

THE INFRASTRUCTURE RATCHET EFFECT

SHLOMIT AZGAD-TROMER*

This article identifies a profound and previously overlooked incentive for excessive risk-taking by infrastructure providers. The magnitude and critical nature of infrastructure implies that negative externalities potentially far exceed the net assets of the infrastructure provider. The nonconsensual relationship of infrastructure providers with their stakeholders implies that excessive risks cannot be contracted for and incorporated into price. Shareholders of infrastructure providers thus develop asymmetric preferences towards excessive risk-taking: They could gain from risks if things go well but are shielded by limited liability rules if things do not. The article identifies this moral hazard and terms it “The Infrastructure Ratchet Effect.”

This Article shows that normal market forces and legal mechanisms fail to counter these distorted incentives in infrastructure providers: Regulation, reputation, litigation, and debt pricing all fail to deter excessive risk-taking in infrastructure. Project finance, leverage, executive compensation, and behavioral tendencies exacerbate the problem.

To illustrate the infrastructure ratchet effect, this Article presents the 2017 data breach at Equifax as a case study, arguing that Equifax is a data public utility and should be considered an infrastructure provider. It surveys the events leading to the massive Equifax data breach and shows that despite cataclysmic implications, Equifax eschewed adequate controls to ensure the security of its data. This Article proposes the infrastructure ratchet effect as a possible explanation for this series of events.

In addition to shedding new light on the infrastructure ratchet effect as a potential source of cataclysmic risks caused by infrastructure providers, this Article considers possible tools to tackle these distorted incentives. Insight is drawn from literature surrounding banking-risk regulation, where a similar moral hazard is well understood.

INTRODUCTION	114
I. MORAL HAZARD IN INFRASTRUCTURE PROVIDERS	117
A. <i>Magnitude of Expected Damages</i>	119
B. <i>Situational Monopolies</i>	119
C. <i>Distorted Incentives in Infrastructure</i>	120
II. MORAL HAZARD IN DATA INFRASTRUCTURE	122
A. <i>The Credit Reporting Bureau as an Infrastructure Provider</i> 122	
B. <i>Equifax as an Infrastructure Provider</i>	123
C. <i>The 2017 Equifax Data Breach</i>	125
III. WHY EXISTING MECHANISMS FAIL TO ELIMINATE THE PROBLEM	127

* Copyright © 2018 by Shlomit Azgad-Tromer, 2018 Associate Research Scholar, Columbia Law School.

A. <i>Regulation</i>	127
B. <i>Reputation</i>	129
C. <i>Litigation</i>	130
D. <i>Debt Pricing</i>	131
IV. POLICY IMPLICATIONS	131
A. <i>The Banking Analogy</i>	132
B. <i>The Regulation Versus Governance Debate</i>	135
CONCLUSION	136

INTRODUCTION

Defining infrastructure involves a separation of economic activity into two categories: the supportive and the supported.¹ Infrastructure, a foundational element required for economic activity, belongs in the former category. Infrastructure is as necessary to economic activity as a solid foundation is for the construction of a building.² Early understandings of infrastructure focused on sets of material objects such as bridges, roads, water, electricity, and gas.³ In later discussions, infrastructure evolved conceptually to describe a category of general prerequisites required for various kinds of human activity.⁴ Scholars recognized different kinds of infrastructure such as economic, social, institutional, organizational, sociological, technological, and data infrastructure.⁵ This Article proposes that credit reporting bureaus should be considered data infrastructure providers. This Article illustrates this proposition by surveying the events leading to the 2017 Equifax data breach and the severe social implications that resulted. The infrastructure ratchet effect explains the 2017 Equifax data breach, among other egregious examples of corporate malfeasance by

¹ See William J. Rankin, *Infrastructure and the International Governance of Economic Development, 1950-1965*, in INTERNATIONALIZATION OF INFRASTRUCTURES: PROCEEDINGS OF THE 12TH ANNUAL INTERNATIONAL CONFERENCE ON THE ECONOMICS OF INFRASTRUCTURES 61, 62 (Jean-François Auger et al. eds., 2009). The word *infrastructure* originated from French railroad engineering in the nineteenth century. Ashley Carse, *Keyword: Infrastructure: How a Humble French Engineering Term Shaped the Modern World*, in INFRASTRUCTURES AND SOCIAL COMPLEXITY: A COMPANION 27, 30 (Penelope Harvey et al. eds., 2016) (studying the rise of infrastructure as a nascent concept in times of social, economic, and technological change). Yet it was only adapted to include large-scale engineering systems in the 1950s, in the context of economic development discourse. *Id.*

² See Rankin, *supra* note 1, at 62.

³ See *Infrastructure*, WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY OF THE ENGLISH LANGUAGE (3d ed. 1993).

⁴ See, e.g., Rankin, *supra* note 1, at 70–71 (discussing organizational, institutional and sociological infrastructure, as well as tangible and intangible infrastructure (such as education) and concluding that “[i]nfrastructure became a way of talking about the necessities of modernity”); Alan Z. Rozenstein, *Surveillance Intermediaries*, 70 STAN. L. REV. 99, 188 (2018) (recognizing that “technology giants are the railroad companies of the twenty-first century”).

⁵ See Rankin, *supra* note 1, at 70.

infrastructure providers, as a consequence of a moral hazard problem.⁶

Infrastructure providers have a profound and previously overlooked incentive to engage in excessive risk-taking due to two properties: the magnitude of the harms they inflict upon the public and their position as situational monopolies.⁷ The scope and critical nature of infrastructure implies that negative externalities will typically far exceed the net assets of the infrastructure provider. Shareholders of infrastructure providers could gain from risks if things go well but are shielded from liability—by virtue of limited liability rules⁸—if they do not. As situational monopolies, the nonconsensual relationship of infrastructure providers with their stakeholders implies that excessive risks cannot be contracted for and incorporated into price.⁹ Together, management of mega¹⁰ social resources, limited liability, and their situational monopolistic positions distort the incentives of shareholders of infrastructure providers such that they have asymmetric preferences towards continuous excessive risk-taking with potential cataclysmic social implications, in a process which this Article terms “the infrastructure ratchet effect.” This Article shows why this moral hazard is unique to the shareholders of infrastructure providers and explains why existing legal mechanisms and market forces aimed to correct distorted incentives are ineffective.

This Article shows that infrastructure providers are particularly vulnerable to failure of existing mechanisms for risk management, including regulation, reputation, litigation, and debt pricing.¹¹ Regulation of

⁶ See *infra* Section II.C.

⁷ Situational monopolies are defined by the circumstances of their stakeholders. The stakeholders of a situational monopoly must transact with it because not doing so would either be technically implausible or would have strong negative implications. See Shlomit Azgad-Tromer, *Too Important to Fail: Bankruptcy Versus Bailout of Socially Important Non-Financial Institutions*, 7 HARV. BUS. L. REV. 159, 171–72 (2017).

⁸ For an argument suggesting limited liability as a key pillar of corporate form, see Phillip I. Blumberg, *Limited Liability and Corporate Groups*, 11 J. CORP. L. 573, 574 (1986) (positing that “[t]he limited liability of the corporate shareholder is a traditional cornerstone both in Anglo-American corporation law and in the corporation law of the civil system”); Paul Halpern et al., *An Economic Analysis of Limited Liability in Corporation Law*, 30 U. TORONTO L.J. 117, 143–45 (1980) (showing that as a consequence of limited liability, managers may select overly-risky projects); John Armour et al., *The Essential Elements of Corporate Law* 10 (Oxford Legal Studies Research Paper No. 20, 2009), <https://ssrn.com/abstract=1436551> (describing limited liability as “a nearly universal feature of corporate form”).

⁹ Ronald Coase has famously suggested that a firm can internalize externalities by contract, where parties adjust the pricing of their contract according to the expected risk. See generally R.H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1 (1960). For the seminal case of the farmer and the cattle raiser, see *id.* at 2–8.

¹⁰ See Bent Flyvbjerg, *What You Should Know About Megaprojects and Why: An Overview*, 45 PROJECT MGMT. J. 6, 7 (2014) (noting that the word “mega” is now used to describe projects costing well into the billions and whose failure causes “entire companies and national economies to suffer”).

¹¹ This Article builds upon and extends the work done by Professors Roy Shapira and Luigi

infrastructure providers, and data infrastructure in particular, requires significant technological proficiency in order to set adequate controls in an environment of constantly changing risks¹² and is susceptible to political capture.¹³ Reputation is likewise inefficient for infrastructure providers. Given that stakeholders must transact with these companies, insufficient exhibitions of corporate goodness typically would not affect their business.¹⁴ Litigation is an inefficient deterrent as the financial stakes of damages may be so high that rational equity holders will discount the threat of liability when damages exceed the corporation's net assets due to limited liability.¹⁵

Debt pricing is also unlikely to provide sufficient deterrence. First, the time span of the outstanding loan is likely to be shorter than the term of the social exposure to the risks infrastructure providers impose.¹⁶ Second, when this debt is secured with higher priority rights, secured creditors are unlikely to have incentives to hedge against risks beyond their collateral.¹⁷

This Article contributes to several strands of literature. First, it identifies a fundamental moral hazard in infrastructure providers. By identifying these distorted incentives across a category of infrastructure

Zingales in identifying deterrence mechanisms that fail to moderate the corporate behavior of the agricultural conglomerate DuPont. *See generally* Roy Shapira & Luigi Zingales, *Is Pollution Value-Maximizing? The DuPont Case* (Nat'l Bureau of Econ. Research, Working Paper No. 23866, 2017), <http://www.nber.org/papers/w23866>.

¹² Information security standards are constantly changing. *See CVSS Severity Distribution over Time*, NAT'L INST. OF STANDARDS AND TECH., U.S. DEP'T OF COM., <https://nvd.nist.gov/vuln-metrics/visualizations/cvss-severity-distribution-over-time> (last visited July 20, 2018) (illustrating increasing cyber vulnerabilities every year).

¹³ Much of the literature on regulatory capture stems from the realm of utilities regulation. *See, e.g.*, TOBIN PROJECT, PREVENTING REGULATORY CAPTURE: SPECIAL INTEREST INFLUENCE AND HOW TO LIMIT IT 5–11 (Daniel Carpenter & David A. Moss eds., 2014) (surveying the history of the academic research of capture); Ernesto Dal Bó, *Regulatory Capture: A Review*, 22 OXFORD REV. ECON. POL'Y 203, 203 (2006) (stating that most of the literature on capture has been developed in the context of utility regulation); Marc T. Law & Cheryl X. Long, *Revolving Door Laws and State Public Utility Commissioners*, 5 REG. & GOVERNANCE 405, 405–24 (2011) (discussing capture in public utilities); George J. Stigler, *The Theory of Economic Regulation*, 2 BELL J. ECON. & MGMT. SCI. 3, 13–17 (1971) (using empirical evidence from occupational licensing); *see also* John C. Coates, IV, *Corporate Politics, Governance, and Value Before and After Citizens United*, 9 J. EMPIRICAL LEGAL STUD. 657, 658 (2012) (examining corporate political activity in regulated industries in light of *Citizens United*).

¹⁴ Shlomit Azgad-Tromer, *The Virtuous Corporation: On Corporate Social Motivation and Law*, 19 U. PA. J. BUS. L. 341, 351–59 (2017) (showing that corporate goodness serves to cater to stakeholder demand).

¹⁵ *See* S. Shavell, *The Judgment Proof Problem*, 6 INT'L REV. L. & ECON. 45, 45 (1986) (“An injurer will treat liability that exceeds his assets as imposing an effective financial penalty only equal to his assets.”).

¹⁶ There is often a long lull between the project's construction and positive cash flows, with “tenors exceeding 10 years.” *See* Torsten Ehlers, *Understanding the Challenges for Infrastructure Finance* 13 (Bank for Int'l Settlements, Working Paper No. 454, 2014), <https://www.bis.org/publ/work454.pdf>.

¹⁷ In a bankruptcy proceeding, unsecured claims are supposed to receive nothing if the secured creditors cannot be paid in full. *See, e.g., In re Kmart Corp.*, 359 F.3d 866, 871 (7th Cir. 2004).

providers, this Article expands the literature pointing to failures of governance in specific firms.¹⁸ The focus on infrastructure providers allows for specific scrutiny of decision-making processes and distortions of corporate governance. Second, the infrastructure ratchet effect sheds light on a fundamental debate in corporate law: whether corporate governance or regulation is the appropriate method for protection of stakeholder interests.¹⁹

The rest of this Article is structured as follows. Part I identifies the moral hazard in infrastructure providers based on the magnitude of the potential negative externalities compared with the corporation's net assets, and given the infrastructure provider's position as a situational monopoly. Part II argues that credit reporting bureaus are providing data infrastructure for the economy and presents the Equifax case study. This Article suggests the infrastructure ratchet effect as a possible explanation for Equifax's failure to adopt adequate security controls and considers other examples of the infrastructure ratchet effect. Part III discusses the failure of reputation, regulation, litigation, and debt pricing to mitigate the infrastructure ratchet effect. Part IV considers policy solutions, drawing from an analogy to banking law and shedding light on the fundamental debate between thick and thin corporate governance regimes.²⁰ This Article then concludes by considering the types of policies that are likely to be effective in reducing the sources of excessive risk in infrastructure providers.

I

MORAL HAZARD IN INFRASTRUCTURE PROVIDERS

The literature on infrastructure providers has documented various characteristics that make infrastructure special. Observers have noted that properties of infrastructure include large-scale operations characterized as public goods with material external effects, among other properties.²¹ This Part draws attention to two particular attributes of infrastructure providers:

¹⁸ See, e.g., J. Mark Ramseyer, *Why Power Companies Build Nuclear Reactors on Fault Lines: The Case of Japan*, 12 THEORETICAL INQUIRIES L. 457, 457 (2012) (analyzing a moral hazard in infrastructure provider Tokyo Electric using the 2011 tsunami as a case study).

¹⁹ See *infra* Section IV.B.

²⁰ See *infra* Section IV.A.

²¹ See RUBEN LEE, RUNNING THE WORLD'S MARKETS—THE GOVERNANCE OF FINANCIAL INFRASTRUCTURE 10 (2011) (identifying nonexclusive factors and attributes that contribute to the identification of a firm as infrastructure provider such as providing basic services that support activity critically important to economic activity, requiring long-term investments, operating a natural monopoly, providing beneficial public goods or services, and requiring "some form of government or public sector involvement"); Walter E. Diewert, *The Measurement of the Economic Benefits of Infrastructure Services*, in LECTURE NOTES IN ECONOMICS AND MATHEMATICAL SYSTEMS 1, 4–5 (1986) (describing infrastructure investment projects as public goods); Walter Buhr, *What Is Infrastructure?* 9–12 (Univ. of Siegen Discussion Paper No. 107–03, 2003), <http://www.wiwi.uni-siegen.de/vwl/repec/sie/papers/107-03.pdf> (noting the attributes assigned to the capital goods of material infrastructure).

(1) the magnitude of potential negative externalities of infrastructure providers compared with the amount of the provider's own net assets as recorded on its balance sheet, and (2) the position of infrastructure providers as situational monopolies. When these two features combine in a particular corporation, a moral hazard occurs, distorting the incentives of shareholders, increasing their appetite for risky behavior and reducing their incentives to adopt policies that mitigate risk. This moral hazard is termed here: "the infrastructure ratchet effect."

To illustrate the infrastructure ratchet effect, it is useful to compare the incentives to endanger stakeholders by eschewing safety measures in infrastructure providers with similar incentives in other industries. Consider the toy industry. If a toy is found to be hazardous, market forces are sure to penalize the toy company.²² The sales of the toy provider will be affected dramatically.²³ Reputational damage in the toy industry may translate to large losses, as injured parties are likely to be the firm's potential future clients. The potential scope of damages is also more closely aligned with the sums we may expect the toy provider to have in its asset portfolio, or for which it has voluntarily insured.

In infrastructure, however, the value of damages resulting from a hazardous event will likely exceed the value of the infrastructure provider's net assets or its (voluntary) insurance policies.²⁴ Further, limited liability rules shield entities and partition assets immunizing other projects by these shareholders from liability.²⁵ The unique nature of infrastructure projects and their technical complexity add an additional hurdle to identifying the connection between one defective project and other potentially reckless investments owned by the same parties. Notably, the potential harm will be

²² For example, in 2007, Mattel recalled 967,000 toys because the products were covered in lead paint. Louise Story, *Lead Paint Prompts Mattel to Recall 967,000 Toys*, N.Y. TIMES (Aug. 2, 2007), <https://www.nytimes.com/2007/08/02/business/02toy.html>. This immediately triggered a plunge in its sales and profit. Justin Grant, *Mattel Posts Lower Profit on Impact of Recalls*, REUTERS (Oct. 15, 2007), <https://www.reuters.com/article/us-mattel-results/mattel-posts-lower-profit-on-impact-of-recalls-idUSWNAS625820071015>.

²³ See Grant, *supra* note 22 (noting the fall in Mattel's profits as a result of the lead paint discovery).

²⁴ I note the voluntary nature of insurance here because if infrastructure providers voluntarily insure themselves, they will do so only up to their invested assets. Damages exceeding these assets are an externality for which the infrastructure providers have no incentive to insure and a third party must then pay. For a detailed exposition on liability insurance, see Shavell, *supra* note 15, at 45 (noting that opting out of insurance is unlikely "because . . . assets are less than the harm . . . cause[d], part of the premium injurers would pay for liability insurance would be to cover losses that they would not otherwise have to bear").

²⁵ See Bruno Biais et al., *Large Risks, Limited Liability, and Dynamic Moral Hazard*, 78 *ECONOMETRICA* 73, 74 (2010) (noting that making managers and firms bear the social costs they generate is often impossible in practice because "total damages . . . exceed the wealth of managers and even the net worth of firms, while the former are protected by limited liability and the latter by bankruptcy laws").

imposed upon consumers unable to voluntarily contract with the infrastructure provider. Unlike the toy company, the infrastructure provider is a situational monopoly. Stakeholders must keep their relationship with the infrastructure provider to sustain their expectation for a normal life, despite recklessness exercised by its controllers. In infrastructure, stakeholders cannot be enlisted as effective monitors, notwithstanding the extreme societal salience of potential risks.

A. *Magnitude of Expected Damages*

Infrastructure providers manage and construct critical social resources and natural assets of significant magnitude. Examples of these resources include the maintenance of water reservoirs, electricity transmission lines, nuclear plants, cellular networks, public transportation facilities, and mega-datasets.

Due to their unique social position, failed or faulty infrastructure projects often carry cataclysmic consequences.²⁶ Infamous examples include Tokyo Electric's Fukushima nuclear power complex and the nuclear disaster following the 2011 tsunami²⁷ and BP's Deepwater Horizon disaster in the Gulf of Mexico.²⁸

B. *Situational Monopolies*

Infrastructure providers are situational monopolies.²⁹ Stakeholders must transact with their infrastructure provider, for the costs of refusing to transact are simply too high.³⁰ Stakeholders often have no contractual privity with infrastructure providers. Even when they do have a contractual relationship with an infrastructure provider, it is effectively nonconsensual. Consider the cases of water and electricity providers. Stakeholders cannot decline the transaction with the provider of their drinking water or with their public utility as these services are essential to participation in a functioning social system.³¹ Declining a transaction with an infrastructure provider will imply

²⁶ See generally Flyvbjerg, *supra* note 10, at 7 (detailing the billion-dollar losses of megaprojects and noting their effect on local economies).

²⁷ See Ramseyer, *supra* note 18, at 457 (arguing that in nuclear power, "unpayable" potential liability has become routine and privately owned companies bear the costs of a potential accident only up to the fire-sale value of their net assets).

²⁸ See John Armour & Jeffrey N. Gordon, *Systemic Harms and Shareholder Value*, 6 J. LEGAL ANALYSIS 36, 57–58 (2014) (arguing that such a harm can be considered "systemic," triggering a "very large aggregate liability" undermining the effectiveness of the managerial norm attempting to maximize shareholder value).

²⁹ See *supra* note 7 and accompanying text.

³⁰ See *supra* note 7 and accompanying text.

³¹ Defining a corporation as an infrastructure provider thus requires a normative benchmark against which we assess the degree of freedom available to decline our relationship with it. This moral baseline is comprised of our expectations of a functioning social system. Infrastructure

disposition from civilized life. Despite the existence of a contract, the relationship between these utilities and their stakeholders is effectively nonconsensual.³²

C. *Distorted Incentives in Infrastructure*

Distorted incentives in corporate risk exposure are rooted in the nearly universal standard of limited liability of the infrastructure provider's corporate form.³³ An infrastructure provider's shareholders have an increased incentive to take risks because the costs they bear are no different if a decline in value equals their invested capital or if it is a portion of a far larger societal cost.³⁴ They will capture the full upside of greater risk-taking, while most of the downside will be borne by others. Where risk-taking results in high damages, the downside may simply fall beyond the scope of shareholders' limited liability. In infrastructure, due to the magnitude of these expected externalities and the scope of the projects and assets involved, the excessive risk-taking often results in cataclysmic harm far beyond the scope of the limited liability.³⁵ As situational monopolies, infrastructure providers impose the excessive risk on stakeholders who neither assumed the risk nor are capable of negotiating to monitor the degree of risk undertaken by the firm.

This moral hazard problem is particularly exacerbated by project finance platforms, leverage,³⁶ and behavioral tendencies.³⁷ Project finance isolates the financed project from other holdings and assets of the shareholders by use of a special purpose corporation,³⁸ further reducing

providers are corporations providing the goods and services we assume to be the social and economic benchmark of our society.

³² See, e.g., Jon Brodtkin, *50 Million US Homes Have Only One 25Mbps Internet Provider or None at All*, ARS TECHNICA (June 30, 2017), <https://arstechnica.com/information-technology/2017/06/50-million-us-homes-have-only-one-25mbps-internet-provider-or-none-at-all/> (noting that at average broadband speeds, most U.S. consumers have no choice of internet service providers); *State-by-State Information*, AM. COALITION COMPETITIVE ENERGY SUPPLIERS, <http://competitiveenergy.org/consumer-tools/state-by-state-links/> (last visited July 21, 2018) (providing a visual representation of U.S. states in which consumers have no choice of electric utility providers).

³³ As noted earlier, limited liability shields shareholders from realizing the full cost of risks: In the event of an adverse claim, a firm's creditors may only recover from assets the shareholder has invested into the firm. Other assets of shareholders are out of reach, protecting these assets from claims made against the corporation. See Biais et al., *supra* note 25, at 74.

³⁴ See Shavell, *supra* note 15, at 45 (noting that where damages may exceed liability, these companies "may engage in risky activities to a socially excessive extent").

³⁵ See *supra* Part I.A.

³⁶ See Azgad-Tromer, *supra* note 7, at 163 (describing how excessive leverage exacerbates the moral hazard problem for infrastructure providers).

³⁷ *Id.*

³⁸ *Project Finance—Key Concepts*, PUB.-PRIV.-PARTNERSHIP LEGAL RESOURCE CTR., <http://ppp.worldbank.org/public-private-partnership/financing/project-finance-concepts> (last

shareholders' risk exposure.³⁹ The use of project finance allows shareholders to further limit the extent of their financial exposure, increasing shareholders' appetite for excessive risk-taking. The segregated corporate structure of project finance allows shareholders to further limit the extent of their liability for losses and damages, without reducing their control and potential gains.⁴⁰

Leverage enhances the moral hazard, increasing shareholders' taste for risk.⁴¹ Most infrastructure providers are heavily leveraged, and leverage further reduces shareholders' risk exposure: in the event that the risky strategy would produce a loss, shareholders will not bear this loss fully.⁴² By contrast, in the event that the risky strategy is successful, the shareholders will have captured the full benefit of the increase in the corporate value. As a result, shareholders' incentives will be biased in favor of the risky strategy.

Behavioral tendencies further exacerbate the infrastructure ratchet effect. Literature notes a present bias among shareholders,⁴³ leading them to privilege short-term earnings over more durable long-term value.⁴⁴ The effects of short-termism have been well-documented in the literature.⁴⁵ In infrastructure, the implications of short-termism are particularly perverse: infrastructure is used for decades after its construction, and the construction itself takes years.⁴⁶ Executives of infrastructure providers may be particularly

visited Aug. 20, 2018) (identifying a “[s]pecial purpose vehicle (SPV) project company with no previous business or record” as a key element of the project finance structure).

³⁹ *Id.* (noting that the liability of the project company's shareholders is generally limited to the extent of their shareholdings).

⁴⁰ See *supra* note 33 and accompanying text (discussing limited liability).

⁴¹ Most infrastructure projects are highly leveraged, with a debt-to-total-capitalization ratio of seventy percent. Benjamin C. Esty, *The Economic Motivations for Using Project Finance* 7, 37 (Feb. 14, 2003) (unpublished manuscript) <http://www.people.hbs.edu/besty/bce%20pf%20motivations%202-14-03.pdf>. If the project goes well, shareholders gain the upside, but if it fails, creditors and the public foot the bill. For the governance implications of high leverage as a source of moral hazard, see Lucian A. Bebchuk & Holger Spamann, *Regulating Bankers' Pay*, 98 GEO. L.J. 247, 255–57 (2010).

⁴² See Azgad-Tromer, *supra* note 7, at 181–82 (describing how excessive leverage encourages excessive risk-taking).

⁴³ Present bias is the human tendency to give stronger weight to payoffs that are closer to the present time when considering trade-offs between two future scenarios. See Ted O'Donoghue & Matthew Rabin, *Doing It Now or Later*, 89 AM. ECON. REV. 103, 103 (1999).

⁴⁴ See Michal Barzuza & Eric Talley, *Short-Termism and Long-Termism* 1 (Va. Law & Econ. Research Paper No. 2, 2016), <https://ssrn.com/abstract=2731814> (noting that investors are “differentially present-biased (causing them to favor short-term liquidity)”).

⁴⁵ See, e.g., John C. Coffee & Darius Palia, *The Wolf at the Door: The Impact of Hedge Fund Activism on Corporate Governance* 5 (Sept. 6, 2015) (unpublished manuscript), <https://ssrn.com/abstract=2656325> (finding that such investor tendencies curb long-term investments in research and development, durable assets, and workforce capital).

⁴⁶ See Ehlers, *supra* note 16, at 13 (highlighting long-term tenors of infrastructure projects). Consider, for example, the Brooklyn Bridge: construction started in 1869, the bridge opened in 1883, and it is still a key means of transportation in New York City in 2018, nearly 150 years later. See generally *Brooklyn Bridge*, HISTORY.COM, <https://www.history.com/topics/brooklyn-bridge>

prone to overoptimism due to the long-term prospects of the projects,⁴⁷ further aggravating the problem. The preference of short-term profits at the expense of long-term performance in infrastructure is therefore a material cause for concern. Infrastructure projects are often spread over several decades, and tend to involve higher uncertainty than usual, and thus amplify attribution bias and overoptimism for their managers.⁴⁸ Such overconfidence and overoptimism may aggravate the tendency to discount the threats of potential litigation, viewed from an *ex ante* perspective, and lead executives to eschew safety measures that could control excessive risks.

II

MORAL HAZARD IN DATA INFRASTRUCTURE

This Part characterizes credit reporting bureaus as data public utilities, surveys the events leading to the September 2017 Equifax data breach, and suggests the infrastructure ratchet effect as a possible explanation.

A. *The Credit Reporting Bureau as an Infrastructure Provider*

Recall that defining infrastructure involves a separation of economic activity into two categories: the supportive and the supported.⁴⁹ Credit reporting bureaus constitute the foundational layer of this vertical analysis. They aggregate consumer information from different lenders and providers, a fundamental service to the economy.⁵⁰ This provides lenders with reliable and timely information about the characteristics and behavior of consumers.⁵¹ Lenders and businesses cannot afford to invest the requisite

(last visited Aug. 6, 2018).

⁴⁷ See Barzuza & Talley, *supra* note 44, at 15–16 (arguing based on empirical evidence that long term investments are associated with higher attribution bias and over-optimism).

⁴⁸ *Id.*

⁴⁹ See Rankin, *supra* note 1.

⁵⁰ Local merchants and finance companies created U.S. consumer credit bureaus in the nineteenth century to pool the credit histories of their customers and assist in collection activities. See Robert M. Hunt, *A Century of Consumer Credit Reporting in America* 10–11 (June 2005) (unpublished manuscript), <https://www.philadelphiafed.org/-/media/research-and-data/publications/working-papers/2005/wp05-13.pdf?la=en> (describing early credit bureaus as cooperatives between local merchants and finance companies). In 1906, the Associated Credit Bureaus, Inc. (ACB) was established to enable the sharing of consumer credit information across different cities and regions of the country. *Id.* at 11. ACB issued sixty million credit reports by 1960, even with technology limited to “filing cabinets, the postage meter and the telephone.” *Id.* Indeed, recent accounts of the data economy draw the parallel between technology giants and infrastructure providers, recognizing that “technology giants are the railroad companies of the twenty-first century.” Rozenstein, *supra* note 4, at 188.

⁵¹ DARRYL E. GETTER, CONG. RESEARCH SERV., R44125, CONSUMER AND CREDIT REPORTING, SCORING, AND RELATED POLICY ISSUES 6 (2017), <https://fas.org/sgp/crs/misc/R44125.pdf> (detailing the types of data on consumer behavior credit bureaus collect when creating risk metrics for lenders).

resources for individual assessment of each credit applicant and potential client.⁵² A credit reporting bureau accumulates information across many firms and sells its analysis back to businesses based on its analysis of a huge database.⁵³ The information aggregation, analysis, and dissemination services lower the cost of credit to consumers and sustain reliable business transactions by virtue of mitigating the likelihood of erroneous decision making by lenders and service providers.⁵⁴ These bureaus manage a mega social resource and are positioned as situational monopolies. Yet no contractual privity exists between credit reporting bureaus and the consumers whose information they collect. Credit reporting bureaus are positioned such that consumers are utterly dependent on their performance. Thus, credit reporting bureaus provide and sustain the underlying foundation for other economic activity, and accordingly, should be classified as data infrastructure providers.

B. *Equifax as an Infrastructure Provider*

Consider first the magnitude of Equifax's database.⁵⁵ Equifax manages comprehensive databases of consumer and business information derived from numerous sources including credit, financial assets, telecommunications and utility payments, and employment, income, demographic, and marketing data for more than 820 million consumers and over 91 million businesses around the world.⁵⁶ It applies advanced statistical techniques and proprietary software tools to analyze all available data, creating customized insights, and processing services for its clients.⁵⁷ If you live in the United States, Equifax knows everything about you: where you work, where you studied for your J.D., where you drink your coffee in the

⁵² Hunt, *supra* note 50, at 5 (describing credit bureaus as a cost-effective tool for helping lenders to evaluate loan applications).

⁵³ Ken Sweet, *Equifax Collects Your Data, and Then Sells It*, INC.COM (Oct. 6, 2017), <https://www.inc.com/associated-press/equifax-data-money.html> ("It's a . . . simple business model, actually. They gather as much information about you from lenders, aggregate it, and sell it back to them.")

⁵⁴ Hunt, *supra* note 50, at 4–8 (discussing the economics of information sharing).

⁵⁵ Equifax was founded in 1899 as the Retail Credit Company and evolved with the industry's consolidation and automation processes to its current form of universal U.S. coverage for information services. See generally Theresa Freas, *Credit Through the Ages: Where It All Began*, EQUIFAX: INSIGHTS BLOG (Apr. 27, 2018), <https://insight.equifax.com/the-history-of-consumer-credit/>.

⁵⁶ See *Equifax Unveils Data-Driven Marketing Capabilities to Help Brands Drive Maximum Customer Value*, EQUIFAX (Aug. 16, 2017), <https://investor.equifax.com/news-and-events/news/2017/08-16-2017-140453525>.

⁵⁷ See Equifax, Annual Report 2 (Form 10-K) (Feb. 22, 2017), <https://otp.tools.investis.com/clients/us/equifax/SEC/sec-show.aspx?FilingId=11875154&Cik=0000033185&Type=PDF&hasPdf=1> (describing Equifax's business model).

morning, and where you go out with your friends on Saturday night.⁵⁸ Equifax's deep and intimate knowledge of us includes a psychological profile, as well as a financial analysis of every single step we take in life. It not only knows everything about our past; it can also predict our future.⁵⁹

To appreciate Equifax's position as a situational monopoly, it may be useful to review the sources of its revenue. According to its 2016 Annual Report, eighty-nine percent of Equifax's consolidated revenue in 2016 originates from corporate clients and other organizations.⁶⁰ Like its peers, Equifax collects information about consumers and sells it to corporate clients seeking to assess their own clients and learn about consumer preferences. In general, Equifax collects "consumer and business credit related data from banks for free, analyze[s] it using its own proprietary processes, and sell[s] it back to the banks, generating a gross margin of around 90%."⁶¹ Consumers are mostly the subject of Equifax's data services rather than its clients.⁶² Equifax is situated in a position that makes consumers utterly dependent on its performance. Consumers depend on Equifax's judgment about their credit worthiness and reliability for any loan or service they may wish to acquire and in a world rife with identify theft and cyber fraud,⁶³ they depend on Equifax to protect their privacy and information. Yet, no contractual privity exists between Equifax and the consumers whose information it collects because consumers are third-party beneficiaries (or victims) of Equifax's business activity rather than its clients.

Ron Lieber recently articulated society's dependency on Equifax and inability to penalize it contractually:

You just can't quit Equifax, no matter how angry you are that it may have

⁵⁸ See Stacy Cowley & Tara Siegel Bernard, *As Equifax Amassed Ever More Data, Safety Was a Sales Pitch*, N.Y. TIMES (Sept. 23, 2017), <https://www.nytimes.com/2017/09/23/business/equifax-data-breach.html> (noting that Equifax record collection extends beyond drivers' licenses and Social Security numbers to include "telephone and cable subscriptions[,] . . . [c]riminal records, medical debt, [and] . . . rental and eviction histories").

⁵⁹ See MATT FELLOWES, BROOKINGS INSTITUTION, CREDIT SCORES, REPORTS, AND GETTING AHEAD IN AMERICA 1 (2006) (noting the growing role credit scores play in economic mobility as they "influenc[e] prices for loans and insurance and efforts to get jobs and rent apartments") https://www.brookings.edu/wp-content/uploads/2016/06/20060501_creditscores.pdf.

⁶⁰ Equifax, *supra* note 57, at 4.

⁶¹ Suraj Srinivasan & Quinn Pitcher, *Data Breach at Equifax 2* (2017) (Harvard Business School case study) (describing Equifax's data collection and analysis services).

⁶² Sweet, *supra* note 53 (noting that the chief business of credit reporting agencies is selling consumer credit reports to lending institutions and potential employers); see also Cowley & Siegel Bernard, *supra* note 58 ("Ordinary people are not Equifax's customers. They are the company's product.").

⁶³ See INTERNET CRIME COMPLAINT CTR., FBI, 2016 INTERNET CRIME REPORT 2–3 (2016), https://pdf.ic3.gov/2016_IC3Report.pdf (noting that financial losses from reported internet crimes totaled \$1.4 billion in 2016 which only accounts for an estimated fifteen percent of total cybercrime).

exposed your personal data and then made you jump through the hoops trying to freeze your credit files. Equifax won't erase your credit report, and lenders won't stop reporting your payment history to the company.⁶⁴

The distinction between situational monopolies and traditional monopolies is significant. Equifax is a situational monopoly because one of its stakeholder constituencies must transact with it. For a situational monopoly, power emerges here—from stakeholder dependency and bounded voluntariness. Unlike traditional monopolies, the circumstances of stakeholders, rather than market power and competition, define the situational monopoly.

C. *The 2017 Equifax Data Breach*

In September 2017, Equifax announced that it had suffered a data breach that allowed hackers to gain access to the personal information of 143 million Americans, including names, Social Security numbers, birth dates, addresses, and in some cases, drivers' license numbers.⁶⁵ In addition, hackers accessed credit card numbers and documents with personal identifying information for approximately 182,000 U.S. consumers.⁶⁶

The events leading to the Equifax data breach detail a systematic compromise of safeguards, raising concerns about the firm's failure to appreciate the magnitude of risk exposure and possibly eschewing adequate controls to ensure the security of its data.⁶⁷

Equifax's failure to adopt adequate controls to ensure the safety of its mega database is particularly noteworthy in light of ample warnings about its vulnerability to cyberattacks prior to the breach. Several cyber-risk analysis firms found that Equifax was ill-prepared to prevent and respond to a data breach months before the cyberattack launched.⁶⁸ Equifax had

⁶⁴ Ron Lieber, *You Can't Fire Equifax, but Your Employer Can. Mine Just Did.*, N.Y. TIMES (Jan. 26, 2018), <https://www.nytimes.com/2018/01/26/your-money/equifax-breach.html> (quoting Bob Sullivan in stating that "[i]f all employees understood that every single pay stub was going to Equifax every week, there would be a mini-revolt") (internal quotations omitted). Lieber takes pride in his employer for quitting Equifax. *Id.* Yet, Equifax will continue to collect and analyze data about you even if your employer quits because of its relationships with banks, credit card companies, and many other businesses and lenders.

⁶⁵ Press Release, Equifax, Equifax Announces Cybersecurity Incident Involving Consumer Information (Sept. 7, 2017), <https://investor.equifax.com/news-and-events/news/2017/09-07-2017-213000628>.

⁶⁶ *Id.*

⁶⁷ *Equifax Hackers Stole 200k Credit Card Accounts in One Fell Swoop*, KREBS ON SECURITY (Sept. 14, 2017), <https://krebsonsecurity.com/2017/09/equifax-hackers-stole-200k-credit-card-accounts-in-one-fell-swoop/> (noting that four months passed before Equifax fixed the vulnerability in software exploited by hackers).

⁶⁸ See Srinivasan & Pitcher, *supra* note 61, at 3–4 (noting that one cybersecurity firm rated Equifax's cybersecurity prevention practices as second-to-last in a peer group of twenty-three financial services companies).

received a number of warnings about its cybersecurity preparedness and its information security vulnerabilities but took no action to mitigate these risks. For example, “[i]n December 2016, an independent cybersecurity researcher [alerted Equifax that it] had left U.S. consumer information open on an internet-accessible, public-facing website . . . [B]ut the company did not take down the website until June 2017.”⁶⁹ Deloitte stated that Equifax had “a careless approach” in 2016.⁷⁰ “In April 2017, Cyence, a cybersecurity firm specializing in quantifying the financial impact of cyber risks, predicted that [the] probability of a [data] breach at Equifax [at some point during that year was] 50%.”⁷¹ Cyence further ranked the company as “second-to-last in its peer group of 23 financial services companies in terms of cybersecurity.”⁷² Brian Krebs, who runs the Krebs on Security website,⁷³ reported in May 2017—four months prior to the company’s announcement—that an Equifax payroll service unit had allowed thieves to access individual salary data for a year.⁷⁴

Even after the breach, information security at Equifax raised doubts about the company’s level of motivation to protect its database. For example, a web developer registered the domain name, “securityequifax2017.com,” and designed it to imitate Equifax’s “equifaxsecurity2017.com,” which the company launched in response to the breach.⁷⁵ Equifax not only failed to protect users from typing their information into the fraudulent website; its official Twitter account accidentally directed consumers to this fake website.⁷⁶ Resources devoted to customer service representatives after the crisis were also limited and complaints accused the company of being unreachable, with only 500 customer representatives dealing with the aftermath of the breach.⁷⁷ The consequences of the Equifax data breach are indeed cataclysmic: “The hackers got all that was necessary to steal someone’s identity, giving them access to everything from medical records to bank accounts.”⁷⁸

⁶⁹ *Id.* at 4.

⁷⁰ Lorenzo Franceschi-Bicchierai, *Equifax Was Warned*, VICE: MOTHERBOARD (Oct. 26, 2017), https://motherboard.vice.com/en_us/article/ne3bv7/equifax-breach-social-security-numbers-researcher-warning.

⁷¹ Srinivasan & Pitcher, *supra* note 61, at 3.

⁷² *Id.* at 3–4.

⁷³ See Nicole Perloth, *Reporting from the Web’s Underbelly*, N.Y. TIMES (Feb. 16, 2014), https://www.nytimes.com/2014/02/17/technology/reporting-from-the-webs-underbelly.html?_r=0 (explaining that Mr. Krebs’s cybersecurity blog primarily covers cybercrime and associated topics).

⁷⁴ *Fraudsters Exploited Lax Security at Equifax’s TALX Payroll Division*, KREBS ON SECURITY (May 18, 2017), <https://krebsonsecurity.com/2017/05/fraudsters-exploited-lax-security-at-equifaxes-talx-payroll-division/>.

⁷⁵ See Srinivasan & Pitcher, *supra* note 61, at 5.

⁷⁶ *Id.*

⁷⁷ *Id.*

⁷⁸ Sarah E. Igo, *The Equifax Breach Has Potential Catastrophic Consequences. But We Can’t*

III

WHY EXISTING MECHANISMS FAIL TO ELIMINATE THE PROBLEM

This Part focuses on the failure of existing mechanisms to mitigate risk assumption by infrastructure providers. Building on previous literature on insufficient deterrence in corporate governance in general,⁷⁹ I show that infrastructure providers are particularly prone to eschew safety due to their unique characteristics, leading to the failure of regulation, reputation, litigation, and debt pricing to eliminate the problem.

A. Regulation

Regulating infrastructure providers is subject to two major limitations. First, infrastructure is typically based on highly technical and scientific knowledge, as such regulators must have a high degree of technical proficiency. This is particularly true for cyber-infrastructure, where the nature of the risk stems from dynamic sources of cyberattacks and calls for tailor-made adjustments, requiring constantly changing methodologies and technical standards.⁸⁰ For these reasons, regulatory responses often lag behind damages. For example, it was not until January 2018, three months after the exposure of the Equifax scandal, that Senator Elizabeth Warren introduced a bill to penalize companies who fail to protect data.⁸¹ Alternatively, the fear of regulatory mistakes in the face of technical complexity may lead regulators to “minimal squawk behavior,”⁸² as mistakes

Let It Obscure the Even Bigger Problem, WASH. POST (Sept. 26, 2017), https://www.washingtonpost.com/news/made-by-history/wp/2017/09/26/the-equifax-breach-has-potentially-catastrophic-consequences-but-we-cant-let-it-obscure-the-even-bigger-problem/?utm_term=.863229df5634 (“A whopping 143 million American consumers, as well as untold numbers of British and Canadian citizens, learned that their most sensitive information—Social Security numbers, names, birth dates and addresses, as well as driver’s license and credit card numbers in some cases—had been taken.”).

⁷⁹ See Shapira & Zingales, *supra* note 11, at 3–4 (showing that regulation, reputation, and litigation were insufficient mechanisms to create sufficient deterrence, based on an analysis of DuPont’s environmental damage scandal).

⁸⁰ See Emanuel Kopp et al., *Cyber Risk, Market Failures, and Financial Stability* 5–6 (Int’l Monetary Fund, Working Paper No. 17/185, 2017), <https://www.imf.org/~media/Files/Publications/WP/2017/wp17185.ashx> (“Cyber-attacks evolve quickly and are highly dynamic by nature, which complicates risk assessment.”); see also Neil Robinson, *Spending for Success on Cyber Defence*, NATO REV. MAG. (Apr. 6, 2017), <https://www.nato.int/docu/review/2017/also-in-2017/nato-priority-spending-success-cyber-defence/en/index.htm> (referring to the dynamic nature of cyber threats).

⁸¹ Press Release, Senator Elizabeth Warren, Warner Unveil Legislation to Hold Credit Reporting Agencies Like Equifax Accountable for Data Breaches (Jan. 10, 2018), <https://www.warren.senate.gov/newsroom/press-releases/warren-warner-unveil-legislation-to-hold-credit-reporting-agencies-like-equifax-accountable-for-data-breaches>.

⁸² Clare Leaver, *Bureaucratic Minimal Squawk Behavior: Theory and Evidence from Regulatory Agencies*, 99 AM. ECON. REV. 572, 573 (2009) (explaining that bureaucrats exhibit “minimal squawk behavior” to keep interest groups quiet and keep mistakes out of the public eye).

affecting the industry are likely to be spotlighted more than mistakes affecting the public.⁸³

Second, regulators are themselves agents with self-interested motivations, and thus are susceptible to interest-group politics that may draw on policy that is far from optimal from a social welfare perspective.⁸⁴ Political influence is expected to be particularly salient in infrastructure, where the industry is typically regulated. In such industries, “political activity is nearly universal” and uncorrelated “with measures of shareholder power, managerial agency costs, or value.”⁸⁵ Notably, political bias of regulators does not necessarily stem from regulatory capture or bribery.⁸⁶ “Soft capture” can be a result of regulators’ professional background with the industry or its service providers, participation in social circles, or hopeful aspirations for their post-regulatory careers.⁸⁷ Campaign finance laws have increased the motivation for and the potential impact of capture.⁸⁸

It may be useful to assess the boundaries of regulation in mitigating the moral hazard problem with the Equifax case study. At the time of the 2017 data breach, Equifax was subject to numerous laws and regulations governing the collection, protection, and use of consumer credit and other information, and imposing sanctions for the misuse of such information or unauthorized access to data.⁸⁹ In addition, a majority of states have adopted

⁸³ *Id.* (“[A]n interest group threatens to draw attention to a mistake (squawk) if a bureaucrat has been tough, but to stay silent if she has been generous.”).

⁸⁴ See Stephen M. Bainbridge, *Mandatory Disclosure: A Behavioral Analysis*, 68 U. CIN. L. REV. 1023, 1056–58 (2000) (explaining how the decisions of regulators and legislators to push for mandatory disclosure are likely driven by self-interested political concerns that do not necessarily align with the goal of corporate profit maximization).

⁸⁵ See Coates, *supra* note 13, at 658 (finding that political activity unrelated to corporate measures prevails in regulated or government-dependent industries such as banking, telecommunications, and defense).

⁸⁶ See Lawrence G. Baxter, *Understanding Regulatory Capture: An Academic Perspective from the United States*, in THE MAKING OF GOOD FINANCIAL REGULATION 31, 32–34 (Stefano Pagliari ed., 2012) (explaining that bias can stem from regulators and executives sharing similar backgrounds, traditions, and implicit understandings).

⁸⁷ See Leaver, *supra* note 82, at 574–75 (discussing literature on the concern that regulators make policy with future job prospects in mind); Shapira & Zingales, *supra* note 11, at 22 (offering an example in which a West Virginia regulator charged with regulating DuPont left the agency to work with a consulting company hired to aid DuPont).

⁸⁸ See LAWRENCE LESSIG, *REPUBLIC, LOST: HOW MONEY CORRUPTS CONGRESS—AND A PLAN TO STOP IT* 89–105 (2011) (identifying the demand and supply sources of campaign cash throughout U.S. political history to show the development of political interest capture was influenced by campaign finance).

⁸⁹ See Gramm-Leach-Bliley Act, 12 U.S.C. § 1811 (2012) (regulating the use of non-public personal information of consumers held by financial institutions, including consumer rating agencies); Dodd-Frank Act, 12 U.S.C. § 5301 (2012) (protecting consumers from abusive financial services practices); Federal Trade Commission Act, 15 U.S.C. §§ 41, 45 (2012) (prohibiting unfair methods of competition and unfair or deceptive acts or practices); Credit Repair Organizations Act, 15 U.S.C. § 1679 (2012) (assisting consumers in improving their credit standing); Fair Credit Reporting Act, 15 U.S.C. § 1681 (2012) (governing the fairness and privacy of information in the

versions of data security breach laws that require notification of affected consumers in the event of a breach of personal information.⁹⁰ Some of these laws require additional data protection measures that exceed the Gramm-Leach-Bliley Act's data safeguarding requirements.⁹¹ None of these regulations created sufficient incentives for Equifax to construct the ex ante protective measures and safety controls that could have prevented the breach.

B. Reputation

In theory, reputation can restrain excessive risk-taking in corporations by setting a price tag for transgressions of the public's trust. Reputational considerations often stem from the business purpose of a corporation,⁹² requiring the satisfaction of the normative taste of various stakeholder constituencies.⁹³

Infrastructure providers will tend to have fewer reputational incentives than other corporations because, as situational monopolies, their stakeholders are bound to transact with them by virtue of their real life circumstances. Therefore, infrastructure providers cannot enjoy a reputational surplus in retail sales. As a result of its stakeholders' bounded voluntariness, the infrastructure provider will have less stakeholder pressure to exhibit virtuousness—better reputation is not likely to expand its sources of income.

files of consumer reporting agencies that engage in evaluating consumer credit, setting reasonable procedures to assure maximal accuracy of the reports).

⁹⁰ See *2018 Security Breach Legislation*, NAT'L CONFERENCE STATE LEGISLATURES (May 6, 2018), <http://www.ncsl.org/research/telecommunications-and-information-technology/2018-security-breach-legislation.aspx> (explaining that states "have enacted security breach notification laws that require businesses or government to notify consumers or citizens if their personal information is breached").

⁹¹ See *id.* (noting that some states provide credit freezes for victims of data breaches, while others are liberalizing the definition of "personal information").

⁹² See generally Azgad-Tromer, *supra* note 14, at 344 (arguing that even seemingly virtuous social engagements of corporations often stem from the self-serving corporate purpose of catering to the normative inclinations of various stakeholders).

⁹³ See Amihai Glazer et al., *Firms' Ethics, Consumer Boycotts, and Signalling*, 26 EUR. J. POL. ECON. 340, 341, 349–50 (2010) (examining how firms strategize their corporate ethics and actions based on the normative preferences of consumers and the potential of consumer boycotts); Diogo Hildebrand et al., Commentary, *Corporate Social Responsibility: A Corporate Marketing Perspective*, 45 EUR. J. MARKETING 1353, 1354–57 (2011) (noting that companies are increasingly engaging in corporate social responsibility based on the interests of various stakeholders, including consumers, employees, investors, and the government, out of a strong belief that such actions would elicit company-favorable responses from the stakeholders involved); Jill Gabrielle Klein et al., *Why We Boycott: Consumer Motivations for Boycott Participation*, 68 J. MARKETING 92, 92–99 (2004) (examining consumer motivations for boycott participation and their impact on corporate practices); Jeff Fromm, *10 Things Millennial CEOs Will Reimagine in America*, FORBES (Apr. 8, 2014, 4:51 PM), <http://www.forbes.com/sites/onmarketing/2014/04/08/10-things-millennial-ceos-will-reimagine-in-america/> (explaining how companies will emphasize corporate social responsibility, as "[m]illennials expect brands to give back, be authentic and transparent").

In addition, in situational monopolies, stakeholders cannot penalize the corporation for excess risk.⁹⁴ Consider again the 2017 Equifax data breach: despite the egregious information security practice, stakeholders are not able to withdraw from Equifax's database. The nonconsensual nature of the relationship affects both the carrot and the stick available to stakeholders: if stakeholders cannot do without the infrastructure provider, the infrastructure provider has limited incentives to invest in catering to their risk preferences or their tastes. Infrastructure providers incorporated as special purpose vehicles⁹⁵ further isolate unrelated assets of their shareholders, providing an additional shield from reputational penalty for these shareholders.⁹⁶

C. Litigation

Litigation fails to mitigate the infrastructure provider's incentive to take excessive risks because managers and shareholders capture the upside of risk, while some of the downside is borne by the injured party, whether it be the environment, the general public, or the government. The nature and the scope of potential damages for infrastructure providers almost inevitably exceeds the net assets of the infrastructure corporation. Expected damages from excessive risk-taking in the management of these mega assets and social resources will often fall beyond the limited liability protective trail. Ownership of an infrastructure provider is a heads I win, tails you lose game: equity holders gain from the benefits of excessive risks, but others bear the costs of failure.⁹⁷ From the shareholders' perspective, there is no difference between a decline equal to their capital investments in that particular corporate entity and any larger decline that wipes out social value exceeding the value of their share; in both cases, they lose the capital they invested in the corporation, and no more. Because the financial stakes of damages are expected to be so high, rational equity holders will discount the threat of liability when the damages exceed the corporation's net assets, effectively making litigation for such mega damages a toothless threat.⁹⁸

⁹⁴ See Cowley & Siegel Bernard, *supra* note 58 (noting that despite consumer backlash, Equifax's customers remained with the company, given their dependency on the credit reports generated by the financial bureau).

⁹⁵ See *Project Finance—Key Concepts*, WORLD BANK GRP., <https://ppp.worldbank.org/public-private-partnership/financing/project-finance-concepts> (last visited Aug. 20, 2018) (explaining that the typical project finance structure includes a special purpose vehicle company).

⁹⁶ See Shapira & Zingales, *supra* note 11, at 23–25 (showing that, for DuPont executives, the potential loss of reputation was less of a concern for the directors due to change in personnel and time lag between the moment when a decision is made and when bad news becomes public).

⁹⁷ See Shavell, *supra* note 15, at 45 (“An injurer will treat liability that exceeds his assets as imposing an effective financial penalty only equal to his assets.”).

⁹⁸ See *id.* at 45–46 (noting that declining to insure against damages may be a rational choice where these damages will exceed available assets).

D. Debt Pricing

Lenders could serve as alternate risk monitors. Unlike consumers, creditors are free not to lend to the infrastructure provider, potentially providing the requisite monitoring service.⁹⁹ Indeed, recent empirical research finds that lenders demand higher spreads to bear industry-level risk.¹⁰⁰

Because of infrastructure providers' reliance on project finance, debt pricing is appealing as a monitoring instrument in infrastructure. In project finance, a particular bank takes the role of the lead agent: meeting with the borrower, conducting thorough due diligence, performing a credit analysis, negotiating the terms and conditions of the loan, and preparing the information for the providing banks.¹⁰¹

Creditors could potentially monitor some of the risk imposed by infrastructure providers. Yet, the lead bank has no incentive to monitor risk above the sum of the outstanding loans. But in infrastructure, the scope of potential damages often surpasses the invested funds in the firm.¹⁰² When the debt is secured, creditors' incentives to monitor risk are further limited.¹⁰³ In addition, the damages from excessive risks can be realized after the loan has been fully paid, and the development and construction phase concluded, during the much longer term of the infrastructure operating phase.¹⁰⁴

IV

POLICY IMPLICATIONS

This Part considers possible policy implications for the infrastructure ratchet effect, drawing from the well-understood moral hazard in the banking sector.¹⁰⁵ It further sheds light on the protection of stakeholder

⁹⁹ See generally Eugene F. Fama, *What's Different About Banks?*, 15 J. MONETARY ECON. 29 (1985) (showing that bank borrowers pay a premium for bank monitoring services, and that the excess returns associated with bank loan announcements are in fact a reflection of the monitoring benefits generated by the bank).

¹⁰⁰ See Dan Amiram et al., *Industry Characteristics, Risk Premiums, and Debt Pricing*, 92 ACCT. REV. 1, 19–23 (2017) (showing that industry characteristics inform lenders about expected loss beyond the information available in common firm-level variables).

¹⁰¹ Syndicated loans are made by a collection of banks that jointly extend the loan to a specific borrower. See STEVEN C. MILLER, S&P CAPITAL IQ, A SYNDICATED LOAN PRIMER 1 (2014), <https://www.lcdcomps.com/d/pdf/2014%20US%20Loan%20Primer.pdf>. Syndication creates a direct contract between each member bank and the borrower. After the financial closing of the loan, the arranging bank continues to monitor compliance with loan covenants, negotiate contingent agreements when they arise, and lead negotiations in default situations.

¹⁰² See *supra* note 24.

¹⁰³ See *supra* note 17.

¹⁰⁴ See Ehlers, *supra* note 16, at 13 (“Infrastructure loans often have tenors exceeding 10 years.”).

¹⁰⁵ See Gary Gorton & Andrew Winton, *Financial Intermediation*, in 1A HANDBOOK OF THE ECONOMICS OF FINANCE 431, 520–26 (George M. Constantinides et al. eds., 2003) (providing

constituencies, an important topic of debate in corporate law.

A. *The Banking Analogy*

The moral hazard identified in this article for shareholders of infrastructure providers is analogous to the moral hazard for banks. Banks are considered “special” because of their ability to shift risk and costs to others, and because normal market forces do not work to counter these distorted incentives.¹⁰⁶ There is a near consensus that bank corporate governance is distorted, as banks are special entities posing significant challenges to the traditional corporate governance design of public corporations. Banks’ shareholders have a considerable interest in taking risks because they capture the upside, while some of the downside is borne by the depositors or by the government as an insurer of deposits. “[T]hey do not internalize the adverse effects that risk-taking has on other stakeholders in the bank.”¹⁰⁷ The pathology is even greater for bank executives compensated with stock options and cash.¹⁰⁸

In response to the 2008 financial crisis, financial regulation has undergone a major transformation that aims to mitigate the excessive risk-taking in the industry.¹⁰⁹ Likewise, literature on bank corporate governance since the crisis recognizes the conflicts of interest in banking and the resulting negative externalities.¹¹⁰ In the following, I survey some of the policy improvements in the banking context and discuss their potential

references to the abundant literature, including empirical literature, documenting the incidence of moral hazard at the bank level in the presence of deposit insurance).

¹⁰⁶ See Anat R. Admati, *A Skeptical View of Financialized Corporate Governance*, 31 J. ECON. PERSPS. 131, 145 (2017) (“What actually makes banks and other financial institutions ‘special’ is their unusual ability to shift downside risks and costs to others and the fact that normal market forces do not work to counter the distorted incentives of those who control them.”).

¹⁰⁷ Bebchuk & Spamann, *supra* note 41, at 251. See generally Armour & Gordon, *supra* note 28, at 38 (claiming that shareholder value mechanisms create incentives for banks to systemically undermine the efficacy of regulatory internalization).

¹⁰⁸ See Lucian A. Bebchuk et al., *The Wages of Failure: Executive Compensation at Bear Stearns and Lehman 2000-2008*, 27 YALE J. ON REG. 257, 259 (2010) (finding that from 2000 to 2008, the top five executives at Bear Stearns and Lehman pocketed about \$1.4 billion and \$1 billion, respectively, or roughly \$200–275 million per executive).

¹⁰⁹ Two landmark examples are the Dodd-Frank Wall Street Reform and Consumer Protection Act, 12 U.S.C. § 5301 (2012), and the Basel III framework for banking regulation, which seeks to “promot[e] a more resilient banking sector. . . . [by] improv[ing] the banking sector’s ability to absorb shocks arising from financial and economic stress.” BASEL COMM. ON BANKING SUPERVISION, BANK FOR INT’L SETTLEMENTS, BASEL III: A GLOBAL REGULATORY FRAMEWORK FOR MORE RESILIENT BANKS AND BANKING SYSTEMS 1 (June 2011), www.bis.org/publ/bcbs189.pdf.

¹¹⁰ See, e.g., Charles K. Whitehead, *Regulating for the Next Financial Crisis*, 24 PAC. MCGEORGE GLOBAL BUS. & DEV. L.J. 3, 8–10 (2011) (explaining negative externalities in this context as how the effect of losses borne by risk-taking could extend to prospective borrowers and other constituents in the real economy).

applicability in infrastructure.

One key corporate governance response to these conflicts of interest within banks is focused on expansion of fiduciary duties.¹¹¹ Jonathan Macey and Maureen O’Hara argue, for example, that “directors and officers of banks should be charged with a heightened duty” to ensure a bank’s financial stability.¹¹² Essentially, they support the application of a hybrid fiduciary duty within banking firms, so that the scope of directors’ fiduciary duties would expand beyond shareholders to include creditors as well as depositors.¹¹³ Under their proposals, bank directors could “incur genuine litigation risk if they violate their fiduciary duties” towards either creditors or shareholders, or both.¹¹⁴ Yet, if directors will have to become servants of two masters, this would likely result in confusion and risk aversion due to legal uncertainty, adversely affect the competitiveness of the bank as a firm and its potential to recruit managerial talent, and ultimately result in wasteful litigation. Macey and O’Hara also propose that directors in banks face a higher professional standard, proposing a new “banking expert” requirement akin to the “financial expert” requirements that the Sarbanes-Oxley Act imposes on audit committees.¹¹⁵

Others suggest relaxing the shareholder value maximization norm for banks that qualify as systemically important financial institutions (SIFIs).¹¹⁶ When harm is systemic, relaxing the shareholder value maximization norm does not increase agency costs.¹¹⁷ Rather, in systemically important banks, shareholder value maximization “tends to harm the interests of both

¹¹¹ Fiduciary duties are comprised of the duty of care and the duty of loyalty, vested upon directors and officers in the service of the corporation and its shareholders. The duty of care requires directors and officers to exercise the level of care that a prudent person would use under similar circumstances. The duty of loyalty requires directors and officers to refrain from benefiting themselves at the expense of the corporation that they serve. For duty of care, see *In re Walt Disney Co. Derivative Litig.*, 907 A.2d 693, 749 (Del. Ch. 2005). For duty of loyalty, see *Cede & Co. v. Technicolor, Inc.*, 634 A.2d 345, 361 (Del. 1993).

¹¹² Jonathan R. Macey & Maureen O’Hara, *The Corporate Governance of Banks*, 9 *ECON. POL’Y REV.* 91, 92 (2003).

¹¹³ *See id.*

¹¹⁴ *Id.* at 103.

¹¹⁵ Jonathan Macey & Maureen O’Hara, *Bank Corporate Governance: A Proposal for the Post-Crisis World*, 22 *ECON. POL’Y REV.* 85, 86 (2016); *see also* Sarbanes-Oxley Act of 2002, 15 U.S.C. § 407 (2012). The higher professional requirements suggested involve differential standards for both bank risk committee members and bank directors, with higher standards applying to the former. Expertise requirements should also be a function of bank size; the larger the bank, the greater the necessary skill set and required familiarity with risk management. Macey & O’Hara, *supra* at 103.

¹¹⁶ *See, e.g.*, Armour & Gordon, *supra* note 28, at 38. This is true because SIFIs’ majoritarian diversified shareholders would prefer that the managers did not impose systemic externalities. *Id.* at 39. SIFIs are “financial institution[s] regarded as so important to the economy that [their] failure could lead to a widespread economic crisis.” *SIFI*, OXFORD ENGLISH DICTIONARY, <https://en.oxforddictionaries.com/definition/sifi> (last visited June 27, 2018).

¹¹⁷ *See* Armour & Gordon, *supra* note 28, at 39.

diversified shareholders *and* society,”¹¹⁸ supporting their argument for imposing liability on directors and officers.¹¹⁹ This would induce executives to behave in a more risk-averse fashion. Because SIFIs are banks that affect systemic risk, the “conventional [shareholder primacy] wisdom is reversed: diversified shareholders [should] want managers to take less risk.”¹²⁰

It may also be possible to draw from some of the risk mitigation measures provided by banking regulation and apply them to infrastructure providers. For example, following the banking panics of the 1930s and the Great Depression, the federal government imposed mandatory deposit insurance for all federally chartered banks, shifting the risk of bank default from depositors to the federal exchange¹²¹ and renewing depositors’ trust in banks.¹²² Mandatory insurance for infrastructure providers may be a prudent solution to the infrastructure ratchet effect, both from an *ex post* perspective and as a potential deterrent mechanism. *Ex ante*, mandatory insurance establishes a regulatory mechanism for internalization of costs, while promoting sound internal control structure that can detect risks early, take corrective action, and minimize exposure. *Ex post*, the insurance can provide some relief to victims beyond the limited liability wedge.

Notably, these risk mitigation strategies are harder to implement in infrastructure than in financial institutions. Because the breadth of optional business actions is so wide, it is almost impossible to tell where a suggested business plan becomes excessively risky. While in banks, risks are always financial and can be measured and monitored *ex ante*, risk in infrastructure is diverse: safety can be compromised in chemical composition of materials; in architectural design; in construction protocols; in civil engineering; and in information security, to list a few examples. The varied risks often fall under the jurisdiction of different regulatory agencies, creating challenges in risk

¹¹⁸ See *id.* at 50.

¹¹⁹ *Id.* Robert Hockett has suggested in several recent works that banks are franchisees that distribute a vital public resource, very much like infrastructure providers. See, e.g., Robert Hockett, *Are Bank Fiduciaries Special?*, 68 ALA. L. REV. 1071, 1111, 1114 (2017); Robert Hockett & Saule T. Omarova, *The Finance Franchise*, 102 CORNELL L. REV. 1143, 1147 (2017); Robert Hockett & Saule T. Omarova, “*Special*,” *Vestigial*, or *Visionary? What Bank Regulation Tells Us About the Corporation—and Vice Versa*, 39 SEATTLE U. L. REV. 453, 461 (2016).

¹²⁰ See Armour & Gordon, *supra* note 28, at 39.

¹²¹ See FED. DEPOSIT INS. CORP., FEDERAL DEPOSIT INSURANCE CORPORATION, *THE FIRST FIFTY YEARS: A HISTORY OF THE FDIC 1933–1983* iii (1984); John R. Walter, *Depression-Era Bank Failures: The Great Contagion or the Great Shakeout?*, 91 FED. RES. BANK. RICH. ECON. Q. 39, 39–54 (2005).

¹²² For an example of government insurance of bank deposits, see the Federal Deposit Insurance Act, Pub. L. No. 114-113, 64 Stat. 873 (1950) (codified as amended at 12 U.S.C. § 1811 (2012)). See also Federal Deposit Insurance Corporation Improvement Act of 1991, Pub. L. No. 102-242, 105 Stat. 2236 (codified as amended at 12 U.S.C. § 3305 (2012)). Deposit insurance is also the justification for banking supervision designed to assure safety and soundness of depository institutions. See 12 U.S.C. § 1831p-1 (2012); 12 C.F.R. § 364 (2015).

management. In addition, unlike banks, not all infrastructure providers are public corporations: many are incorporated as nonprofits or private corporations and are not required to make systematic disclosures.

B. *The Regulation Versus Governance Debate*

The moral hazard among infrastructure providers illuminates the fundamental debate in corporate law regarding whether externalities regulation or governance better protects stakeholder constituencies. The prevailing view among prominent corporate law theorists is that maximization of shareholder value should be for-profit corporations' sole focus.¹²³ Agency costs motivate this rationale: if managers are allowed to pursue other goals, they will choose their own idiosyncratic values as opposed to focusing on value maximization for the shareholder. In this framework, managers can consider the interests of other stakeholders only when they are instrumental in promoting the interests of shareholders—seeking profit is the single proper mission of the corporations.¹²⁴ The interests of other stakeholder constituencies and their protection from corporate externalities are left to regulation.¹²⁵

Others argue that corporations are social institutions chartered in order to facilitate diverse social goals, and shareholders are simply one stakeholder constituency among others.¹²⁶ Accordingly, corporate managers can sacrifice shareholder interests in order to confer benefits on others.¹²⁷ Proponents of this view contend that managers should consider the interests of other stakeholder constituencies, because focusing exclusively on profit making will pose excess externality risks and societal costs.¹²⁸ Recently, egregious

¹²³ See William T. Allen, *Our Schizophrenic Conception of the Business Corporation*, 14 CARDOZO L. REV. 261, 265 (1992); Henry Hansmann & Reinier Kraakman, Essay, *The End of History for Corporate Law*, 89 GEO. L.J. 439, 440–41 (2001); Milton Friedman, *A Friedman Doctrine—The Social Responsibility of Business Is to Increase Its Profits*, N.Y. TIMES MAG., Sept. 13, 1970, at 32, 33.

¹²⁴ See Allen, *supra* note 123, at 269.

¹²⁵ See, e.g., Kenneth J. Arrow, *Social Responsibility and Economic Efficiency*, 21 PUB. POL'Y 303 (1973), reprinted in 6 COLLECTED PAPERS OF KENNETH J. ARROW: APPLIED ECONOMICS 130, 130–32, 136, 137 (2d ed. 1985) (arguing that profit maximization can achieve a high level of efficiency, while acknowledging the need for regulation of externalities); Jonathan R. Macey, *An Economic Analysis of the Various Rationales for Making Shareholders the Exclusive Beneficiaries of Corporate Fiduciary Duties*, 21 STETSON L. REV. 23, 42 (1991) (“If actions of a firm are genuinely detrimental to a local community, the members of that community can appeal to their elected representatives in state and local government for redress.”).

¹²⁶ See Hansmann & Kraakman, *supra* note 123, at 440–41.

¹²⁷ See Einer Elhauge, *Sacrificing Corporate Profits in the Public Interest*, 80 N.Y.U. L. REV. 733, 738, 840–41, 848–52 (2005) (recognizing the boundaries of legal intervention and arguing that managers need wider discretion to act in the public interest).

¹²⁸ See Lynn A. Stout, *Bad and Not-So-Bad Arguments for Shareholder Primacy*, 75 S. CAL. L. REV. 1189, 1197–98 (2002) (demonstrating that shareholder primacy can be inefficient ex post).

corporate behavior has led scholars to revive the search for an empowered board of directors that is better informed of the company's business, politics, and vulnerabilities, and more likely to assume the role of the corporation's conscience.¹²⁹

The infrastructure ratchet effect sheds light on this fundamental debate, suggesting that instead of evaluating corporate governance purely in terms of the relationship a corporation has with its shareholders, corporate governance is also a function of *what* the corporation does, and *how* it does it. The heightened incentives for excessive risk-taking by infrastructure providers suggests that in this space, corporate governance must move away from a simple shareholder empowerment-versus-stakeholder dichotomy, toward a more dynamic and inclusive picture of operating realities.

CONCLUSION

Defining infrastructure providers and drawing attention to their position as situational monopolies highlights the core political and social characteristics of the nonconsensual relationship between consumers and infrastructure providers. We do not have a contractual relationship with the corporations that assume the traditional power of governments in managing and controlling our natural and social resources. The lack of contractual privity implies reduced incentives for corporate social motivation and eliminates the consumer's ability to transact against excessive risk. Combined with potential negative externalities far exceeding the net assets, the unique position of infrastructure providers inheres a consistent preference for excessive risk for their shareholders. Infrastructure providers run nuclear plants, provide water and energy, and manage mega-databases, among other critical social functions. Beyond the theoretical implications on possible protection of stakeholder constituencies within doctrinal corporate law versus the traditional approach that relies exclusively on regulated externalities, the infrastructure ratchet effect identifies distorted incentives in the corporate governance of firms providing and managing infrastructure, with potential cataclysmic social implications.

¹²⁹ See John C. Coffee, Jr., *Preserving the Corporate Superego in a Time of Stress: An Essay on Ethics and Economics*, 33 OXFORD REV. ECON. POL'Y 221, 221–23 (2017).