenous to the firms' actions, but that firms' strategies in later periods were adapted to appease fears of unemployment and loss of competitiveness that achieved greater consonance with the changing cultural values and norms in the U.S. In other words, firms' strategic actions resembled an emergent strategy (Mintzberg and Waters, 1985).

Our analysis, however, also revealed unexpected and somewhat ironic implications. Specifically, while American automakers won the "battle for safety" in the 1970s, they lost the "war for profits" in the 1980s, since Japanese (and European) manufacturers leveraged safety as a differentiation opportunity to develop and market cars that were not only smaller (and thus more fuel efficient), but fundamentally safer. It is particularly ironic that the triggers for Japanese technological advancements were NHTSA's initial recalls (Toyota Motor Corporation 2012) and the agency's Experimental Safety Vehicle (ESV), an international program aiming at creating the prototype of the safe car of the future. The Japanese government and manufacturers ended up adopting many of the innovations generated by the ESV program, and in particular an S-shaped frame that allowed the car to better handle energy absorption, and had automatic lap belts, airbags, and disc brakes on all wheels. Many of these advancements were included in the redesigned Toyota Corona marketed in 1973, which ended up the best-selling compact car for the following 4 years and would become the boiler-plate for the successful Toyota expansion in the American market led by Toyota Corolla in the ensuing years. This outcome reveals that cultural consonance may sometimes serve as a double-edge sword: beneficial in the short term for firms seeking consonance, but potentially dangerous by providing competitors an opportunity to unseat incumbents in the future.

The core argument of our paper is the relationship between firms and their legal environment, which has been considered in terms of the core debate on “Who influences whom?” but can be better understood as a question whose answer is contingent on cultural context. Our arguments imply that the values incorporated in a new law – in our case, citizens’ right to safety, a risk-free society, or a belief in firms’ technological abilities – ultimately correspond to Selznick’s idea (1957) of “precarious values.” A value is precarious because it is always in danger of losing its flag carriers and representatives – that is, the active support by organized interest groups and elites that help preserve it against competing values (Favereau and Lazega 2002). Of course, this prompts a much larger question that goes beyond the scope of our study: How does cultural change happen? While it is not easy to pinpoint the specific motors of cultural change in societies (Tarrow 1989), our study suggests the importance of the interplay of the rise and fall of social movements (Ingram and Silverman 2016), economic factors (Vogel 1989), and media interpretations (Rao 1998) in fostering change in dominant beliefs and values.

We also see our study as contributing methodologically to the field of organizational theory in three distinct ways. First, we offer an innovative approach to triangulate qualitative and quantitative content analysis by implementing a concurrent triangulation strategy (Creswell 2003). Second, we showcase a quantitative research design that bundles several methods to provide evidence for cross-level mechanisms (Thornton and Ocasio 2008). Finally, we import advanced techniques from computer science to automatize the open problem about identifying the optimal number of topics when using topic modeling techniques (Arun et al. 2010; Deveaud et al. 2014; see Appendix A for more details). These methods could be fruitfully applied to examine the robustness of our perspective on the firm/legal environment relationship over time (i.e., as an undulating battle for relative power influenced by cultural consonance) in analyzing modern-day questions.

Consider the current situation regarding autonomous driving, i.e., the development of cars capable of sensing their environment and navigating without human input. The growing cultural consonance of autonomous driving as a fundamentally safer form of driving very recently saw a setback due to the first pedestrian death due to an autonomous car (Fitzgerald Rodriguez 2018; Matousek 2018).

Despite autonomous driving's recent legalization in California, no automaker has yet applied for an autonomous driver permit, due in part to the loss of cultural consonance triggered by the unfortunate accident. There are certain situations in which we would expect our model of cultural consonance to be less applicable, e.g., when a technology is perceived as "high risk" or the assessment of its costs and benefits is riddled with technical challenges. An example in this regard is the nuclear power industry, which has one of the most contentious technologies in the U.S., and faces challenges in how experts seek to calculate the costs of operating a nuclear plant (Ross and Staw, 1993), and the dire and far reaching consequences of a potential accident (Perrow 1999). These factors combine to make the debate less susceptible to cultural contingencies, evidenced by the stall of nuclear investments in the late 1970s, with no new plants ordered since 1978 (Hultman and Koomey 2007). Even here, however, our theoretical framework could be adapted to analyze the cross-national (rather than cross-temporal) undulation in cultural consonance, e.g., comparing and contrasting the unfavorable situation for the nuclear power industry in the U.S. versus the more favorable reception in other countries, such as France.

Finally, we wish to stress that our study's emphasis on cultural context is not intended to suggest that more traditional political views on firms' likely influence over their legal environments (e.g., business unity, access to considerable resources, and ties with elite politicians) do not matter. Rather, as noted earlier, we found that those factors were relevant throughout our period of study, and hence do not provide an explanation for the observed differences in firms' success in these different periods. We encourage future research to build upon our cultural consonance perspective to show how and why culture matters in understanding firms' actions and outcomes over time. At certain historical junctures, "new cultural complexes make possible new or reorganized strategies of action" (Swidler, 1986:282). Our study specifies how and why attaining greater cultural consonance between these new cultural complexes and firms' strategies of action can change (at least temporarily) the balance of power between firms and their legal environment.

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APPENDIX A – LDA and semantic network analysis preparation

Automated Topic-Modeling Analysis

Topic models are based upon the idea that documents are mixtures of topics and a topic is a probability distribution over words (Blei et al. 2003, Griffiths and Steyvers 2002, 2003, 2004, Hofmann 2001, Hofmann and Thomas 1999, Steyvers and Griffiths 2007). A topic consists of a cluster of words that frequently occur together. A topic to the computer is composed as a list of words that occur in statistically meaningful ways. A text is every kind of unstructured text, i.e., that has no computer readable annotations telling the computer the semantic meaning of the words in the text. The advantage of topic modeling over other techniques used to capture content (e.g., word counts) is that it allows for polysemy—as words inductively can take on different meanings depending on their context. Topics thus emerge from the text, without the need to specify categories in advance. Using contextual clues, topic models can connect words with similar meanings and distinguish between the uses of words with multiple meanings (Steyvers and Griffiths 2007). Our automated analysis included three phases: text preparation, application of the Latent Dirichlet Allocation (LDA) algorithm to extract topics, and topic coding.

Text preparation. We followed a standard procedure (Croidieu and Kim 2017) to prepare the raw text for topic-model analysis. First, we collected and converted all the input documents (84 annual reports, 25 congressional hearings, 950 newspaper articles—approximately 20,000 pages in total) into machine-readable files using commercial optical character recognition (OCR) software. The converted files were then manually checked and corrected to fix the errors of the automated procedure. Second, we transformed words into input tokens by removing punctuation and numbers, and separating them by spaces. Third, we applied a stemming procedure to automatically drop common suffixes (for instance –ing, -s, etc.) to cluster words with a common root together (e.g. safety, safe, safer). Finally, we removed common stop-words, such as conjunctions, common adverbs, and rare words.

Topic extraction. We employed the Latent Dirichlet Allocation (LDA) algorithm to identify topics (Blei 2012, Mohr and Bogdanov 2013). LDA uses the co-location of words in a collection of documents to infer the underlying (or latent) topics in those texts and each topic's weight in each individual document. MALLET, a Java-based open-source NLP (Natural Language Processing) text analytics tool (McCallum 2002), was used to extract the topics from the set of available documents. MALLET uses a simple implementation of the Gibbs sampling algorithm, which considers each word as a token in the text collection and estimates the probability of assigning the word (or token) to each topic class conditional on the topic assignments to all other word tokens (Casella and George 1992). Each topic is assigned a score depending on the topic's overall presence in the dataset.

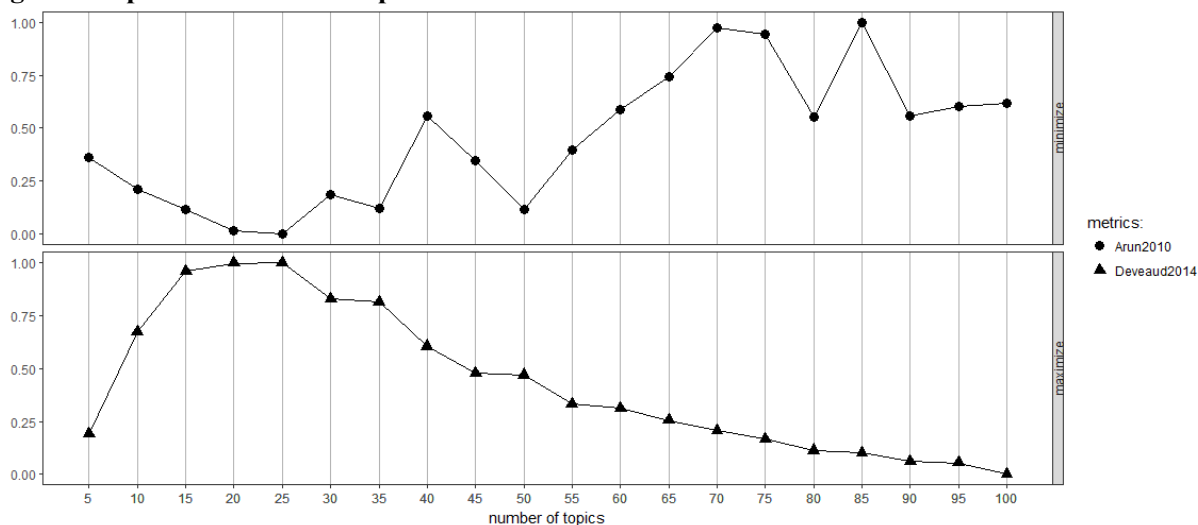
LDA requires to choose *ex ante* the number of topics T to extract, and how to identify the “right” number of topics to extract remains hotly debated. Indeed, Wallach et al. (2009) note that “selecting the number of topics T is one of the most problematic modeling choices in finite topic modeling” (p.7). A number of topics too small might generate sets of words that are too general, and thus not useful; too many topics might, on the other hand, extract topics that are very specific to specific documents, and thus not useful to understand general trends across the corpus (Marshall 2013). Indeed, the right number of topics is corpus specific, as each corpus has a unique size and a specific content scope (for instance, our corpus was quite focused given our interest in auto safety). As a matter of reference, in the 2013 special issue of *Poetics* dedicated to topic modeling, the number of topics generated by each article ranged from 12 to 500.

To identify the most meaningful T to fit our data, we started by extracting 20 topics – the recommended default option in MALLET. We then manually compared the topic extraction with alternative models of 15 and 25 models, evaluating the quality of information gained (lost) by the marginal addition (removal) of topics. Past research on the “right” number of topics in a corpus (Arun et al., 2010) concluded that the correct number of topics must be a “small range that gives the best accuracy on a held out dataset” (Arun et al., 2010, p. 392), implicitly stating that, since the topics in topic modeling are generative, the choice must be human-assisted.

To check for the correctness of the assumed range of topics chosen, we used two metrics introduced by Arun et al. (2010) and Deveaud et al. (2014). The measure developed by Arun et al. (2010)

considers LDA as a matrix factorization method which factorizes a document-word frequency matrix M into two matrices M_1 (of order $T * W$) and M_2 (of order $D * W$) in which T is the number of topics, W is the size of the vocabulary, and D the number of documents in the corpus. The measure computes the symmetric Kullback-Leibler divergence of the SVD (Singular Value Decomposition) of matrix M_1 and the distribution of the vector $L * M_2$, where L is a $1 * D$ vector containing the lengths of each document in the corpus. Arun et al. (2010) demonstrated that, at the optimal number of topics, these distributions are comparable. Accordingly, the divergence between these distributions will be the lowest in the case of the “right” number of topics (in our case using 20 or 25 topics). The measure by Deveaud et al. (2014) uses “concepts” in order to recreate the conceptual view of the original stream of information. The underlying assumption of the algorithm is that all the documents are essentially dealing with the same topics (no matter what the T is); therefore, concepts that are more likely to appear improve the probability to find the “right” number of topics, while noisy concepts are not. Finally, the measure estimates the similarity between every pair of concept models, and the maximum redundancy between two sets of concepts gives the optimum number of topics to use. Again, the results suggest to use either 20 or 25 topics as the perfect fit for the data and, after manual inspection of the results, we confirmed our decision to use 20 topics considering the difference between the two choices not significant enough.

Figure 1. Optimal number of topics.



Following Giorgi and Weber (2015), we decided to label our 20 topics with unique titles to better contextualize each topic. We decided to discard 5 topics as they pertained to the release of financial information in the annual reports, leaving us with a set of 15 topics reported in Table 3 in the main text. Finally, each document in our corpus was then assigned a score for each topic (between 0 and 1), resulting in a 15-dimensional vector. This step allowed us to stochastically estimate the likelihood of each topic appearing in each document, thus permitting an analysis of the topics’ emergence and diffusion over time and across stakeholder groups.

Topic coding. As our qualitative analysis revealed two major rivalling conceptualizations of auto safety across our data period, we decided to classify our 15 topics as pertaining to either the “safety as design” or “safety as cost-benefit” conceptualization (Marshall 2013). Two coders classified all the topics independently, reaching an 87% agreement. The remaining topics were classified after a joint resolution. The final results of the topic modeling analysis are reported in Figures 3a–3c in the paper.

Network-Text Analysis

We applied network text analysis on the automakers’ annual reports to capture changes in their symbolic framing. To do so, we first selected all the paragraphs including the word “safety” in their annual reports. We then cleaned our textual data by removing stop words (Luhn 1959) and using the

Porter stemming procedure (Porter 1980) – two widely employed methods for standardizing and filtering texts. Stop words are the most common words that are used to connect concepts in a language, such as conjunctions and adverbs. Stemming is a reduction process of a word’s inflected form to its root form, which removes all the prefixes and suffixes that express tense, case, voice, aspect, person, number, gender and mood. Finally, we created a thesaurus to ensure that synonyms were considered jointly during the analysis (Carley et al. 2013).

The network text analysis was performed using the AutoMap software package (Carley et al. 2013), which generates semantic networks: nodes are concepts and ties represent how frequently two linked concepts co-occur within a specific text window. We set this window to a distance of plus or minus three words within a sentence. For instance, the concepts “safety” and “cost” would have a link value of 5 if they co-occurred 5 times within said set window in a specific corpus of text. The value of a tie thus represents the strength of association between two concepts. Network text analysis thus provides insights into how concepts are used in relation to one another. We used this technique to reveal how automakers (a) employed different safety-related concepts and (b) changed these semantic associations over time. Given our focus, we displayed the ego-networks of “safety” (i.e., the associations of “safety” with other concepts) and displayed only the strongest (most frequent) associations among concepts. We chose a visualization threshold based on relative frequency (Carley et al. 2013), thus only showing the co-occurrences that appeared in the text a number of times over 20% of the highest value of any frequency. For instance, in Figure 2c, given a highest value of 60, we displayed links among concepts that appeared at least 12 times for the given period. As such, the displayed associations featured in Figures 2a–2c are only highly frequent co-occurrences. To further simplify the interpretation of the maps, we circled cluster of words related to theoretical concepts. We have done so by mixing a qualitative reading with a clustering analysis performed using UCINET (Borgatti et al. 2002).

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Table 1. Summary of data sources.

Source	Database	Time period
(1) Congressional Hearings	LexisNexis Congressional	1965–1980
(2) Annual reports (General Motors, Ford, Chrysler, and American Motors)	ProQuest Historical Annual Reports	1965–1980
(3) Advertising (General Motors, Ford, Chrysler, American Motors, BMW, Mercedes, Volvo, Saab, Honda and Toyota)	Car magazines such as <i>Road and Track</i> , <i>Car and Driver</i> , and <i>Motor Trend</i> (in print)	1965–1980
(4) Audio recordings of Nixon Oval Office meetings with automobile executives	Nixon Presidential Library and Museum	1971
(5) NHTSA’s regulatory analyses and interpretation letters	NHTSA’s online archive	1965–1980
(6) Congressional reports	LexisNexis Congressional Database, library	1965–1980
(7) Newspaper articles (<i>The New York Times</i> , <i>The Wall Street Journal</i> , <i>The Washington Post</i> , <i>Chicago Tribune</i> , <i>Boston Globe</i> , <i>Los Angeles Times</i>)	ProQuest Historical Newspapers, library indices of <i>The New York Times</i> and <i>The Wall Street Journal</i>	1965–1980

Table 2. Main chronology, 1965-1980.

Year	Event
1965	Ralph Nader publishes his book <i>Unsafe at Any Speed</i> , in which he criticizes the Chevrolet Corvair's inherent design defects and blames the auto industry for millions of deaths.
1966	The National Academy of Sciences publishes a report entitled "Accidental Death and Disability: The Neglected Disease of Modern Society." <i>The New Republic</i> publishes the story about GM's private investigations and harassment of Ralph Nader; <i>Unsafe at Any Speed</i> becomes an overnight bestseller. James Roche, president of GM, publicly apologizes to Congress. President Johnson signs the National Traffic and Motor Vehicle Safety Act of 1966; a new administrative agency—the National Highway Traffic Safety Bureau (NHTSB)—is established under the U.S. Department of Transportation to carry out safety programs under the National Traffic and Motor Vehicle Safety Act of 1966 and the Highway Safety Act of 1966. Dr. William Haddon, an epidemiologist by training, becomes NHTSB's first administrator.
1967	NHTSB issues the first 30 Federal Motor Vehicle Safety Standards (FMVSS), including a mandate governing door latch strength and mandatory fitting of front seatbelts.
1968	NHTSB makes seat belts a required feature in all new U.S. vehicles starting in the 1968 model year.
1969	President Nixon takes office. GM stops manufacturing the Chevrolet Corvair.
1970	NHTSA is officially established to replace the National Highway Safety Bureau. NHTSA amends Standard 208 on "Occupant Crash Protection," one of the original FMVSS to "upgrade the requirements of 1974 and 1975 models." The requirements for this amendment are "significantly" changed before taking effect. Ford introduces its first Pinto model. Congress passes the Occupational Health and Safety Act and Clean Air Act Amendments. Volvo runs "It shouldn't take an act of Congress to make cars safe" advertising campaign.
1971	Ford builds an experimental airbag fleet.
1972	President Nixon signs the Motor Vehicle Information and Cost Savings Act with strong bumper requirements. NHTSA introduces changes to Standard 208: the manufacturers are given three options for compliance under the standard: (a) a totally passive system, (b) the existing lap/shoulder system with a warning device, and (c) an intermediate system. Standard 208 is modified further to require ignition interlocks for the lap/shoulder belt system on 1973 and subsequent models.
1973	NHTSA mandates fitting of seatbelts with ignition interlocks. The Federal Aid Highway Act passes. This year marks the height of oil crisis (Emergency Petroleum Allocation Act). GM builds experimental airbag fleet on Chevrolet vehicles.
1974	President Ford takes office. A countrywide 55 MPH fuel-saving speed limit is imposed. The law requiring seatbelt-ignition interlocks is revoked. GM first offers an airbag option. The oil embargo is lifted. Standard 208 is altered; the requirement for ignition interlocks for the lap/shoulder belt is rescinded ("Because of public reaction").
1975	The Vietnam War ends. The 55 MPH fuel-saving speed limit is made permanent.
1976	President Ford signs the Federal-Aid Highway Amendments. New NHTSA administrator Joan Claybrook issues new standards to improve frontal crash protection, such as the installation of air bags and automatic belts, to prevent tampering with odometers and to extend steering column protections to vans and light trucks. NHTSA's Associate Administrator Robert Carter reports that he has ordered the abandonment of a 1971 proposal to require the installation of rear under-ride guards on trucks after a cost-benefit analysis predicts that the costs will exceed the benefits.
1977	President Carter takes office. Mandatory airbag or automatic seatbelt regulations are reinstated, starting in the 1984 model year. <i>Mother Jones Magazine</i> publishes "Pinto Madness: For seven years the Ford Motor Company sold cars in which it knew hundreds of people would needlessly burn to death."
1978	Ford recalls 1.5 million Ford Pintos.
1979	Second oil crisis (in the wake of the Iranian Revolution) begins.
1980	NHTSA adopts cost-benefit ratio requirements for each new safety standard (the device, system, or design feature may not be made mandatory unless it will save more money, e.g., in property damage or health care, than it costs, or must not

cost more than a specified amount of money per life saved).

Ford goes through criminal trial and is charged with reckless homicide in the deaths of three Indiana teenagers who were killed when their Ford Pinto was hit from behind.

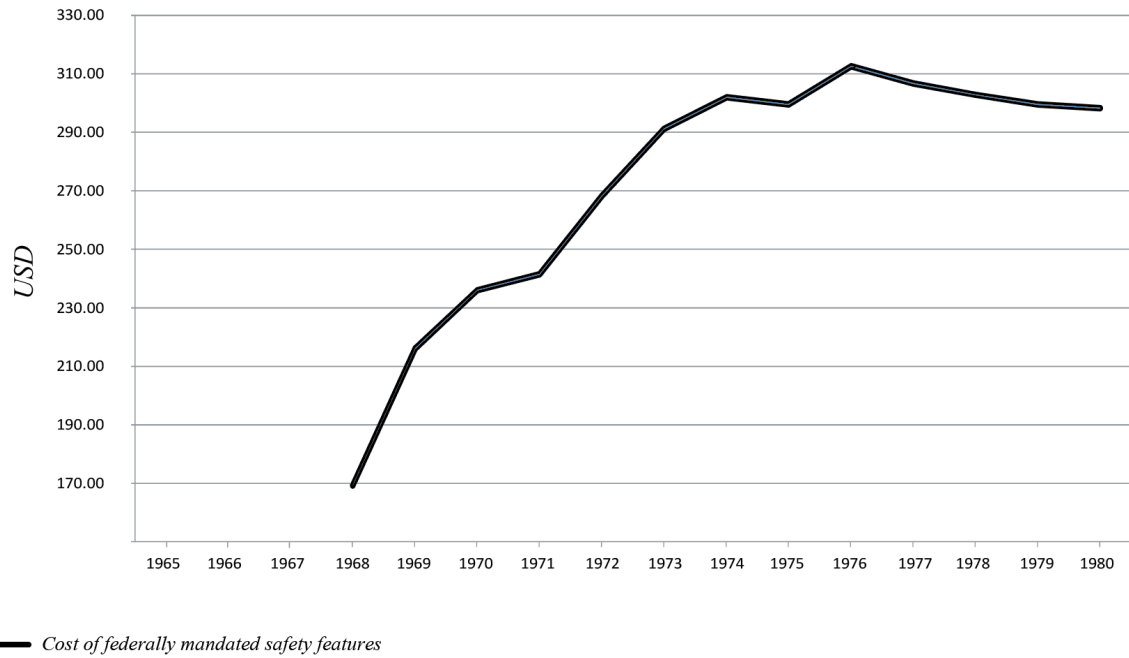
Ford stops manufacturing the Pinto.

Table 3. Topics extracted by topic modeling analysis (1965-1980).

Topic	Weight	Topic label	Top topic words
TOPICS RELATED TO "SAFETY AS DESIGN"			
1	0.30	New regulations for safety, health and environment	chairman standards statement public congress federal safety questions
2	0.19	Increased role of federal government in safety regulation	public federal states national programs highway law action study committee authority
3	0.46	Role of engineering and testing in increasing safety	research motors safety engineering improved development systems progress control design
4	0.03	Importance of design to increase safety	safety vehicle seat cars research motor standards driver design accidents steering
5	0.26	Consumers' push for safer products	safety consumer product federal commission Nader standards industry congress
6	0.03	Monitoring of car defects	safety tire motor information defects car inspection
7	0.53	Public/private relations and balance of power	industry government work committee report problem action result
TOPICS RELATED TO "COST-BENEFIT"			
8	0.05	Cost/benefit of government and federal regulations	regulations NHTSA costs benefits agencies government EPA control price coal health fuel capital model analysis
9	0.04	Reform of the regulatory process to increase efficiency	administrative agencies law congress regulations process review rulemaking judges committee veto rules
10	0.02	Criticism of NHTSA standards	standard vehicle safety NHTSA system equipment manufacturers requirements highway stopping systems
11	0.04	Introduction of the Highway Safety Act	safety traffic standards vehicle highway accidents driver research federal government
12	0.11	Data requirements for implementing cost-effective regulations	standard bumper speed safety cost data crash damage systems test study analysis impact
13	0.24	Increase in costs and gasoline prices	industry economy fuel car sales automobile energy market price percent increase gasoline general cost
14	0.03	Cost of car repairs	repair consumer vehicle service inspection warranty diagnostic cost mechanics industry
15	0.06	Passive restraints in automobiles/airbag standards	airbag passive restraint belt safety seat system insurance injury protection

Note: Topics were extracted on the complete text corpus comprised of Congressional Hearings, Annual Reports and Newspapers articles, 1965-1980.

Figure 1. Costs of NHTSA-mandated safety features per passenger car, 1965–1980



Source: National Highway Traffic Safety Administration (NHTSA) Technical Report DOT HS 809 834 (December 2004).

Figure 2a. Automakers' symbolic associations with "safety", first phase (1965-1966)

Note: Nodes are placed to facilitate visualization.

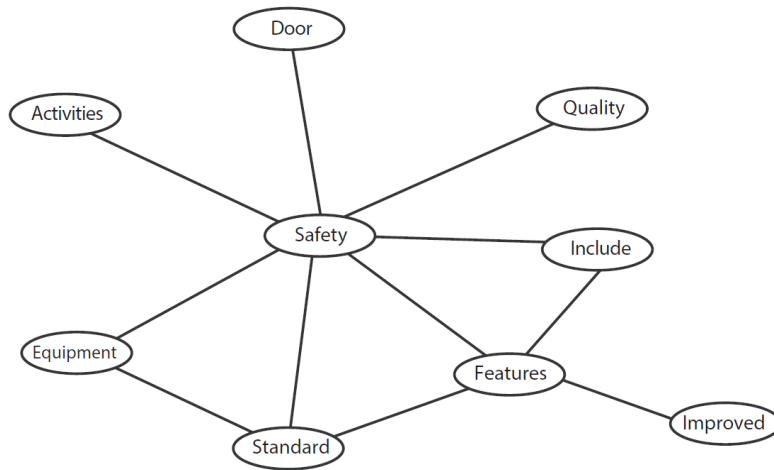


Figure 2b. Automakers' symbolic associations with "safety", second phase (1967-1972)

Note: Nodes are placed to facilitate visualization.

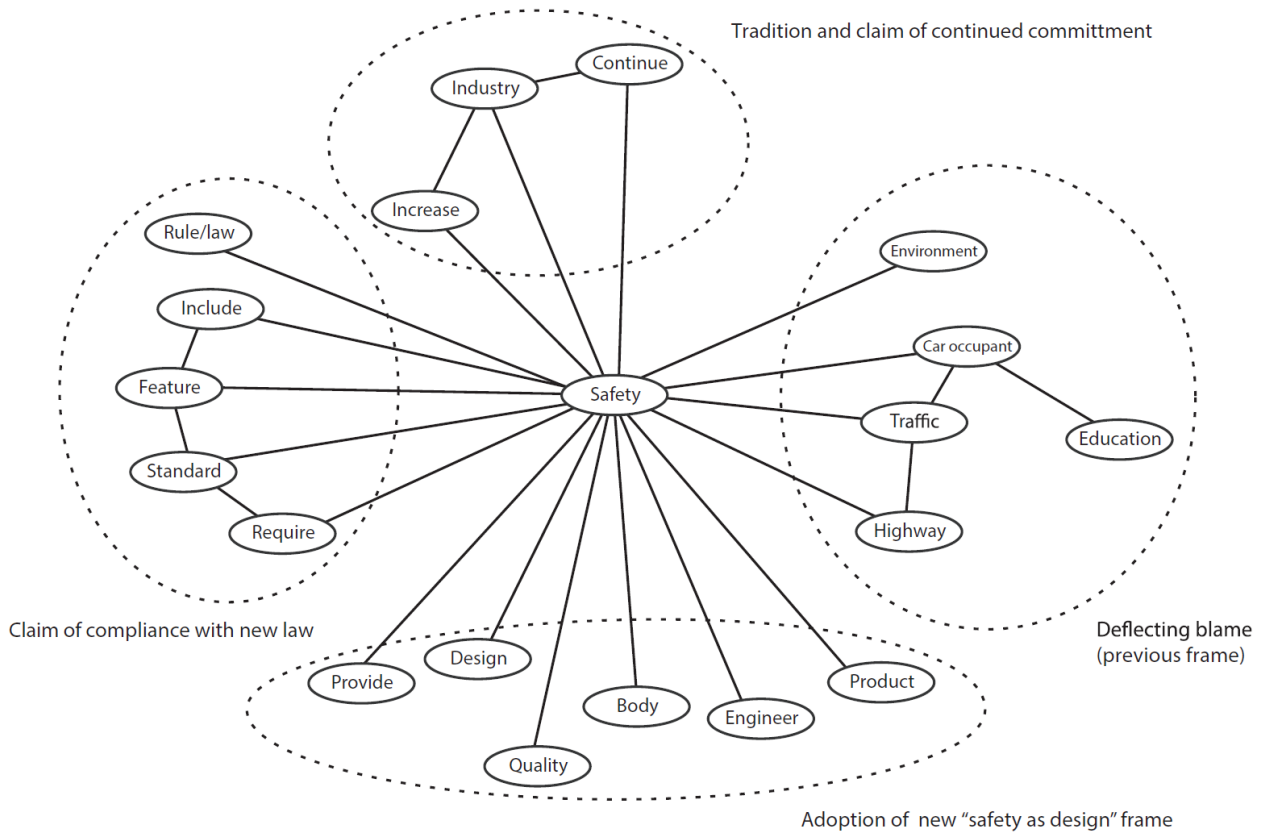


Figure 2c. Automakers' symbolic associations with "safety", third phase (1973-1980)

Note: nodes are placed to facilitate visualization.

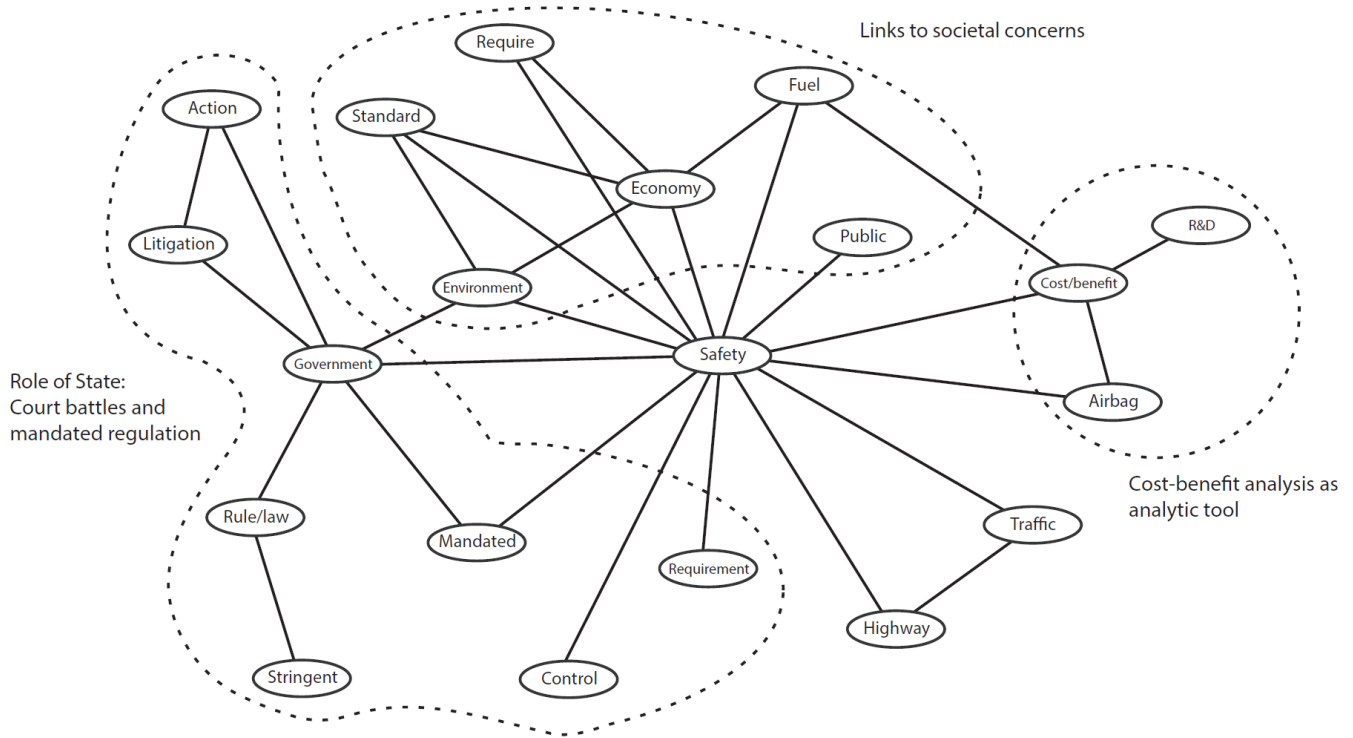


Figure 3a. Likelihood of the appearance of “safety-as-design” topics by phase across key actors, 1967–1972 vs. 1973–1980

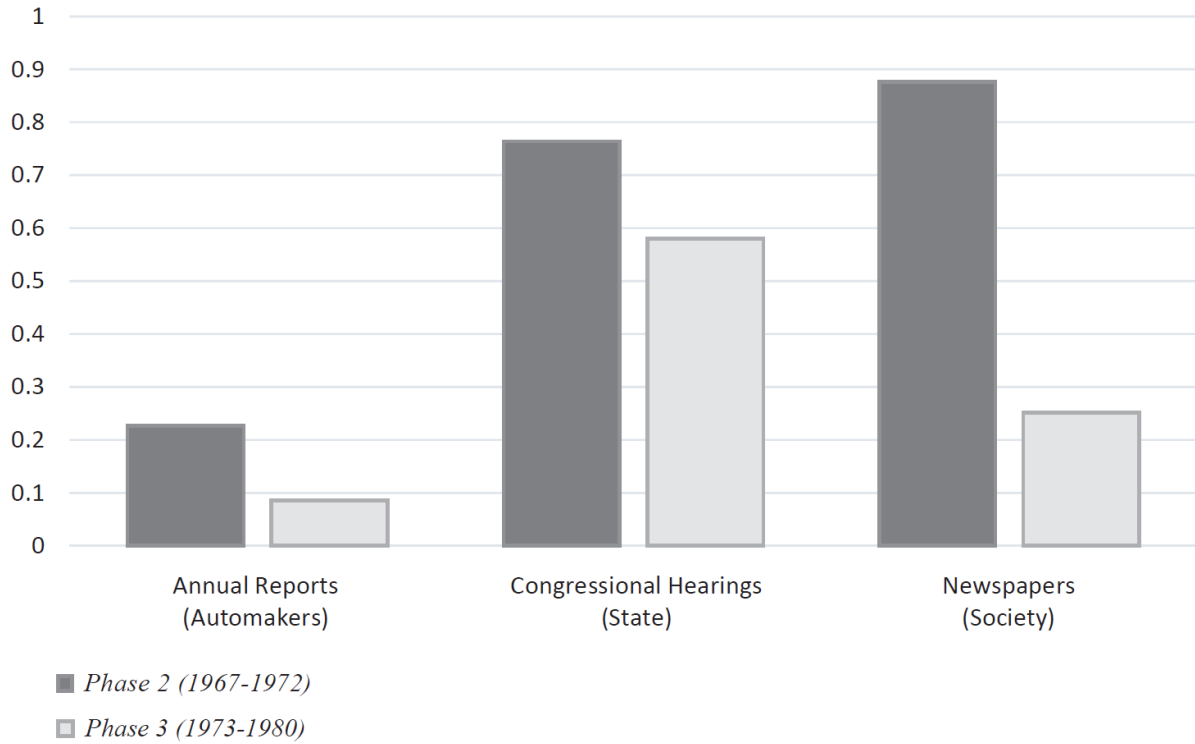


Figure 3b. Likelihood of the appearance of “safety as cost benefit” topics by phase across key actors, 1967–1972 vs. 1973–1980

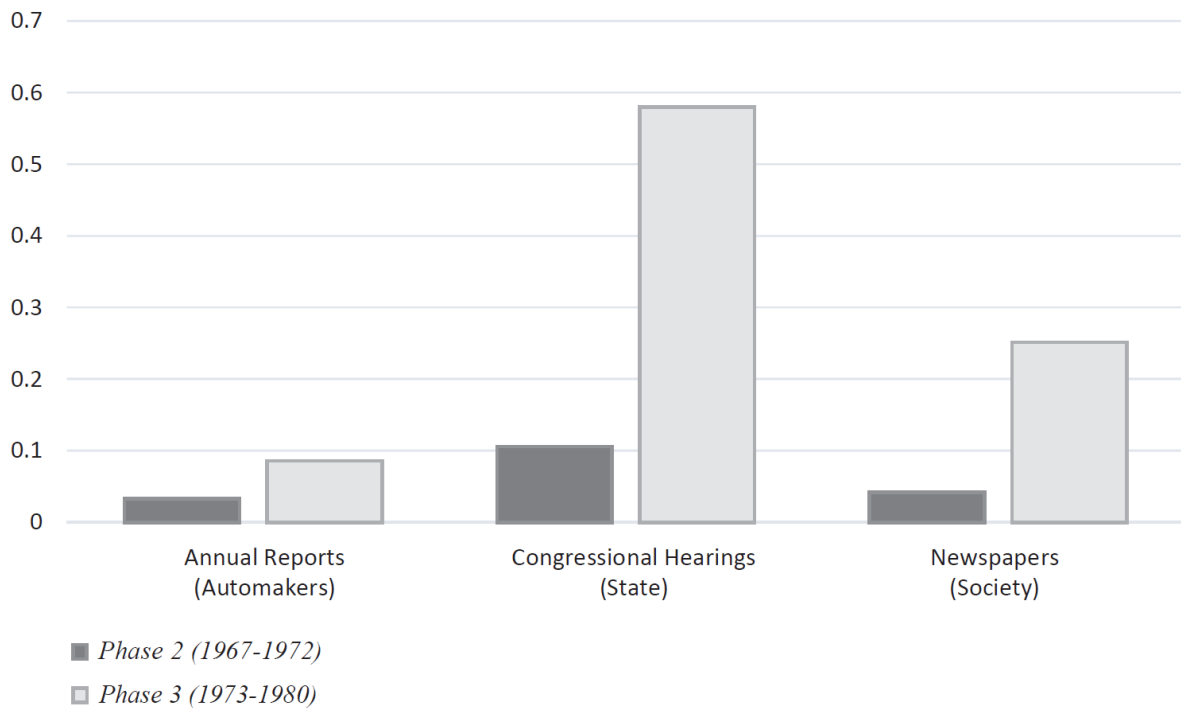


Figure 3c. Comparison of topic prevalence in Congressional Hearings, 1965–1980

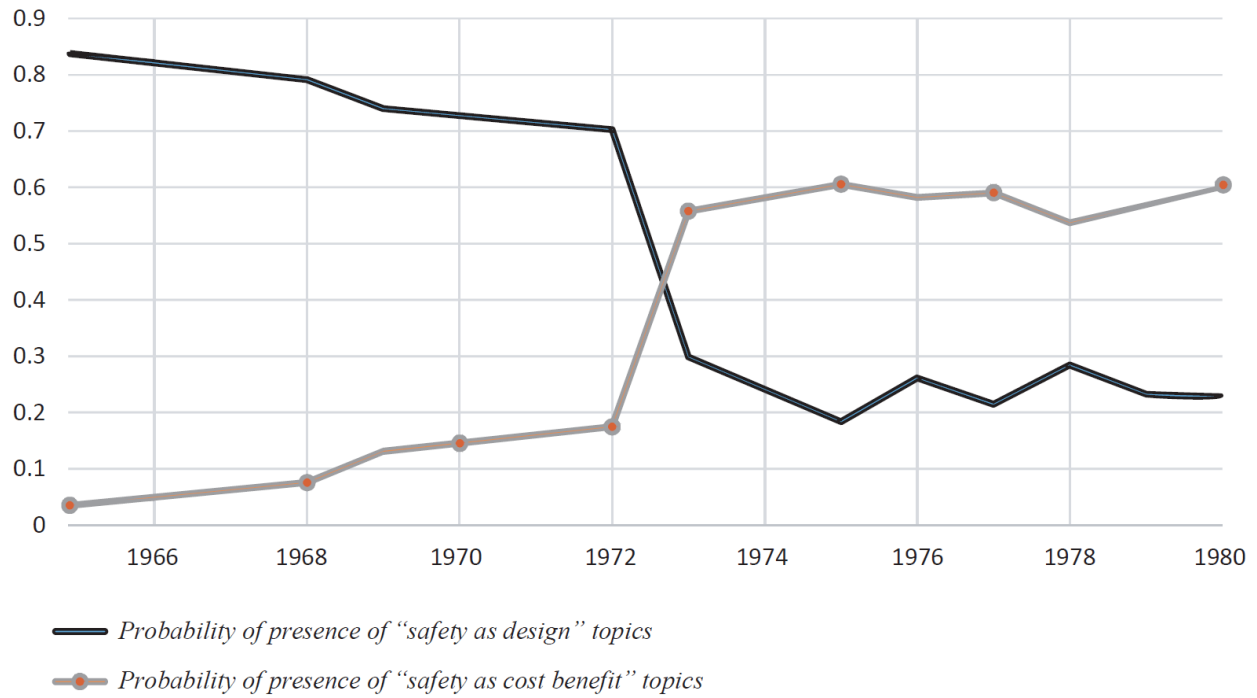
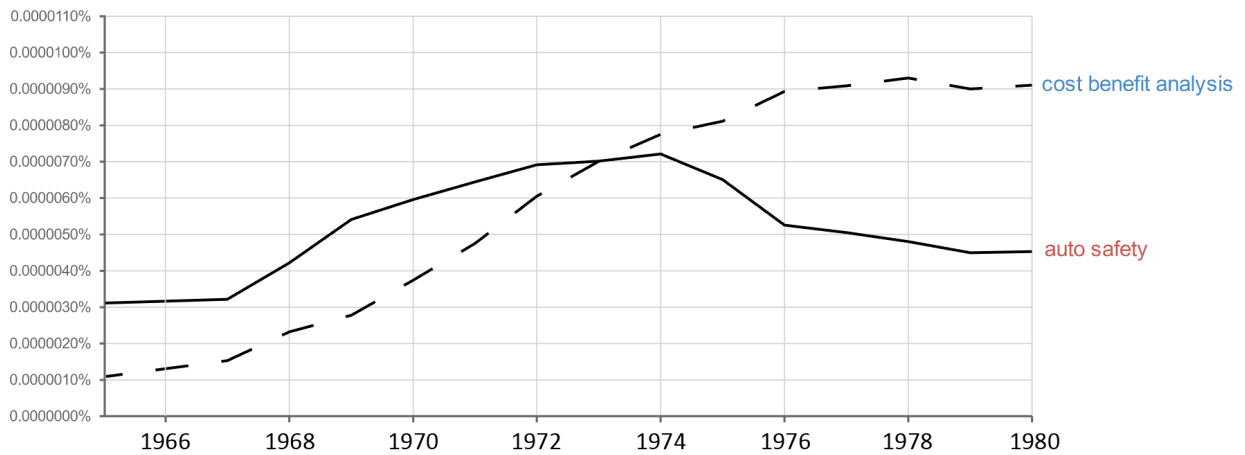


Figure 4. Frequencies of "auto safety" and "cost benefit analysis" n-grams in published sources, 1965–1980



Source: <https://books.google.com/ngrams>

Figure 5. A model of the balance of power between firms and the legal environment as contingent on cultural context

