THE LAW AND ECONOMICS OF RESILIENCE

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ABSTRACT

The field of law and economics has long studied externalities, the costs and benefits actors create and yet fail to internalize. But scholars have largely overlooked a set of externalities that lead firms across the economy to systematically underinvest in resilience, with macroeconomically harmful consequences. In this Article, we address this gap with a theory of the law and economics of resilience, by which we mean the ability of markets to reliably and optimally meet demand for goods and services without extreme price fluctuations.

We argue that corporate resilience is determined by a conflict between two basic forces: the resilience externality, which arises because firms do not adequately appropriate the benefits their resilience provides others, and the business-stealing externality, which results from the fact that firms do not fully bear the costs their resilience has on total market output. Available evidence suggests that the resilience externality will tend to dominate, leading firms to underinvest in resilience, especially in markets featuring bottleneck products, weak competition, high demand variability, and large benefits of product diversity.

We then illustrate the usefulness of the framework by analyzing the interaction between law and resilience across major domains of business law: tort, contract, antitrust, bankruptcy, and corporate law. In each area, we recommend targeted interventions that would mitigate the resilience externality. We also identify a set of existing legal regimes that are dedicated to promoting resilience, which we dub "resilience regulation." We evaluate the costs and benefits of pursuing resilience through dedicated, often industry-specific regulation versus through general-purpose business law. Both approaches will be needed to mitigate the supply-chain crises

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caused by war, climate change, and the unraveling of the modern international trading system.

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INTRODUCTION

Supply shortages are the macroeconomic challenge of the moment. If in the 2010s macroeconomic stability was all about banking crises, in the 2020s it is all about real resource shortages. After decades of hype about the "new economy," where digital bits zip around instantly with zero marginal cost, recent events have reminded us that we still live in a world of atoms, where weather can disrupt delivery and the absence of one critical part can stop a production line.[1] One prominent commodities analyst has dubbed this moment the "revenge of the old economy."[2]

Almost every critical input to modern life has been affected by supply-chain disruptions in the past decade, from the high-tech to the mundane.[3] In the first two years of the COVID-19 pandemic, average transpacific cargo shipping rates increased fivefold.[4] Wholesale lumber and plywood prices quadrupled.[5] Semiconductor shortages cost the global automotive industry $210 billion in revenue in 2021.[6] Fast forward to 2024, and chips recovered but electrical transformers were backlogged, with the lead time for new transformers up to two years, and prices up by as much as four to nine times over the past three years.[7] Today, global supply chains are under renewed stress in the wake of the second Trump administration's radical revival of tariffs, with average U.S. tariffs in mid-2025 at their highest rate since the early 1930s.[8] The pain was amplified by retaliation from China, which

1. *See* David Dayen & Rakeen Mabud, *How We Broke the Supply Chain*, AM. PROSPECT (Jan. 31, 2022), https://prospect.org/economy/how-we-broke-the-supply-chain-intro/ [https://perma.cc/CW8W-C2NR].

2. Jeff Currie, Opinion, *The Revenge of the Old Economy*, FIN. TIMES (Oct. 20, 2021), https://www.ft.com/content/c7732d53-2e34-4fde-b5fb-6f45f114111f [https://perma.cc/SC5R-JZGJ].

3. The New York Fed's Global Supply Chain Pressure Index hit its all-time high in December 2021. *See* Gianluca Benigno, Julian di Giovanni, Jan J.J. Groen & Adam I. Noble, *The GSCPI: A New Barometer of Global Supply Chain Pressures* 5–6, 11, 14 (Fed. Rsrv. Bank of N.Y., Working Paper No. 1017, 2022), https://www.newyorkfed.org/medialibrary/media/research/staff_reports/sr1017.pdf [https://perma.cc/8N2Z-7CN3].

4. *See Taking Stock of the Supply Chain Crisis – The State of Trade*, FLEXPORT: BLOG (Oct. 9, 2022), https://www.flexport.com/research/taking-stock-of-the-supply-chain-crisis-the-state-of-trade/ [https://perma.cc/BBY6-BNKS].

5. *See* Virginia McDaniel, *How the Pandemic Drove up the Cost of Wood Products*, U.S. FOREST SERV. (May 13, 2022), https://www.fs.usda.gov/about-agency/features/how-pandemic-drove-cost-wood-products [https://perma.cc/8NPW-PRY4].

6. *See* Kate Duffy, *Global Chip Shortages Are Expected to Cost Automakers $210 Billion in 2021—Almost Double Previous Estimates, a Consulting Firm Says*, BUS. INSIDER AFRICA (Sept. 23, 2021), https://africa.businessinsider.com/transportation/global-chip-shortages-are-expected-to-cost-automakers-dollar210-billion-in-2021/ezfr3je [https://perma.cc/N9RJ-3UUN].

7. *See* KILLIAN MCKENNA, SHERIN ANN ABRAHAM & WENBO WANG, NAT'L RENEWABLE ENERGY LAB'Y, MAJOR DRIVERS OF LONG-TERM DISTRIBUTION TRANSFORMER DEMAND 1 (2024), https://www.nrel.gov/docs/fy24osti/87653.pdf [https://perma.cc/TWA3-WJFV].

8. *State of U.S. Tariffs: August 7, 2025*, BUDGET LAB (Aug. 7, 2025) https://budgetlab.yale.edu/research/state-us-tariffs-august-7-2025 [https://perma.cc/P6UE-ZMYC].

refines 90% of the world's rare earth metals, essential materials for producing cars, drones, microelectronics, medical imaging devices, and much else.[9]

Each shortage cascades into countless other transactions and balance sheets: without sufficient lumber, homebuilding stalls; without rare earth metals, new production of factory robots grinds to a halt. Thanks to extensive global interdependence, small disruptions can cascade into macro-level shocks.[10] The International Monetary Fund estimates that supply disruptions lowered global GDP by approximately 1% in 2021.[11] Supply shocks were also a major contributor to inflation in the United States and other nations.[12] Frustrated, at least in part, by these disruptions, voters have rejected incumbent political parties across the world.[13]

These crises have led policymakers and scholars to devote renewed attention to understanding supply shortages.[14] The generalized economic

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9. Keith Bradsher, *U.S. Dependence on China for Rare Earth Magnets Is Causing Shortages,* N.Y. TIMES (June 2, 2025), https://www.nytimes.com/2025/06/02/business/china-rare-earths-united-states-supplies.html [https://perma.cc/VEJ2-8JY2]; Jon Emont, Heather Somerville & Alistair MacDonald, *China Is Choking Supply of Critical Minerals to Western Defense Companies,* WALL ST. J. (Aug. 3, 2025), https://www.wsj.com/world/asia/china-western-defense-industry-critical-minerals-3971ec51 [https://perma.cc/QT2T-4XBY] ("More than 80,000 parts that are used in Defense Department weapons systems are made with critical minerals now subject to Chinese export controls."); Katrina Northrop & Lyric Li, *China's Restrictions on Rare Earths Could Hurt U.S. Health Care*, WASH. POST (Apr. 20, 2025), https://www.washingtonpost.com/world/2025/04/18/china-restricts-rare-earths-export [https://perma.cc/F4XZ-B5M5]. China's move was also a response to aggressive U.S. export controls on advanced semiconductors. For an analysis of the cross-cutting effects of modern export controls, see Doni Bloomfield & Jeff Gordon, *The New Export-Control Equilibrium* (2026) (working paper) (manuscript on file with authors).

10. *See generally* Daron Acemoglu, Vasco M. Carvalho, Asuman Ozdaglar & Alireza Tahbaz-Salehi, *The Network Origins of Aggregate Fluctuations*, 80 ECONOMETRICA 1977, 2003 (2012).

11. *See* Harri Kemp, Rafael Portillo & Marika Santoro, *Assessing the Impact of Supply Disruptions on the Global Pandemic Recovery* 2, 13, 18–20 (Int'l Monetary Fund, Working Paper No. WP/23/42, 2023), https://www.imf.org/en/Publications/WP/Issues/2023/02/24/Assessing-the-Impact-of-Supply-Disruptions-on-the-Global-Pandemic-Recovery-530165# [https://perma.cc/35Q5-M9WR]; *see also* Vasco M. Carvalho, Makoto Nirei, Yukiko U. Saito & Alireza Tahbaz-Salehi, *Supply Chain Disruptions: Evidence from the Great East Japan Earthquake*, 136 Q.J. ECON. 1255, 1257 (2021).

12. Xiwen Bai, Jesús Fernández-Villaverde, Yiliang Li & Francesco Zanetti, *The Causal Effects of Global Supply Chain Disruptions on Macroeconomic Outcomes: Evidence and Theory* 4 (Nat'l Bureau of Econ. Rsch., Working Paper No. 32098, 2024), https://www.nber.org/papers/w32098 [https://perma.cc/F7HN-8MQR]; Robin Brooks, Peter R. Orszag & William E. Murdock III, *The Lagged Effects of COVID-19 Supply Chain Disruptions on Inflation*, BROOKINGS INST. (Aug. 1, 2024), www.brookings.edu/articles/the-lagged-effects-of-covid-19-supply-chain-disruptions-on-inflation [https://perma.cc/VM9Z-LPZB].

13. *See* Janet Nguyen, *Incumbents Are Losing Around the World, Not Just the U.S.*, MARKETPLACE (Nov. 14, 2024), https://www.marketplace.org/2024/11/14/incumbents-are-losing-around-the-world-not-just-the-u-s [https://perma.cc/2ZS9-R5S6] (identifying the link between inflation and incumbent losses).

14. It is worth noting that the supply chain crisis of the early 2020s is hardly the first of its kind in recent world history. The 1970s stagflation took a similar form. The famous inflation of that period

definition of a supply shortage is when the production and distribution of a critical resource hits its capacity constraint.[15] An economy's capacity is its finite ability to produce goods and services, as determined by the stock of technology, capital, and labor.[16]

In textbook microeconomic models, there are no capacity constraints. Supply curves are depicted as sloping infinitely upward and outward: as much as prices increase, quantity supplied can always increase commensurately.[17] But in reality, supply curves are convex: as prices increase, supply tends to increase somewhat more slowly.[18] In the limit, supply curves can go vertical. No matter how much prices rise, producers cannot out-produce their capacity constraints.[19]

Just as supply shortages have emerged as the macroeconomic challenge of the moment, resilience has emerged as the corresponding cure. The 2022 Economic Report of the President defines resilience as the ability of supply chains to recover quickly from unexpected events.[20] For our purposes, resilience is the ability to supply desired goods or services at a relatively consistent cost across a range of circumstances. But while resilience is important, it is not the only value. The type of resilience we are concerned with here is not resilience at any price, but rather *optimal* resilience—reliability at an appropriate price.[21]

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was largely attributable to supply shocks to two critical commodities, oil and grain, rather than demand outstripping supply at the aggregate level. *See generally* Alan S. Blinder & Jeremy B. Rudd, *The Supply-Shock Explanation of the Great Stagflation Revisited*, *in* THE GREAT INFLATION: THE REBIRTH OF MODERN CENTRAL BANKING 119, 121 (Michael D. Bordo & Athanasios Orphanides eds., 2013); BARRY P. BOSWORTH & ROBERT Z. LAWRENCE, COMMODITY PRICES AND THE NEW INFLATION (1982); May Peters, Suchada Langley & Paul Westcott, *Agricultural Commodity Price Spikes in the 1970s and 1990s: Valuable Lessons for Today*, U.S. DEP'T OF AGRIC.: ECON. RSCH. SERV. (Mar. 1, 2009), https://www.ers.usda.gov/amber-waves/2009/march/agricultural-commodity-price-spikes-in-the-1970s-and-1990s-valuable-lessons-for-today [https://perma.cc/MA87-8YA2].

15. *See* Diego Comin, Robert C. Johnson & Callum Jones, Supply Chain Constraints and Inflation 1 (May 9, 2024) (unpublished manuscript), https://tobin.yale.edu/sites/default/files/2024-05/CJJ%20May%202024.pdf [https://perma.cc/UL8H-KQJ6].

16. *See* Pejman Bahramian & Andisheh Saliminezhad, *Does Capacity Utilization Predict Inflation? A Wavelet Based Evidence from United States*, 58 COMPUTATIONAL ECON. 1103, 1103–04 (2021).

17. *See* Christoph Boehm & Nitya Pandalai-Nayar, *Convex Supply Curves* 35 (Nat'l Bureau of Econ. Rsch., Working Paper No. 26829, 2020), https://www.nber.org/system/files/working_papers/w26829/w26829.pdf [https://perma.cc/WE8Q-E567].

18. *See id.* at 1, 11.

19. *See id.* at 1 ("We argue that convex supply curves at the industry level arise from capacity constraints at the plant level.").

20. *See* COUNCIL OF ECON. ADVISERS, ECONOMIC REPORT OF THE PRESIDENT 191 (2022), https://bidenwhitehouse.archives.gov/wp-content/uploads/2022/04/2022-ERP-Book-wCover-final.pdf [https://perma.cc/N4TA-XGRZ].

21. *See* Agostino Capponi, Chuan Du & Jospeh E. Stiglitz, *Are Supply Networks Efficiently Resilient?* 3–4 (Nat'l Bureau of Econ. Rsch., Working Paper No. 32221, 2025), https://www.nber.org/system/files/working_papers/w32221/w32221.pdf [https://perma.cc/W87P-S6YQ].

There are many strategies to achieve resilience, some of which rely more on ex ante preparation and others more on ex post adaptation. During the Biden presidency, the U.S. government started to monitor firms' vulnerability to supply shortages more actively and encouraged firms to invest in resilience. President Biden's three major pieces of economic legislation—the Bipartisan Infrastructure Law, the CHIPS and Science Act, and the Inflation Reduction Act—all contained significant supply-chain investments.[22] In President Trump's second term, the government has instead moved to purchasing shares in critical domestic suppliers such as semiconductor manufacturer Intel and rare-earths miner MP Materials.[23] As its trade policies disrupt supply, the government is seeking to ballast domestic production.

These fledgling efforts to make production more resilient build on murky conceptual foundations. What do we know about whether, absent specific intervention, firms will sufficiently invest in resilience? Under what conditions do they and don't they? And what does law have to do with it? That is, how does law calibrate market incentives toward or away from promoting resilience? Finally, how should law be reformed to better promote optimal resilience?

These questions have received strikingly little attention in the legal, and until recently, the economics literature.[24] This oversight is particularly apparent when comparing it with scholarly attention to other questions involving externalities, such as innovation or pollution.[25] Scholars have, with good reason, lavished attention on the role legal institutions such as intellectual property and tort law play in securing the appropriate level of

22. *See* Infrastructure Investment and Jobs Act, Pub. L. No. 117-58, 135 Stat. 429 (2021); CHIPS and Science Act, Pub. L. No. 117-167, 136 Stat. 1366 (2022); Inflation Reduction Act of 2022, Pub. L. No. 117-169, 136 Stat. 1818.

23. Martha Muir & Steff Chávez, *Pentagon Strikes Investment Deal with US Critical Minerals Producer*, FIN. TIMES (July 10, 2025), https://www.ft.com/content/6693da6f-7cb7-4c74-8c4f-45b1bf533cbe [https://perma.cc/2G94-ARY5]; Tony Romm & Ana Swanson, *After U.S. Takes Stake in Intel, Trump Pledges 'Many More' Deals*, N.Y. TIMES (Aug. 25, 2025), https://www.nytimes.com/2025/08/25/us/politics/trump-intel-economy-strategy.html [https://perma.cc/4ARN-6BEJ].

24. For counterexamples in the legal literature, see Matthew Jennejohn, *The Transactional Dynamics of Market Fragility*, 85 LAW & CONTEMP. PROBS. 281 (2022); Aneil Kovvali, *Essential Businesses and Shareholder Value*, 2021 U. CHI. LEGAL F. 191; Timothy Meyer, *Trade Law and Supply Chain Regulation in a Post-COVID-19 World*, 114 AM. J. INT'L. L. 637 (2020); Timothy Meyer & Ganesh Sitaraman, *The National Security Consequences of the Major Questions Doctrine*, 122 MICH. L. REV. 55, 76–77 (2023); Ganesh Sitaraman, *A Grand Strategy of Resilience: American Power in the Age of Fragility*, FOREIGN AFFS., Sept.–Oct. 2020, at 165.

25. These externalities can be quite related. For example, the innovation externality and resilience externality are both at work in the case of vaccines. *See, e.g.*, Rachel Glennerster, Catherine Che, Sarrin M. Chethik, Claire T. McMahon & Christopher M. Snyder, *Investing in Vaccines to Mitigate Harm from COVID-19 and Future Pandemics* (Nat'l. Bureau of Econ. Rsch., Working Paper No. 32984, 2024), https://www.nber.org/papers/w32984 [https://perma.cc/55S7-DXBU].

research and environmental caution. As we show in this Article, legal rules also play a key role in either fostering or undermining market resilience.

Resilience can best be seen by its absence: by a market's inability to deliver goods and services reliably. Examples abound: mask and ventilator stock-outs during the early months of COVID-19; blackouts in the Texas winter; recurrent shortages of generic injectable drugs. In some of these cases, a firm defaulted on a contract. In others, the market as a whole failed to offer the goods or services for which others relied on it at a competitive price. What unites these examples, and the nature of resilience more generally, is the existence of what seems to be a market failure. Firms in and out of the market fail to internalize the cost of disruption to the public and therefore undersupply resilience. We call this shortcoming the resilience externality.[26]

Market failure can also cut in the opposite direction: A market could, in theory at least, *over-supply* resilience. That is, an industry could invest more in resilience than an ideal social planner would like. For example, an industry might have inefficiently many firms, or firms might spend too much money on securing their supply chains. Just as some markets feature too many entrants, or too much research and development, markets can be overly resilient.[27] The money spent on resilience, after all, could go toward other ends. This over-spending on resilience is possible because each firm values its own profits but is indifferent to its rivals' profits. Following the economics literature, we refer to the market incentive to over-invest in resilience as the business-stealing externality.[28]

Though both externalities are relevant, we argue that in most markets the resilience externality will tend to dominate. Direct empirical evidence on this question is scant, so we draw on related evidence as to other externalities, and the predominance of moral hazard, to make the case that most firms are probably incentivized to invest too little in securing their reliability. These findings in turn suggest that specific markets will be most susceptible to undershooting investments in resilience. In particular, these will be markets for bottleneck products, as well as markets featuring weak competition, high demand variability, and large resilience benefits of product diversity or multiplicity. Moreover, the resilience externality will grow larger when disruptive scenarios are more frequent. During a time of supply shocks created both by natural disasters and political decisions, it becomes all the more important that firms protect themselves—and, in turn,

26. *See infra* Section I.B.
27. *See* Glenn C. Loury, *Market Structure and Innovation*, 93 Q.J. ECON. 395, 403–05 (1979).
28. *See infra* Section I.C.

protect downstream counterparties and the public.[29] In this sense, the resilience externality is a key mechanism by which wars, pandemics, extreme weather, and unexpected changes to trade policies cause economic pain.

Identifying the impact of the resilience externality naturally leads to the question: What can be done about it? We consider two complementary strategies for promoting resilience: resilience regulation and business law. Resilience regulation refers to legal regimes and policy instruments that are squarely focused on resilience, such as strategic reserves of critical resources, incentives to increase output in fragile markets, and ex post emergency bailouts.[30] Resilience regulation requires an intensive, often industry-specific administrative arrangement.

Meanwhile, it is possible to incorporate resilience considerations into the everyday functioning of business law—e.g., torts, contracts, and so on. We argue that the case for specialized resilience regulation is strongest when the public sector has a comparative advantage in achieving resilience, specialized market administrators are capable of making sensible resilience planning decisions, and the benefit of spreading costs across society outweighs the risk of moral hazard.[31] These conditions are most likely to obtain in a select set of industries that require dedicated treatment to improve resilience above that incentivized by business law.

Within business law, we use our framework to analyze how some of the most important legal regimes governing corporate conduct interact with resilience incentives. In tort law, for example, the tort of public nuisance provides a potentially compelling avenue for public officials to seek damages from central firms that cause unreasonable service disruptions.[32] In contract law, resilience concerns may justify ordering specific performance more liberally than courts ordinarily do.[33] In antitrust law, resilience considerations complicate the standard analysis of vertical mergers by revealing countervailing forces.[34] We consider like-minded revisions to corporate law and bankruptcy law, as well. Business law may be especially important as a bulwark against the resilience externality when federal policymakers are actively exacerbating supply uncertainty, or are uninterested in pursuing adequate resilience regulation.

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29. *See* Tim Sahay, *A Year in Crises*, PHENOMENAL WORLD (Dec. 21, 2023), https://www.phenomenalworld.org/analysis/a-year-in-crises [https://perma.cc/ZSC6-5VJR].

30. *See infra* Section II.B.

31. *See infra* Section II.C.

32. *See infra* Section III.A.

33. *See infra* Section III.B.

34. *See infra* Section III.C.

At a methodological level, this Article aims to link, and critique, the fields of law and macroeconomics and law and economics. Law and economics has laid the foundation for reasoning about the mutually reinforcing nature of legal rules and economic welfare. More recently, pioneering work in law and macroeconomics has expanded the aperture to consider how law affects welfare at the macroeconomic scale.[35] But neither framework has squarely examined the resilience externality. This is because law and economics has traditionally been focused on single-market analysis—indeed, there are many valuable studies of resilience in individual sectors, especially the financial sector and energy markets[36]—while law and macroeconomics has taken the relationship between law and the business cycle as its object of study.

We aim to broaden both frames, showing how microeconomic foundations—in the form of externalities shaped by law, and faced by individual firms—can alter the risk of macroeconomically important shocks, all without any necessary reference to the business cycle. Supply shocks should join the business cycle as the core subjects of law and macroeconomic analysis, but expanding the field in this way will require starting from microeconomic incentives faced by individual firms.

The Article proceeds as follows. In Part I, we theorize the causes of resilience and of its absence. We begin by arguing that corporate investment in resilience is the most important factor for explaining the degree of resilience in individual markets. We then turn to the incentives that explain resilience investment: the resilience externality and the business-stealing externality. The available evidence suggests that the resilience externality dominates in most settings. In Part II, we explore the alternative approaches to mitigating the resilience externality: resilience regulation, business law, and insurance. We view resilience regulation and business law as complementary, though the optimal mix between the two will differ by market and depend, in part, on political circumstances and possibilities.

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35. *See, e.g.*, Yair Listokin, *A Theoretical Framework for Law and Macroeconomics*, 21 AM. L. & ECON. REV. 46, 49 (2019); Anna Gelpern & Adam J. Levitin, *Considering Law and Macroeconomics*, 83 LAW & CONTEMP. PROBS. i, i–xviii (2020).

36. *See, e.g.*, Alessandro Romano, Luca Enriques & Jonathan R. Macey, *Extended Shareholder Liability for Systemically Important Financial Institutions*, 69 AM. U. L. REV. 967 (2020) (on shareholders' incentives for excessive risk-taking in the financial sector); Iman Anabtawi & Steven L. Schwarcz, *Regulating* Ex Post*: How Law Can Address the Inevitability of Financial Failure*, 92 TEX. L. REV. 75, 113 (2013) (on ex post adaptation and resilience in the financial sector); Alexandra Klass, Joshua Macey, Shelley Welton & Hannah Wiseman, *Grid Reliability Through Clean Energy*, 74 STAN. L. REV. 969, 1005 (2022) (proposing energy law reforms in service of grid reliability and resilience); Jim Rossi & Michael Panfil, *Climate Resilience and Private Law's Duty to Adapt*, 100 N.C. L. REV. 1135, 1138 (2022) (proposing a negligence tort for private utilities' failure to make efforts at climate resilience).

Drawing on our new framework, in Part III we analyze some of the most relevant domains of business law through the lens of the resilience externality. In each domain, we investigate how current law affects firms' resilience incentives, draw attention to possible reforms that could better align firms' incentives with the societal interest in resilience, and discuss whether it would be wise to pursue resilience-minded reform inside that body of law as opposed to elsewhere.

I. THE CAUSES OF RESILIENCE

In this Part, we introduce our theory of the origins of resilience. We understand resilience as the ability of markets to reliably and optimally meet demand for goods and services across a range of circumstances.[37] Inherent to resilience is a degree of consistency: the ability to meet demand not just on an ordinary day, but also when things go wrong.

At a conceptual level, there are two ways to increase a market's resilience. First, individual firms can increase their own resilience. We refer to such choices as investing in resilience. Second, additional firms (or government actors) can enter a market and substitute for the shortcomings of other firms that failed to sufficiently invest in resilience. We begin this Part by explaining why we view investment as the predominant force in achieving resilience, even as entry plays an important secondary role. Next, we argue that the main forces affecting firms' investment in resilience are two externalities—that is, benefits conferred on, or costs extracted from, society but ignored by firms. We refer to these as the resilience externality and the business-stealing externality. The available evidence suggests that on balance the resilience externality dominates, such that markets typically underinvest in resilience. The interaction between these externalities will help explain where the problem is the worst, and what the law can do both before and after crises to address the problem.

A. Resilience as Investment

Firms can invest in their own resilience, giving them a better shot at running smoothly during a crisis.[38] Investing in resilience can entail

37. This definition draws on prior work in economics. *See* COUNCIL OF ECON. ADVISERS, *supra* note 20, at 191 (defining resiliency as the ability to recover quickly in the face of adversity); Capponi et al., *supra* note 21, at 2–3 (describing how markets that are "efficiently resilient strike[] the optimal balance" between over- and under-investment in capacity).

38. *See, e.g.*, Juanma Castro-Vincenzi, Guarav Khanna, Nicolas Morales & Nitya Pandalai-Nayar, *Weathering the Storm: Supply Chains and Climate Risk* 5 (Nat'l. Bureau of Econ. Rsch., Working

increasing one's production capacity so as to withstand a segment of production failing, investing more in relationships with each supplier, seeking out more suppliers, or creating redundancies in one's production network.[39] For example, telecommunications company Cisco revamped its supply chain tracking after Hurricane Katrina, when it was unable to keep up with the $1 billion in new orders following the storm.[40] The company focused on highly profitable products that were typically needed on short timelines, such as customized routers, and invested in redundant suppliers and factories to maintain production during a crisis.[41] That planning allowed Cisco to respond quickly to the 2011 Tōhoku tsunami in Japan, pinpointing more than 300 suppliers and 7,000 parts affected by the disaster within 12 hours, and finding alternatives as needed. Firms can plan ahead in other ways; numerous industries prepared for the second Trump presidency by stockpiling goods they anticipated being subject to tariffs.[42]

One way firms can invest in their resilience is by building relationships with their suppliers, rather than prioritizing the cheapest source of supply. In a series of studies of the apparel market, Julia Cajal-Grossi and colleagues found that buyers in long-term bilateral agreements with sellers paid higher markups than buyers on the garment spot market and received more reliable service.[43] These so-called relational buyers also saw their imports drop less steeply in the face of COVID-19 than other buyers.[44] Gaurav Khanna and colleagues, studying firms in a large Indian state, found that customers with more complex supply chains were more likely to maintain supply

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Paper No. 32218, 2025), https://www.nber.org/system/files/working_papers/w32218/w32218.pdf [https://perma.cc/7D9U-YWYR]; Gaurav Khanna, Nicolas Morales & Nitya Pandalai-Nayar, *Supply Chain Resilience: Evidence from Indian Firms* 1, 3 (Nat'l Bureau of Econ. Rsch., Working Paper No. 30689, 2025), https://www.nber.org/papers/w30689 [https://perma.cc/4TXC-CTSJ]; Valerie Reitman, *Toyota Motor Shows Its Mettle After Fire Destroys Parts Plant*, WALL ST. J. (May 8, 1997), https://www.wsj.com/articles/SB863043244663561500 [https://perma.cc/UK3N-LLAJ]. This characteristic is sometimes called "robustness" in the business literature. *See* Richard Baldwin & Rebecca Freeman, *Risks and Global Supply Chains: What We Know and What We Need to Know*, 14 ANN. REV. ECON. 153, 158 (2022).

39. Matthew Elliott, Benjamin Golub & Matthew V. Leduc, *Supply Network Formation and Fragility*, 112 AM. ECON. REV. 2701, 2704 n. 7 (2022).

40. María Jesús Sáenz & Elena Revilla, *Creating More Resilient Supply Chains*, MIT SLOAN MGMT. REV. (Jun. 17, 2014), https://sloanreview.mit.edu/article/creating-more-resilient-supply-chains [https://perma.cc/8PMT-WVR9].

41. *See id.*

42. Daisuke Wakabayashi, *American Businesses in 'Survival Mode' as Trump Tariffs Pile Up,* N.Y. TIMES (Aug. 20, 2025), https://www.nytimes.com/2025/08/20/business/trump-china-tariffs-american-importers.html [https://perma.cc/T9NC-LXVH]; Zehra Munir & Michael Peel, *US Groups Raced to Stockpile Pharmaceuticals Ahead of Tariffs*, FIN. TIMES (May 12, 2025), https://www.ft.com/content/bcf501c7-9c7f-40ed-8da2-be6fb769a106 [https://perma.cc/3G4B-LE5L].

43. Julia Cajal-Grossi, Davide Del Prete & Rocco Macchiavello, *Supply Chain Disruptions and Sourcing Strategies*, 90 INT'L J. INDUS. ORG., Sept. 2023, art. no. 103004.

44. *Id.*

connections during the COVID-19 lockdowns than those with simpler supply chains, which the authors attributed to investments in corporate relationships.[45] Juanma Castro-Vincenzi and colleagues found that Indian firms respond to the risk that suppliers will be hit by a flood by paying higher prices to obtain supplies from multiple suppliers located in drier regions.[46] Firms can and often do spend their way to greater reliability.

Timely entry by new firms can mitigate firms' failure to invest in resilience. If entering firms quickly replace the output of the failed firm, the failure may be almost immaterial to counterparties. Speedy entry is a key cause of many procompetitive effects, like increased output and reduced prices, that result from the existence of supply alternatives.[47] As one example, consider Toyota's response to a fire that halted production of a sole-sourced brake valve in 1997. The automaker scrambled to recruit thirty-six new manufacturers—including "a sewing-machine maker that had never made car parts"—to assemble the valves.[48] After only five days, Toyota's 14,000-car-a-day operation in Japan was back up and running. Similarly, companies around the globe repurposed their factories to address shortages during the early months of the COVID-19 pandemic.[49]

The relevance of entry varies drastically across markets. For homogeneous goods like crude oil, price signals can lead alternate producers to spring into action and rapidly produce replacements. But new entry is unlikely to prevent disruption if a producer of a specialized intermediate part (e.g., a jet engine) is unable to deliver.[50] Empirical studies generally find that firms cannot find substitutes for intermediate parts in the short run.[51] Firm investment may also be the only option in markets with high switching costs or legal barriers to entry, such as business lending or

45. *See* Khanna et al., *supra* note 38, at 3.

46. *See* Castro-Vincenzi et al., *supra* note 38.

47. *See, e.g.*, U.S. DEP'T OF JUST. & FED. TRADE COMM'N, MERGER GUIDELINES § 2.4.A (2023), https://www.justice.gov/d9/2023-12/2023%20Merger%20Guidelines.pdf [https://perma.cc/WJ6E-MMBP] [hereinafter 2023 MERGER GUIDELINES]; Amanda Starc & Thomas G. Wollmann, *Does Entry Remedy Collusion? Evidence from the Generic Prescription Drug Cartel*, 115 AM. ECON. REV. 1400 (2025).

48. *See* Reitman, *supra* note 40.

49. *Id.*; *see also* Jamie L. LaReau, *GM and Ford End Critical Care Ventilator Production*, DET. FREE PRESS (Sept. 1, 2020), https://www.freep.com/story/money/cars/general-motors/2020/09/01/gm-and-ford-deliver-last-ventilators-amid-coronavirus/3449490001 [https://perma.cc/HY3W-RY3M].

50. *See* Baldwin & Freeman, *supra* note 38, at 158–59.

51. *See* Enghin Atalay, *How Important Are Sectoral Shocks?*, AM. ECON. J. MACROECONOMICS, Oct. 2017, at 254, 255; Christoph E. Boehm, Aaron Flaaen & Nitya Pandalai-Nayar, *Input Linkages and the Transmission of Shocks: Firm-Level Evidence from the 2011 Tōhoku Earthquake*, 101 REV. ECON. STAT. 60, 60 (2019); *see also* BARRY C. LYNN, END OF THE LINE: THE RISE AND COMING FALL OF THE GLOBAL CORPORATION 220 (2005); Caroline Freund, Aaditya Mattoo, Alen Mulabdic & Michele Ruta, *Natural Disasters and the Reshaping of Global Value Chains*, 70 IMF ECON. REV. 590, 591 (2022).

pharmaceuticals.[52] For example, scholars have found that prices increase when a drug goes into shortage, but regulatory barriers prevent sufficiently speedy entry to meet demand or bring prices back in line.[53] In these markets, firm investments in resilience are key to avoiding disruptions.[54] In most of what follows, we treat firm investment as the relevant causal mechanism that leads to resilience, while recognizing that competition and entry modify the incentive to invest.[55]

B. The Resilience Externality

In this Section, we argue that the ultimate cause of firms' failures to invest in resilience, insofar as such failures occur, is what we call the resilience externality. Three key facts explain why the resilience externality exists, and why it matters. First, resilience provides significant benefits to trading partners and to society at large. Second, firms do not fully reap the benefits of the reliability they provide. Third, firms do not pay the full price of the harm they inflict when they act unreliably.

1. Resilience Is Socially Beneficial

Corporate reliability plays a key role in economic growth and wellbeing. The economy is a highly fragmented set of planners—firms, government agencies, workers, customers, and so on—and it is difficult for them to engage in long-term planning without reliable trading partners. This fact relates to what economist Michael Kremer calls the "o-ring theory of economic development"—the idea, illustrated by the *Challenger* space shuttle disaster, that complex enterprises require a minimal level of reliability at many different tasks to pull off.[56] In the case of *Challenger*, the malfunctioning of a single cheap rubber component known as an o-ring led the shuttle to explode.[57] So too, complex economic endeavors—for example, building an airplane—can easily be derailed by weak links in the

52. *See* Gabriel Chodorow-Reich, *The Employment Effects of Credit Market Disruptions: Firm-Level Evidence from the 2008–9 Financial Crisis*, 129 Q.J. ECON. 1, 1 (2014) (high switching costs in business lending markets); Starc & Wollmann, *supra* note 47 (high switching costs in pharmaceutical markets).

53. *See* Anaïs Galdin, Resilience of Global Supply Chains and Generic Drug Shortage 11–12 (Dec. 15, 2025) (unpublished manuscript), https://agaldin.github.io/webfiles/GALDINAnais_JMP_OffshoringShortages.pdf [https://perma.cc/79U7-BQVC]; Starc & Wollmann, *supra* note 47.

54. *See* Elliott et al., *supra* note 39, at 2704.

55. *See* Doni Bloomfield, *Competition and Risk*, 86 ANTITRUST L.J. 63, 68, 77 (2024).

56. *See* Michael Kremer, *The O-Ring Theory of Economic Development*, 108 Q.J. ECON. 551, 551 (1993); Charles I. Jones, *Intermediate Goods and Weak Links in the Theory of Economic Development,* AM. ECON. J. MACROECONOMICS, Apr. 2011, at 1, 2.

57. *See* Kremer, *supra* note 56, at 551.

production chain.[58] Such disruptions do not only undermine economic growth; they also help explain macroeconomic fluctuations in the short and medium term. A key producer's failure not only harms immediate trading partners but can also cause a chain reaction as shortages and stop-orders spill over up and down the chain.

Many individual producers matter to society at large because companies depend on specific or customized inputs that are challenging to substitute in the short run. That inability to find substitutes amplifies temporary shortages into harms affecting a whole economy. The 2011 Tōhoku tsunami and the COVID-19 pandemic have provided clarifying evidence of how shortages damage broad supply chains. Christoph Boehm and colleagues found that after the tsunami led many Japanese firms to pause local production, their U.S. affiliates and other dependent customers could find effectively no substitutes in the short run.[59] This led them to curtail output on a virtually one-to-one basis with the decline in imports. The earthquake in Japan in this way caused a 1% decline in U.S. manufacturing.[60] Economists studying the same event have found that the earthquake's disruptions harmed firms several trading partners removed from the earthquake almost as much as stricken firms' immediate trading partners.[61]

In complementary work, Cevallos Fujiy and colleagues examined how Indian firms reacted to COVID-19 shutdowns in other parts of the country. They found that buyers frequently were unable to find temporary replacements for disrupted products, and that this low level of substitutability substantially increased the widespread economic hardship caused by lockdown.[62] Veronica Guerrieri and colleagues argue that the low elasticity of substitution between sectors helped explain why the COVID-19 lockdowns—which fell much more heavily on some sectors than others—had such severe economic consequences in the short run.[63] Enghin Atalay has shown that U.S. firms generally cannot substitute inputs from

58. *See* Elliott et al., *supra* note 39, at 2705 (finding, in a network model of heterogenous firms, that "a supply network is only as strong as its weakest links"); David Rezza Baqaee & Emmanuel Farhi, *The Macroeconomic Impact of Microeconomic Shocks: Beyond Hulten's Theorem*, 87 ECONOMETRICA 1155, 1155 (2019); Ernest Liu, *Industrial Policies in Production Networks*, 134 Q.J. ECON. 1883 (2019).

59. *See* Boehm et al., *supra* note 51, at 60.

60. *Id.* at 61.

61. *See* Carvalho et al., *supra* note 11, at 1258 ("[W]e find that disaster-stricken firms' customers' customers experienced a 2.8 percentage point reduction in sales growth, while their suppliers' suppliers experienced a 2.1 percentage point decline.").

62. *See* Brian Cevallos Fujiy, Devaki Ghose & Gaurav Khanna, *Production Networks and Firm-Level Elasticities of Substitution* 23–24 (STEG, Working Paper No. WP027, 2022).

63. *See* Veronica Guerrieri, Guido Lorenzoni, Ludwig Straub & Iván Werning, *Macroeconomic Implications of COVID-19: Can Negative Supply Shocks Cause Demand Shortages?*, 112 AM. ECON. REV. 1437, 1439–40 (2022).

one industry with those from another industry.[64] For this reason, shocks to specific industries frequently affect economies as a whole, and contribute significantly to overall volatility.

The benefits of resilience (and the costs of unreliability) are large, and they stem disproportionately from a small number of bottleneck industries.[65] Industries that have an especially high number of downstream links with others—paradigmatically, electricity and finance—help facilitate production in ways that are understated by their share of total GDP.[66] When these industries fail, the whole economy shudders. The idea is that a great deal of production is downstream of these industries and cannot function, or function effectively, without their input.[67] As we discuss more below, identifying these industries will be key to understanding where the resilience externality is most consequential.

2. Firms Do Not Fully Appropriate the Resilience Benefits They Supply

The fact that corporate resilience is economically important does not by itself suggest that there is a resilience externality. The problem is that firms do not adequately account for this importance because they do not sufficiently capture the benefits that their resilience provides.[68] Firms are thus systematically incentivized to under-invest in resilience.

Why do firms fail to capture the full benefits of their resilience? As an initial matter, for the same reason that consumer surplus exists in general. In competitive markets, prices are driven (imperfectly) toward marginal cost, irrespective of the value the good provides to trading partners. Any value trading partners receive from a trade above the transaction price is surplus. Consumer surplus can be large, though it is challenging to estimate empirically.[69] Even when competition is limited or wholly absent, as when

64. *See* Atalay, *supra* note 51, at 255–57.

65. *See* Acemoglu et al., *supra* note 10; Baqaee & Farhi, *supra* note 58; Saki Bigio & Jennifer La'O, *Distortions in Production Networks*, 135 Q.J. ECON. 2187, 2227 (2020); Liu, *supra* note 58; Ian Dew-Becker, *Tail Risk in Production Networks*, 91 ECONOMETRICA 2089, 2091 (2023); *see also* Jones, *supra* note 56.

66. Baqaee & Farhi, *supra* note 58, at 1194.

67. *See* Dew-Becker, *supra* note 65, at 2095 ("[N]egative productivity shocks propagate downstream through parts of the production process that are complementary, while positive productivity shocks propagate through parts that are substitutable." (equations omitted)); *id.* at 2099.

68. *See* Elliott et al., *supra* note 39, at 2738; Gene M. Grossman, Elhanan Helpman & Alejandro Sabal, *Resilience in Vertical Supply Chains* 1–2 (Nat'l Bureau of Econ. Rsch., Working Paper No. 31739, 2023); Baldwin & Freeman, *supra* note 38; Bloomfield, *supra* note 55, at 73.

69. *See* Peter Cohen, Robert Hahn, Jonathan Hall, Steven Levitt & Robert Metcalfe, *Using Big Data to Estimate Consumer Surplus: The Case of Uber* 2 (Nat'l Bureau of Econ Rsch., Working Paper

there is an oligopoly or a monopolist, consumers generally retain some amount of surplus because firms usually cannot price discriminate perfectly.[70]

The externality is compounded here because the beneficiaries of resilience are highly diffuse. That makes it harder for the market to properly account for resilience benefits. Resilience can benefit parties that are parallel to, as well as upstream and downstream of, the transaction at issue. For example, if a semiconductor fabricator always produces on time, its reliability benefits not only its immediate customer but also *other* customers, who will face reduced competition in the market for semiconductors.[71] The fabricator's reliability also helps downstream parties (e.g., smartphone purchasers) and upstream parties (e.g., lithography equipment suppliers). In this way, the resilience externality resembles some of the more famous externalities legal policies are designed to counteract, like innovation and pollution. In those examples, transacting parties radically affect third parties—often helping them, when it comes to innovation; harming them, when it comes to pollution—and the trading partners take insufficient account of those effects.[72]

The resilience externality looks a lot like the innovation externality. Inventors generally capture only a small share of the value of their new and useful inventions, even after accounting for the existence of intellectual property.[73] Useful ideas are expensive to create and cheap to copy, and IP protections are neither impermeable nor permanent. Moreover, the beneficiaries of innovation are diffuse, and often take no part in transactions involving invented products. For example, when an insurer pays for a vaccine that extends a patient's life, it does not weigh all the downstream benefits to the person's family, friends, co-workers, and so on. Nor are inventors compensated for all the potential future uses to which an invention might be put when IP rights expire. Thus, absent government intervention, inventors would likely invest an inefficiently small amount in R&D.[74] Like

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No. 22627, 2016). Note that several coauthors in Cohen et al. disclosed a financial relationship with Uber.

70. *See* Joseph E. Stiglitz, *Monopoly, Non-Linear Pricing and Imperfect Information: The Insurance Market*, 44 REV. ECON. STUD. 407 (1977).

71. In other words, because the reliable supplier's customer orders are filled, those customers do not need to seek semiconductors from others. Reliability can thus be viewed as an increase in surge capacity which helps everyone in the market. *See* Cajal-Grossi et al., *supra* note 43, and associated text.

72. *Cf.* Christopher Buccafusco & Samuel N. Weinstein, *Antisocial Innovation*, 58 GA. L. REV. 573 (2024) (on potential downsides of innovation).

73. *See infra* notes 94–96.

74. This is not to suggest that in an ideal world inventors would fully appropriate the value of their innovations, but that in some situations IP still does not adequately compensate inventors. *See* Brett M. Frischmann & Mark A. Lemley, *Spillovers*, 107 COLUM. L. REV. 257 (2007).

innovation, investments in resilience often help rivals and, also like innovation, the investment's beneficiaries are dispersed and often removed from relevant market transactions. Although the analogy is not perfect, it furthers the case for thinking that the resilience externality is sizable.

3. Resilience Failures Are Under-Punished

Firms are not only insufficiently *rewarded* for resilience; they are also *under-punished* for failing to be resilient. That is, firms face moral hazard. This can manifest in several ways.

For one thing, in imperfectly competitive markets, suppliers can take advantage of supply crises to exercise market power. That makes shocks less painful to suppliers than society would wish them to be. Agostino Capponi and colleagues argue that the ability to exercise market power during a shock thus pushes firms to underinvest in capacity: "When upstream firms over-invest in capacity, part of the cost savings are passed on to downstream firms via lower prices; but when firms underinvest, they can defend their profit margins in spite of mounting costs by charging higher prices."[75] This appears to have happened, for example, in meatpacking markets in the early months of COVID-19,[76] and may also help explain some of the inflationary spikes later in the pandemic.[77] To be clear, this does not mean that firms *seek out* crises to charge higher prices. Instead, the ability to charge higher prices in a crisis weakens the incentive to invest in resilient supply chains that would otherwise pertain.[78] Suppliers can make up for crisis-induced higher cost or lower volume by increasing markups.

A recent study of the U.S. generic injectable pharmaceuticals market provides evidence for the role moral hazard plays in the resilience externality. Anaïs Galdin examined endemic shortages in the generic injectable market in the United States between 2002 and 2019.[79] She concludes that firms are causing substantial harm by manufacturing medicines in less reliable factories, leading to shortages that cannot be

75. *See* Capponi et al., *supra* note 21, at 3; *see also* Bloomfield, *supra* note 55, at 77.

76. *See* Bloomfield, *supra* note 55, at 78–80.

77. MIKE KONCZAL & NIKO LUSIANI, ROOSEVELT INST., PRICES, PROFITS, AND POWER: AN ANALYSIS OF 2021 FIRM-LEVEL MARKUPS (2022), https://rooseveltinstitute.org/wp-content/uploads/2022/06/RI_PricesProfitsPower_202206.pdf [https://perma.cc/3N8D-QEP3]. Excess demand caused by the stimulus packages may also explain some of the inflation seen over the past few years.

78. Conceivably, the ability to charge higher prices could also lead to greater incentive on net to invest in resilience to take advantage of future crises. The reason Capponi and colleagues argue this is not the case is that such investments, by boosting capacity, can lead to lower prices in the interim. *See* Capponi et al., *supra* note 21, at 3. Future market power functions like insurance, and thus on net reduces investment in resilience.

79. *See* Galdin, *supra* note 53, at 14 ("Of the total market for generic sterile injectable drugs, fully 55% of these medicines were on the shortage list in 2011-2019.").

alleviated in the short run because of rigid capacity constraints.[80] Her economic model suggests that if generic manufacturers were penalized for shortages, prices would rise modestly but shortages would sharply decline, improving consumer wellbeing.[81] The upshot is that firms are insufficiently punished (or face insufficient threat of punishment) for their unreliability.

In addition, in many sectors of the economy, government guarantees, implicit or explicit, provide a safety net in the case of catastrophic shocks. For example, the U.S. government stepped in to save the automakers, auto-part manufacturers, and banking sector during the Great Financial Crisis; to save airlines at the start of COVID-19; and to shield Americans and U.S. small businesses writ large as the pandemic progressed.[82] The Trump administration is today investing in, and arguably bailing out, the U.S. semiconductor champion Intel, and considering other such deals.[83] These classic examples of moral hazard push firms away from preparing for risk. We discuss the resilience effects of these ex post crisis interventions more fully in Part II.

The danger of moral hazard is heightened in markets without sufficient competition. Robust competition can reduce the resilience externality by giving firms less insurance (in the form of market power) than they would otherwise have against their failure to be reliable. In addition, if one firm is hit by a shock, its rivals can sometimes take up the slack.[84] For example, consider the 2017 malware attack known as NotPetya. NotPetya caused significant damage to large companies, including the shipping giant Maersk, that were hit by the attack directly. Matteo Crosignani and colleagues found that while the attack also caused substantial harm to *customers* of those

80. *See id.* at 1–3.

81. *See id.* at 5, 49–51.

82. *See Troubled Asset Relief Program*, U.S. DEP'T OF THE TREASURY, https://home.treasury.gov/data/troubled-asset-relief-program [https://perma.cc/88MZ-VT9X]; Peter Baker, *Don't Call It a Bailout: Washington Is Haunted by the 2008 Financial Crisis*, N.Y. TIMES (June 20, 2023), https://www.nytimes.com/2023/03/14/us/politics/bailout-biden-financial-crisis.html [https://perma.cc/V6JT-SPC2]; Paul Kiel, *The Bailout Was 11 Years Ago. We're Still Tracking Every Penny*, PROPUBLICA (Oct. 3, 2019), https://www.propublica.org/article/the-bailout-was-11-years-ago-were-still-tracking-every-penny [https://perma.cc/J4HP-HCGU]; Michael Laris & Lori Aratani, *Taxpayers Spent Billions Bailing Out Airlines. Did the Industry Hold Up Its End of the Deal?*, WASH. POST (Dec. 14, 2021), https://www.washingtonpost.com/transportation/2021/12/14/airline-bailout-covid-flights [https://perma.cc/Y6CS-TAFF]; *Covid-19 Economic Relief*, U.S. DEP'T OF THE TREASURY, https://home.treasury.gov/policy-issues/coronavirus [https://perma.cc/N279-AH8Q].

83. Michael Acton & Joe Miller, *Trump Intel Deal Designed to Block Sale of Chipmaking Unit, CFO Says*, FIN. TIMES (Aug. 28, 2025) https://www.ft.com/content/29fb5020-2b25-429a-b63f-18356b467e7a [https://perma.cc/WP5C-VUUS]; Romm & Swanson, *supra* note 23.

84. *See* Starc & Wollmann, *supra* note 47 (generic drugs), Matteo Crosignani, Marco Macchiavelli & André F. Silva, *Pirates Without Borders: The Propagation of Cyberattacks Through Firms' Supply Chains*, 147 J. FIN. ECON. 432, 433 (2023) (Maersk meltdown); Jean-Noël Barrot & Julien Sauvagnat, *Input Specificity and the Propagation of Idiosyncratic Shocks in Production Networks*, 131 Q.J. ECON. 1543 (2016); Atalay, *supra* note 51; Bloomfield, *supra* note 55, at 76.

firms, those harms were "concentrated among customers that [had] fewer alternatives for the directly hit supplier."[85] A large survey of the effects of U.S. natural disasters over thirty years points in the same direction—alternative suppliers bolster resilience.[86]

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Though we have good reason to think the resilience externality exists and is material, to our knowledge there are no good empirical estimates of its size. Despite this empirical gap, we can make headway by assessing which industries will see the largest resilience externalities. We can do so by considering three variables that should predict the relative size of the externality.

First, we can consider the degree to which an industry's resilience benefits society. This is probably best measured by the industry's centrality, a mathematical measure of the degree to which other industries rely on it.[87] Shocks to central industries are much more likely to spread broadly.[88] Second, we can analyze the degree to which the industry fails to appropriate that benefit, whether because of principal-agent problems, demand variability, competition, insufficient vertical integration, or some other reason. And third, we can weigh the extent of moral hazard in the industry. Such moral hazard could depend on bailout guarantees or expectations, the extent of competition, or other factors that could shield a firm from the result of its failure during a crisis. To summarize, resilience externalities are likely most significant in industries that provide large resilience benefits, have highly distorted appropriation of those benefits, and are subject to substantial moral hazard.

C. The Business-Stealing Externality

Another incentive, known as the business-stealing externality, pushes markets toward too much investment in resilience. When multiple firms see an opportunity for profit they will each invest to secure it without fully

85. *See* Crosignani et al., *supra* note 84, at 433.

86. *See* Barrot & Sauvagnat, *supra* note 84, at 1588. For further discussion, see Bloomfield, *supra* note 55, at 76.

87. *See* Vasco M. Carvalho, *From Micro to Macro via Production Networks*, J. ECON. PERSPS., Fall 2014, at 23, 36–37; David Rezza Baqaee, *Cascading Failures in Production Networks*, 86 ECONOMETRICA 1819, 1824–25 (2018); Francis Bloch, Matthew O. Jackson & Pietro Tebaldi, Centrality Measures in Networks (Feb. 16, 2023) (unpublished manuscript), https://ssrn.com/abstract=2749124 [https://perma.cc/LM2D-RQ6K]; *see also* Bloomfield, *supra* note 55, at 93–94; Gregory Day, *The Necessity in Antitrust Law*, 78 WASH. & LEE L. REV. 1289 (2021).

88. *See* Dew-Becker, *supra* note 65, at 2091.

accounting for the effect their investment will have on other firms or the social costs of parallel investments, potentially leading to over-investment.[89] Richard Posner introduced the general version of this effect in a classic article arguing that the cost of monopoly is not only due to traditional deadweight loss—the consumption that never happens because prices are too high—but also the profligate rent-seeking that firms engage in to become a monopolist in the first place.[90] Mankiw and Whinston refined the general concept into its current form, arguing that the business-stealing externality will, in theory, lead too many firms to enter homogeneous product markets such as interchangeable commodities.[91] They reasoned that when firms enter a market, they often steal business from rivals and reduce those rivals' output. Because society cares about *total* output, but firms care only about the output they profit from, social and private motives diverge.[92]

In our context, the worry is that firms will be interested in charging unusually high prices after a shock and so invest too much in resilient supply chains. Each firm will spend up to its discounted expected value of post-crisis profits, and together these could exceed the social value of resilience. Gene Grossman and colleagues have recently presented a theoretical model they argue shows that the business-stealing externality will indeed dominate the resilience externality in many settings.[93]

Despite this theoretical concern, and though empirical evidence is scarce, we are skeptical that the business-stealing externality outweighs the resilience externality in most realistic situations. That is the conclusion of the more extensive scholarship about innovation.[94] In some fields, inventors acquire so little of the total value of their inventions that they invest much less than socially desirable, swamping business-stealing effects. For example, a recent study of pharmaceutical competition to address COVID-19 found that firms invested substantially less in creating new vaccines than

89. Richard A. Posner, *The Social Costs of Monopoly and Regulation*, 83 J. POL. ECON. 807 (1975); N. Gregory Mankiw & Michael D. Whinston, *Free Entry and Social Inefficiency*, 17 RAND J. ECON. 48 (1986); Grossman et al., *supra* note 68, at 24.

90. Posner, *supra* note 89.

91. Mankiw & Whinston, *supra* note 89.

92. *See id.* at 48.

93. *See* Grossman et al., *supra* note 68.

94. *See* Kevin A. Bryan & Heidi L. Williams, *Innovation: Market Failures and Public Policies*, *in* 5 HANDBOOK OF INDUSTRIAL ORGANIZATION 281, 287 (Kate Ho, Ali Hortaçsu & Alessandro Lizzeri eds., 2021) (citing Benjamin F. Jones & Lawrence H. Summers, *A Calculation of the Social Returns to Innovation* (Nat'l Bureau of Econ. Rsch., Working Paper No. 27863, 2020)).

the social optimum.[95] Other research underlines the conclusion that firms gain a small share of the value of their most important inventions.[96]

Several factors suggest a similar result when it comes to resilience. First, as with innovation, resilience externalities include substantial positive spillover effects on other firms.[97] Second, the possibility of reduced competition in a crisis is less enticing than it might appear, dampening the incentive to engage in resilience races. Firms are constrained in their ability to charge monopoly profits during a crisis by price-gouging laws and firms' interest in avoiding the reputational damage of being seen as taking advantage of a crisis.[98] Third, explicit or implicit governmental promises of support during a crisis further reduce the lure of serving customers in a crisis. If the government will save company A's rival B, allowing it to keep up competitive pressure during a crisis, that reduces A's incentive to invest in resilience. All the more so if the government will bail out A's failure to adequately prepare for a crisis, too. Fourth, theoretical findings about the magnitude of the business-stealing externality are quite sensitive to context. For example, in Mankiw and Whinston's model, market entry is excessive in homogeneous markets but not in markets in which product variety is valuable. In those markets, the additional value of variety overcomes the business-stealing externality and results in too little entry.[99] Many of the most critical input goods are imperfect substitutes for one another, underlining the value of variety and the rarity of truly homogeneous markets.[100]

None of this is to say that firms are indifferent to resilience; they clearly are not. Witness the intense efforts to prepare for the Trump tariffs, to deliver goods during COVID-19, or to route around the Red Sea during the frequent Houthi attacks beginning in late 2023. Firms engage in impressively long-range planning. Still, these efforts are likely smaller than socially desirable. Because the evidence suggests that insufficient resilience is costlier than over-investment in resilience, and that the markets affected

95. Kevin A. Bryan, Jorge Lemus & Guillermo Marshall, *R&D Competition and the Direction of Innovation*, 82 INT'L J. INDUS. ORG., 2022, art. no. 102841, at 14.

96. *See* Ashish Arora, Sharon Belenzon & Lia Sheer, *Knowledge Spillovers and Corporate Investment in Scientific Research*, 111 AM. ECON. REV. 871 (2021) (finding that companies reduce research output when the research is benefitting rivals); Kyle R. Myers & Lauren Lanahan, *Estimating Spillovers from Publicly Funded R&D: Evidence from the US Department of Energy*, 112 AM. ECON. REV. 2393, 2393 (2022) ("[F]or every patent produced by grant recipients, three more are produced by others who benefit from spillovers.").

97. *See, e.g.*, Cajal-Grossi et al., *supra* note 35.

98. These effects also reduce the benefits of competition for reducing the resilience externality.

99. Mankiw & Whinston, *supra* note 89, at 49.

100. *See* Baqaee & Farhi, *supra* note 58, at 1157 n.2; *see also* Capponi et al., *supra* note 21, at 5 ("An economy exhibiting . . . higher substitutability . . . will be more efficiently resilient.").

by insufficient resilience are especially important, in the remainder of the Article we focus largely on addressing the resilience externality.

II. WHO SHOULD BE RESPONSIBLE FOR RESILIENCE?

Identifying the resilience externality is only the first step toward achieving optimal resilience. The next step is more difficult: determining the legal and policy tools best suited to mitigating the externality. At a high level, there are two distinct (but possibly complementary) strategies to pursuing resilience through law. First, to the extent that the ordinary operation of business law—e.g., contract law, corporate law, and so on—affects firms' resilience incentives, it may be possible to reform those bodies of law to better promote resilience. We refer to this approach as the business law approach. Second, there exist specialized bodies of law and policy that operate principally in pursuit of resilience. We refer to the operation of these systems and the creation of new ones as the resilience regulation approach. In this Part, we first introduce the resilience regulation approach, which is likely less familiar to readers than the core bodies of business law. We then suggest general principles for choosing between (or pairing) business law and resilience regulation. The following Part then examines potential applications of resilience thinking to several areas of business law.

A. The Resilience Regulation Approach

Direct regulation of business reliability can effectively reduce the resilience externality. We refer to "resilience regulation" as those legal and policy regimes that operate for the explicit, focused purpose of promoting resilience. Resilience regulation is widespread, and visible within almost every industry's regulatory environment once one looks for it. The FCC administers Network Outage Reporting Rules that require telecommunications firms to report network outages, and the agency can fine carriers for unapproved failures of network access.[101] The USDA's Food Safety and Inspection Service tests products at slaughterhouses to identify food-borne illnesses, aiming to alert food producers before outbreaks become more widespread and costly.[102] Most state utility regulators require public utilities to provide continuity of service or risk

101. *See* 47 C.F.R. §§ 4.9, 9.19 (2025); *see also* 47 U.S.C. § 214(a).

102. *See* FSIS Directive 5100.5, Public Health Regulations and FSIS Response to Elevated Public Health Regulation Noncompliance Rates (U.S.D.A. 2019) (providing protocols for promulgating "early warning alerts" triggered by noncompliance at testing sites).

revocation of their privileges.[103] All of these approaches operate on an industry-specific basis and are administered by a regulator or market administrator.

These examples give the sense that resilience regulation is everywhere. While that is true, we view a smaller subset of regulatory regimes as distinctively central to the resilience challenge. In this Section, we briefly review three major approaches to resilience regulation.[104] First, the state requires or incentivizes private firms to maintain a certain quantity of production capacity ex ante, which we term quantity targeting. Second, the state requires or practically effectuates a minimum price or a band of prices ex ante, so as to incentivize the maintenance of production levels, which we term price targeting. Third, the state maintains a stockpile of critical resources as preparation for shortages. These three approaches do not exhaust the possibilities of resilience regulation, but they illustrate its prevailing patterns.

1. Quantity Targeting

Quantity targeting is the most direct response to the resilience externality. When there is a risk of too little production of some critical good or service, one response is for law to mandate or incentivize a higher volume of production. This form of intervention is somewhat rare. It is much more common for policy to target *prices* in the hope that higher prices will encourage sufficient production (as discussed below). Historically, quantity targeting has been most prevalent in the form of wartime production quotas.[105] Today, the most widespread application of quantity targeting is in electricity resource adequacy policies.

Electricity resource adequacy policies are intended as a solution to the problem of insufficient energy supply at times of peak demand.[106] The primary mechanism for matching supply and demand of electricity across the United States is known as an "energy-only" market. There, load-serving

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103. *See, e.g.*, 52 PA. CODE § 27.13 (2025); MORGAN RICKS, GANESH SITARAMAN, SHELLY WELTON & LEV MENAND, NETWORKS, PLATFORMS, AND UTILITIES: LAW AND POLICY 12–13 (2022).

104. One additional, intuitively appealing approach to ensuring regular supply at consistent prices might be price caps. Because we believe it likely that price controls would in most cases unduly risk supply disruptions and inefficient metering (e.g., gasoline lines), we do not consider such controls in detail here, though we recognize there is substantial debate about their efficacy. *See, e.g.*, H.E. Frech III & William C. Lee, *The Welfare Cost of Rationing-by-Queuing Across Markets: Theory and Estimates from the U.S. Gasoline Crises*, 102 Q.J. ECON. 97 (1987); Max N. Helveston, *Regulating Economic Opportunism in Postdisaster Markets*, 102 N.C. L. REV. 811 (2024).

105. On the history of production mandates in wartime, see Mariano-Florentino Cuéllar, *Administrative War*, 82 GEO. WASH. L. REV. 1343, 1370–77 (2014).

106. *See generally* TODD S. AAGAARD & ANDREW N. KLEIT, ELECTRICITY CAPACITY MARKETS (2022).

entities (i.e., entities responsible for providing electricity to customers) bid to buy energy on a spot market and generators decide whether to produce and sell at the marginal price.[107] For a variety of reasons, energy-only markets do not always supply as much energy as is needed, at least not at prices that consumers and regulators deem acceptable.[108] Because maximum prices are capped by law, the marginal suppliers often do not make enough of a profit during shortages to cover their fixed costs.[109] Some extra pot of money is then needed to ensure that someone is available to meet peak demand.

That pot of money is provided by a capacity market or a capacity requirement. Capacity markets are administrative processes in which, years ahead of time, generators agree to provide, and load-serving entities agree to buy, some *extra* quantity of electricity above that which transacts in the primary market.[110] Capacity requirements or reserve obligations forego the market mechanism and instead directly obligate load-serving entities to procure a margin of reserve capacity.[111] Either version generates more electricity than the energy-only market would have provided.

Quantity targeting in the electricity sector tends to run into two major problems. First, the policies tend to overshoot and end up procuring more capacity than turns out to be needed.[112] This stems from the basic difficulty of forecasting how much capacity the grid needs. Second, even when capacity markets or requirements procure more electricity than the grid ends up needing, they do not guarantee reliability: The winning bid is not always able to provide energy at the relevant time.[113]

As these challenges illustrate, the benefits of quantity targeting correspond closely to its downsides. Quantity targeting goes directly to the heart of the resilience problem by intervening on the central measure of interest: supply. But regulating supply requires a visionary level of foresight to be able to prescribe exactly which goods are needed, in what quantity,

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107. Joshua C. Macey & Jackson Salovaara, *Rate Regulation Redux*, 168 U. PA. L. REV. 1181, 1206 (2020).

108. *Id.* at 1209–11.

109. *Id.* at 1216.

110. For a sense of the mechanics of a capacity auction, see EMR DELIVERY BODY (U.K.): NATIONAL GRID, CAPACITY AUCTION USER GUIDE (2016), https://www.emrdeliverybody.com/Lists/Latest%20News/Attachments/72/Auction%20Guidance%20v1.pdf [https://perma.cc/ AYE4-8L6J].

111. *See generally* AAGAARD & KLEIT, *supra* note 106 (providing an overview of electricity capacity markets).

112. *See* Todd Aagaard & Andrew N. Kleit, *Too Much Is Never Enough: Constructing Electricity Capacity Market Demand*, 43 ENERGY L.J. 79 (2022).

113. *See* ROB GRAMLICH & MICHAEL GOGGIN, GRID STRATEGIES LLC, TOO MUCH OF THE WRONG THING: THE NEED FOR CAPACITY MARKET REPLACEMENT OR REFORM 11 (2019), https://gridstrategiesllc.com/wp-content/uploads/2024/05/too-much-of-the-wrong-thing-the-need-for-capacity-market-replacement-or-reform.pdf [https://perma.cc/HYR7-8JDK].

and how that aggregate quantity should be distributed among individual firms. In short, quantity targeting runs into the Hayekian "knowledge problem" to the greatest degree of any resilience policy.[114] Moreover, assigning production quantities to individual firms requires central coordination of the market, which exists in electricity markets but not much elsewhere.

2. Price Targeting

Price targeting aims to achieve the same goals as quantity targeting but operates at one further layer of remove from the outcome of interest, supply. The basic logic is to encourage or require prices to remain at a level conducive to stable production. Price targeting tends to be an analytically simpler, if less ambitious and less precise, alternative to quantity targeting. No explicit estimate of the required resource level is needed. Of course, setting a price implies a resulting quantity. But the mechanism is attenuated: Nothing about setting a price—not even the immanent logic of the supply curve—can force producers to supply the desired amount of the resource.

The government implements price targets across a variety of markets and through a variety of institutional mechanisms. First, the law can mandate a minimum price at which a good or service may be sold in private markets. State and federal minimum wage laws are the most familiar example of this mechanism. Second, the government can establish a guaranteed price floor by promising to compensate producers whenever market prices fall below a certain threshold. The federal government's agricultural commodity support programs work this way.[115] Third, the government can issue a more informal commitment to buy or subsidize a resource when market prices fall below a threshold. The Department of Energy has recently experimented with committing to buy oil to refill its Strategic Petroleum Reserve when prices fall within a fixed band. This approach takes advantage of various flexible legal authorities that permit the government to buy and sell, but the absence of a statutory *requirement* to buy puts pressure on the credibility of the promise.[116] Finally, rate of return regulation is a widespread form of price

114. *See* F.A. Hayek, *The Use of Knowledge in Society*, 35 AM. ECON. REV. 519 (1945).

115. *See* 7 U.S.C. §§ 9011–18 (defining how to establish payment yields, creating formula for how many acres to compensate, defining payment rate in relation to reference prices and effective prices). On the history of the farm commodity programs, see Shane Hamilton, *Crop Insurance and the New Deal Roots of Agricultural Financialization in the United States*, 21 ENTER. & SOC'Y 648 (2020).

116. *See* Arnab Datta & Skanda Amarnath, *Prescriptive View: The Next Pilot - Faster, More Efficient SPR Acquisition at the DOE,* EMPLOY AM. BLOG (Mar. 15, 2023), https://www.employamerica.org/blog/prescriptive-view-the-next-pilot-faster-more-efficient-spr-acquisition-at-the-doe/ [https://perma.cc/P2XB-GGXX] (recounting challenges faced by the DOE in convincing market participants to respond to its bids to purchase oil).

targeting that entitles certain firms to charge prices that cover their operating expenses plus a rate of return on equity, free from the threat of price-cutting competition.[117]

What price targeting may sacrifice in precise control over the resulting quantities, it gains in its administrative simplicity. In light of the tradeoff between precision and simplicity, price targeting may be most appealing when policymakers do not have a precise quantity target in mind but simply want to ensure that there is some incentive for producers beyond that which the private market provides.

3. Government Reserves

Both price targeting and quantity targeting work by nudging the private sector. In both cases, the government provides the incentive or directive, but it is private firms that are meant to supply the desired goods. An alternative approach is for the government to get its hands dirty by stockpiling the goods and pushing them into circulation once the private market hits a shortage. This government stockpiling approach is at work in the Strategic Petroleum Reserve, Strategic National Stockpile (for public-health goods such as vaccines and masks), Northeast Home Heating Oil Reserve, and National Defense Stockpile, and in the now-privatized National Helium Reserve. Each of these is a publicly administered reserve of a resource deemed critical for economic or national security purposes.[118] In the previous Section, we discussed one government reserve—the Strategic Petroleum Reserve (SPR)—in its capacity to set ex ante price incentives through offers to buy oil from the private sector. Here, we again use the example of the SPR, this time in its capacity to alleviate scarcity ex post by releasing the resource into the market. Government reserves are a crucial means of planning around the private sector's potential failures.

Government reserves are an ancient policy tool that can be traced back to the imperial Chinese practice of the "Ever Normal Granary."[119] Public granaries in China would buy from the public around harvest time to raise the market price, and later sell to the public in spring and summer when

117. *See* Karl Dunkle Werner & Stephen Jarvis, *Rate of Return Regulation Revisited* (Energy Inst. at Haas, Working Paper No. 329R, 2025), https://haas.berkeley.edu/wp-content/uploads/WP329.pdf [https://perma.cc/99T2-CEQB].

118. *See* Anshu Siripurapu & Noah Berman, *The State of U.S. Strategic Stockpiles*, COUNCIL ON FOREIGN RELS. (Mar. 2, 2023), https://www.cfr.org/backgrounder/state-us-strategic-stockpiles [https://perma.cc/G2BL-8AX4] (describing the set of current and historical strategic national stockpiles).

119. *See* Isabella Weber & Hao Qi, *The State-Constituted Market Economy: A Conceptual Framework for China's State-Market Relations* (Univ. of Mass. Amherst Econ. Dep't, Working Paper No. 2022-01, 2022). See also the story of Joseph in the Hebrew Bible, *Genesis* 41:33–49.

private stocks were dwindling and prices rising.[120] Familiar with that history, interwar thinkers including Benjamin Graham and John Maynard Keynes proposed modern versions of public food and material storage.[121] Keynes wrote that "it is an outstanding fault of the competitive system that there is no sufficient incentive to the individual enterprise to store surplus stocks of materials, so as to maintain continuity of output and to average, as far as possible, periods of high and of low demand."[122]

In other words, Keynes diagnosed a version of the resilience externality specific to the producers and consumers of commodities: Storage is costly, and so private parties do not amass adequate holdings, making themselves vulnerable to fluctuations in demand. Keynes proposed that the British government offer storage as a public resource, arguing that the state could provide storage at lower costs due to its ability to borrow at low interest rates and its economies of scale in warehousing.[123] A few years later, Keynes proposed the creation of an international buffer stock of key commodities that would buy goods from the private market whenever market prices dipped 10 percent below a reference price and sell back into the market whenever market prices reached 10 percent above the reference price.[124] In broad strokes, that describes the operation of the contemporary SPR, which buys oil when market prices dip below a target band and sells it when prices rise again.

B. Choosing Between Resilience Regulation and Business Law

When is resilience regulation the best way to achieve optimal resilience? The question necessarily invites a comparison to the alternative—incorporating resilience considerations into ordinary business law. While a detailed analysis of how resilience might fit into tort, contract, antitrust, corporate law, and bankruptcy must wait until Part III, we can sketch the broad contours of that approach for the purpose of framing the comparison. Under each variant of business law, counteracting the resilience externality

120. *See* PIERRE-ÉTIENNE WILL & R. BIN WONG, NOURISH THE PEOPLE: THE STATE CIVILIAN GRANARY SYSTEM IN CHINA 1650–1850 (1991); *cf.* CHRISTOPHER CLARK, REVOLUTIONARY SPRING: EUROPE AFLAME AND THE FIGHT FOR A NEW WORLD, 1848–1849, at 49–51 (2023).

121. *See* BENJAMIN GRAHAM, STORAGE AND STABILITY: A MODERN EVER-NORMAL GRANARY (1937); J.M. Keynes, *The Policy of Government Storage of Foodstuffs and Raw Materials*, 48 ECON. J. 449 (1938) [hereinafter Keynes, *Policy*]; J.M. Keynes, *The Objective of International Price Stability*, 53 ECON. J. 185 (1943); J.M. Keynes, *The International Control of Raw Materials*, 4 J. INT'L ECON. 299 (1974) [hereinafter, Keynes, *International Control*].

122. Keynes, *Policy*, *supra* note 119, at 449.

123. *See* Robert W. Dimand & Mary Ann Dimand, *J.M. Keynes on Buffer Stocks and Commodity Price Stabilization*, 22 HIST. POL. ECON. 113, 116–17 (1990).

124. Keynes, *International Control*, *supra* note 121.

would involve asking generalist courts to apply resilience-oriented principles in appropriate cases. For example, it could mean asking courts to award tort damages for resilience shortcomings that cause losses for third parties, to incline toward specific performance injunctions in contract law, and to consider resilience effects in merger review.[125]

At a high level, the main differences between resilience regulation and business law are that resilience regulation asks more of executive agencies and market regulators, while business law asks more of courts; that resilience regulation works on an industry-specific basis, while business law works on an industry-agnostic basis; and that resilience regulation distributes the costs of resilience across entire markets and even across the entire society, while business law distributes the costs of resilience among the parties to a given transaction. In addition, business law is often created through the actions of dispersed legal actors (e.g., state and federal courts), whereas resilience regulation is typically the domain of centralized federal policymakers. These differences suggest possible criteria for choosing between resilience regulation and business law in any given market context.[126]

1. Institutional Role

Achieving optimal resilience requires making choices about which products to protect against supply disruption and in what quantities. Deciding when to invest in resilience requires a degree of foresight—predicting where needs may arise and in what magnitude—as well as an understanding of the social value of resilience, so as not to under- or over-invest. A central question for law's response to the resilience externality is who should be responsible for deciding when firms should invest in resilience (and/or, retrospectively, when they should have done so). Business law and resilience regulation allocate this responsibility very differently.

The case for relying on business law must include an argument that generalist courts are capable of incorporating resilience considerations into their resolution of cases. To be sure, the case for business law does not rely exclusively on courts, because private actors should be expected to adjust

125. *See infra* Sections III.A, III.B, III.C.

126. Of course, resilience regulations and business laws are not mutually exclusive. In some situations, they can be mutually reinforcing, as scholars have argued is sometimes the case as to tort and regulatory oversight. *See, e.g.*, Nora Freeman Engstrom & Robert L. Rabin, *Pursuing Public Health Through Litigation: Lessons from Tobacco and Opioids,* 73 STAN. L. REV. 285, 354 (2021). We are not denying the possible complementarities between business law and resilience regulation, but trying to locate their comparative strengths.

their behavior ex ante to anticipate their treatment in resilience-minded courts.[127] Still, adjudication of business cases would need to generate sufficiently consistent pro-resilience outcomes in order to incentivize firms to choose resilience in the shadow of the law.

Meanwhile, resilience regulation imposes more continuous, ex ante administrative oversight on firms and markets compared to the more sporadic, ex post judicial supervision of business law. In each of the resilience regulation paradigms introduced above, an administrative agency determines the minimum level of production that must be coaxed out of the market through quantity targets, price targets, and/or government stockpiles. In the case of electricity capacity markets, the market administrator is responsible for determining how much aggregate generation capacity must be procured. In the case of the Strategic Petroleum Reserve, the Department of Energy decides how much crude oil to buy for its reserve and at what price. The federal agricultural commodity support programs provide a slightly contrasting example, as Congress sets the price triggers for commodity subsidies by statute rather than tasking the Department of Agriculture with intervening on a discretionary basis.[128]

To the extent that the dynamics behind insufficient resilience are industry-specific, it may make more sense to entrust oversight to specialized regulators than to generalist courts. Each of the resilience regulation programs discussed above governs a single industry—electricity, oil, and agriculture, respectively. In each of these industries, the costs of insufficient resilience are especially high due to the industry's centrality in the broader economy.[129] Other highly central industries, like the chemicals sector, lack a regulator dedicated to supply adequacy, though the Defense Department may sometimes play that role.[130] One path for resilience policy would be to create such a regulator for particularly central industries. Of course, there are reasons to be wary of adding new market regulators or administrators. Attempting to combat the resilience externality in this way may conflict

127. In addition, some areas of business law are dominated by specialized courts and legislatures (the Delaware chancery and legislature, in the case of corporate law) or enforced by expert agencies (the FTC and Department of Justice, in the case of antitrust), making the inclusion of resilience considerations in these bodies of law more plausible.

128. *See, e.g.*, 7 U.S.C. § 9016 (defining the reference price at which subsidies under the price loss coverage program shall be paid).

129. *See* Isabella M. Weber, Jesus Lara Jauregui, Lucas Teixeira & Luiza Nassif Pires, *Inflation in Times of Overlapping Emergencies: Systemically Significant Prices from an Input-Output Perspective*, 33 INDUS. & CORP. CHANGE 297 (2024) (identifying the sectors where price shocks contribute most significantly to the overall price level).

130. *See, e.g.*, U.S. DEP'T OF DEF., SECURING DEFENSE-CRITICAL SUPPLY CHAINS: AN ACTION PLAN DEVELOPED IN RESPONSE TO PRESIDENT BIDEN'S EXECUTIVE ORDER 14017 13–16 (2022) (proposing that the Department of Defense "address supply chain vulnerabilities to critical chemical supply").

with other values like industry dynamism. Especially for industries where resilience failures are less common and lower impact, business law adjudication is a ready-made forum that can potentially deal with resilience concerns using existing institutional architecture.

2. Comparative Advantage

One of the main ways firms achieve resilience is by holding extra resources in reserve. As discussed in the previous Section, the government can make up for private shortages by holding its own reserves. Public and private reserves are complementary, but the public sector has a comparative advantage in holding reserves in certain circumstances—especially when the resource is a relatively generic commodity. The advantage stems from three main forces: freedom from profit incentives, low cost of capital, and economies of scale and centralization. In the canonical theory of storage, firms adjust inventories until the marginal benefit—the difference between current and expected future prices—equals the marginal cost, which includes opportunity costs and operational costs of storage.[131] Each feature of the public sector advantage modifies some or all of this formula.

First, freed from the profit motive and instead motivated by the positive social externalities of resilience, the public sector defines the marginal benefit of holding inventories more expansively.[132] That is, even when the difference between the current price and expected future price is low, the public sector derives a benefit from providing an insurance function to the rest of the market. Second, the public sector faces lower opportunity costs of storage due to its low cost of capital.[133] In the private sector, firms with a lower cost of capital choose higher inventory levels, and this same logic can be extended to the public sector.[134] Third, the public sector faces lower

131. *See* Joseph P. Janzen, Nicholas D. Paulson & Juo-Han Tsay, *Commodity Storage and the Cost of Capital: Evidence from Illinois Grain Farms*, 106 AM. J. AGRIC. ECON 526, 527 (2024); CRAIG PIRRONG, TRAFIGURA, THE ECONOMICS OF COMMODITY TRADING FIRMS (2014), https://www.bauer.uh.edu/spirrong/economics-commodity-trading-firms.pdf [https://perma.cc/MMQ2-AJRY]; Bryan R. Routledge, Duane J. Seppi & Chester S. Spatt, *Equilibrium Forward Curves for Commodities*, 55 J. FIN. 1297 (2000).

132. *See generally* JOSEPH E. STIGLITZ & JAY K. ROSENGARD, ECONOMICS OF THE PUBLIC SECTOR (4th ed. 2015) (explaining that a core role of government is to correct market failures).

133. *See* Kenneth J. Arrow & Robert C. Lind, *Uncertainty and the Evaluation of Public Investment Decisions*, 60 AM. ECON. REV. 364 (1970) (establishing that the social discount rate for public investments approaches the risk-free rate).

134. *See* Janzen et al., *supra* note 131, at 540–41.

operational costs due the economies of scale in providing centralized storage.[135]

The upshot of this comparative advantage is that when the relevant mechanism for achieving resilience is to hold reserves, it will generally be more efficient for the government to manage a public reserve than to use business law to nudge firms to increase their private reserves.

However, several factors can overcome the state's generic comparative advantage in managing reserves. First, in relatively more technologically sophisticated and fast-changing industries, the state may lack the administrative expertise to choose the right products and the right quantities to hold in reserve. It will be difficult for regulators to anticipate the right mix of grades of steel, types of microchips, or categories of personal protective equipment for which to mandate production and/or storage. Industries with relatively standard commodity products, like oil, are those where the public comparative advantage likely holds. Second, there is a moral hazard risk in releasing firms from the obligation to obtain their own reserves.[136] Third, the greater that government incentives deviate from those of the ideal social planner—e.g., in the presence of regulatory capture—the less likely it is that the government will have an advantage in setting reserve targets over private actors.

3. Distribution of Costs

Investing in resilience comes at a cost, and business law and resilience regulation differ in how they distribute responsibility for paying for it. Resilience-minded reforms to business law will generally involve asking the firms—and intra-firm stakeholders—responsible for resilience breakdowns to internalize the cost of their actions rather than force it onto counterparties or the general public. For example, contract and tort law might impose damages on firms that caused economic harm through their lack of preparedness, and bankruptcy law might redistribute value from equity owners to creditors in order to make owners more cautious about falling into distress.[137] By contrast, resilience regulation distributes the costs of resilience more widely, either spreading costs across an entire market (in the case of electricity capacity markets) or across the public at large (in the case of resilience policies conducted with public funds, like the Strategic

135. *See* KENDALL MONGIRD ET AL., U.S. DEP'T OF ENERGY, 2020 GRID ENERGY STORAGE TECHNOLOGY COST AND PERFORMANCE ASSESSMENT 7–9 (2020) (discussing the per-unit price efficiencies of storing compressed air in large, publicly-owned salt caverns. The insight generalizes to other stored commodities).

136. See *infra* Section II.B.3 for further discussion of moral hazard.

137. *See infra* Section III.D.

Petroleum Reserve or the agricultural commodity programs).[138] In this light, choosing the appropriate legal regime for resilience-minded reform implicates a view on who should be financially "responsible" for overcoming the resilience externality.

The question of who should pay for resilience boils down to two main considerations: the loss-spreading principle and the moral-hazard principle. These are the same countervailing forces that characterize the dilemma of insurance markets.[139] The basic dilemma is that spreading the risk of loss among a large population through insurance-like mechanisms is desirable, but comes at the cost of encouraging excessive consumption of the risky activity.

The appeal of loss-spreading is twofold. First, according to prospect theory and its core principle of loss aversion, people generally prefer a small loss (such as an insurance premium or a slight increase in taxation) over a small probability of a large loss, even when the expected values of the two scenarios are equivalent.[140] Second, as a matter of fairness, if the risks of loss are mostly random (i.e., unrelated to individuals' and firms' actions), it is unfair to make the unlucky victims of misfortune bear the entire loss, and instead preferable to spread it across large groups or the entire society.[141]

On the other side of the ledger, insuring firms against loss through resilience regulation raises the problem of moral hazard. Secure in the knowledge that the government will intervene, whether through a stockpile or by imposing price or quantity targets, private firms might lack motivation to invest in resilience of their own accord. If government interventions successfully smooth a price shock, they mute the price signal that might otherwise encourage private firms to increase supply.[142] Yet it is difficult to

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138. In this case, depending on the nature of public debt the "public" could include future generations as well as persons alive today.

139. *See* Richard Zeckhauser, *Medical Insurance: A Case Study of the Tradeoff Between Risk Spreading and Appropriate Incentives*, 2 J. ECON. THEORY 10 (1970); Isaac Ehrlich & Gary S. Becker, *Market Insurance, Self-Insurance, and Self-Protection*, 80 J. POL. ECON. 623 (1972).

140. *See* Daniel Kahneman & Amos Tversky, *Prospect Theory: An Analysis of Decision Under Risk*, 47 ECONOMETRICA 263, 281 (1979) (reporting experimental preference for "a small loss, which can be viewed as the payment of an insurance premium, over a small probability of a large loss"); Dimitris Georgarakos et al., *How Costly Are Business Cycle Volatility and Inflation? A Vox Populi Approach* 25 (Nat'l Bureau of Econ. Rsch., Working Paper No. 33476, 2025), https://www.nber.org/papers/w33476 [https://perma.cc/8EJX-R8CP]. *But see* Ryan Oprea, *Decisions Under Risk Are Decisions Under Complexity*, 114 AM. ECON. REV. 3789 (2024).

141. *See* Kenneth S. Abraham, *Efficiency and Fairness in Insurance Risk Classification*, 71 VA. L. REV. 403, 436–38 (1985) (providing an account of fairness in risk allocation where it is unfair to assign responsibility for risk factors that an individual cannot control).

142. JASON BORDOFF, ANTOINE HALFF & AKOS LOSZ, COLUM. SCH. OF INT'L & PUB. AFFS. CTR. ON GLOB. ENERGY POL'Y, NEW REALITIES, NEW RISKS: RETHINKING THE STRATEGIC PETROLEUM RESERVE 24 (2018), https://www.energypolicy.columbia.edu/wp-content/uploads/2018/05/CGEP_Rethinking_the_Strategic_Petroleum_Reserve_June2018.pdf [https://perma.cc/ZB9P-DKWZ].

determine when the moral hazard concern applies. In principle, moral hazard should only be a concern when an agent has an opportunity to mitigate losses. Certain shocks like extreme weather may seem outside of any firm's ability to control or mitigate. On the other hand, if there has been a pattern of extreme weather in a certain region, and the firm sources a crucial input exclusively from that region with no backup options, it seems that the firm could be held responsible for failing to avoid a known risk.

The scholarly debate about moral hazard from government crisis intervention has mostly taken place in the context of financial bailouts.[143] There, predictions of moral hazard have been met with a rejoinder about stigma: Firms that find themselves needing bailouts may gain government support in the short term at the expense of losing access to private credit in the medium and long term.[144] In theory, the argument goes, firms will want to avoid that stigma and so will not be tempted by moral hazard.

But the sort of bailout involved in resilience regulation is not likely to create the same stigma as direct financial injections into struggling firms. For one, if the government intervenes in a commodity market, it spreads the bailout among all market participants rather than concentrating the benefit (and stigma) on individual firms. Second, buying and selling commodities (even if at prices that deviate from the rest of the market) looks more similar to "normal" market activity than a financial bailout does. For these reasons, government stockpiles and price supports probably do come at the cost of moral hazard unmitigated by bailout stigma.

On the other hand, the sort of moral hazard engendered by resilience regulation is limited to *collective* moral hazard. That is, commodity holders get a bailout only if the market as a whole undersupplies the resource and provokes government intervention. But if an individual firm lacks supply for idiosyncratic reasons, one should not expect resilience regulation to come to the rescue, and therefore there should be no harm from moral hazard. The distinction between collective and idiosyncratic moral hazard has perhaps been downplayed in the financial regulation literature due to the existence of numerous "too big to fail" actors, any of whose

143. *See, e.g.*, Kenneth Ayotte & David A. Skeel, Jr., *Bankruptcy or Bailouts*, 35 J. CORP. L. 469, 485 (2010); Adam J. Levitin, *In Defense of Bailouts*, 99 GEO. L.J. 435, 509 (2011); ADAM J. LEVITIN, LINDSAY OWENS & GANESH SITARAMAN, ROOSEVELT INSTITUTE, NO MORE BAILOUTS: A BLUEPRINT FOR A STANDING EMERGENCY ECONOMIC RESILIENCE AND STABILIZATION PROGRAM (2020).

144. *See* Jenny Corbett & Janet Mitchell, *Banking Crises and Bank Rescues: The Effect of Reputation*, 32 J. MONEY, CREDIT & BANKING 474, 477 (2000); Anthony J. Casey & Eric A. Posner, *A Framework for Bailout Regulation*, 91 NOTRE DAME L. REV. 479, 525–26 (2015) (suggesting that "the moral hazard problem is partly self-correcting and largely exaggerated"); Tom Baker, *On the Genealogy of Moral Hazard*, 75 TEX. L. REV. 237 (1996) (criticizing the economistic tendency to warn of moral hazard).

idiosyncratic failure would plausibly invite government intervention.[145] The distinction is much more salient in relatively decentralized industries, where the uncorrelated unpreparedness of a single firm does not pose a systemic threat.

4. Conflicting Priorities

The most straightforward advantage of resilience regulation is that it is explicitly and unabashedly concerned with resilience. By contrast, business law serves many purposes, and adding resilience onto a crowded menu might clash with the existing dishes.[146] Attempting to solve resilience through general-purpose business law should caution wariness about unintended consequences. Making contract partners liable for third-party damages might discourage the use of formal contracts; making tortfeasors liable for pure economic losses might discourage business investment; and prioritizing vertical integration in merger review might have horizontally anticompetitive effects. These unintended consequences would not necessarily outweigh the attendant resilience benefits, but they at least force a difficult analysis of pros and cons, which we begin to sketch out in the next Part. What is more, even if one were to conclude that the resilience benefits justified sacrificing some other goals of business law as a general matter, it might still be difficult for courts to adjudicate between such conflicting priorities in each individual case. That is, the presence of conflicting priorities for business law exacerbates the challenges of the judicial role discussed above.

5. Political Cyclicality

Which institution is best suited to address resilience may also vary based on broader political context. In many arenas, business law is slower to change than resilience regulations because the former is the product of many uncoordinated actors—mainly state courts, state legislatures, and federal courts—whereas the latter is governed by a single or small number of executive agencies.[147] The many actors that matter in business law make it

145. *See, e.g.*, Saule T. Omarova, *The "Too Big to Fail" Problem*, 103 MINN. L. REV. 2495 (2019); Steven L. Schwarcz, *Too Big to Fool: Moral Hazard, Bailouts, and Corporate Responsibility*, 102 MINN. L. REV. 761 (2017) (discussing financial institutions whose individual failures would pose systemic risk).

146. At the risk of mixing food metaphors, you might worry, that is, about "everything-bagel common law." *Cf.* Ezra Klein, Opinion, *The Problem With Everything-Bagel Liberalism*, N.Y. TIMES (Apr. 2, 2023), https://www.nytimes.com/2023/04/02/opinion/democrats-liberalism.html [https://perma.cc/NL2S-LUBJ].

147. *Cf.* Margaret H. Lemos, *State Enforcement of Federal Law*, 86 N.Y.U. L. REV. 698 (2011).

harder for them to settle on new policies or create a coordinated response than an agency like the Treasury Department. That fact might incline us to give a greater role to resilience regulation when fast responses are needed, for example in allocating a bailout or coordinating a bank closure.

At the same time, the stickiness of business law counts in its favor if federal policymakers are uninterested in protecting resilience, or are actively undermining it. That suggests the value of what we might term countercyclical resilience law, to adapt a phrase from Howard Shelanski.[148] Shelanski argues that when federal policy turns to (net negative) deregulation, private and state-level antitrust enforcement should act as a ballast to guard against corporate abuse.[149] Similarly in our setting, when federal policymakers turn against resilience-improving measures, there is a stronger case for business law to take on the task—although to do so cautiously in light of business law's stickiness.[150] On the margin, the reverse is also true. As centralized policymakers adopt more effective resilience regulation, states and generalist courts can step back.

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This Part has argued that dedicated resilience regulation is in some settings the best way to mitigate the resilience externality. The case for resilience regulation is strongest when the public sector has a comparative advantage in amassing surplus resources; when specialized market administrators are capable of making sensible resilience planning decisions; when the benefit of spreading costs outweighs the risk of moral hazard; when the alternative of relying on business law would conflict with business law's other core functions; and especially when multiple of these conditions apply. The case for business law is, by contrast, stronger when federal policymakers are unequipped or uninterested in pursuing adequate resilience regulation.

The specialized market-administrator condition is probably the most restrictive one, both in practical terms because it requires Congressional action to establish, and more generally because not every market is well-suited to central planning to the degree that platform industries like

148. *See* Howard Shelanski, *Antitrust and Deregulation*, 127 YALE L.J. 1922 (2018). There is a large literature on litigation by private persons and states as cyclical responses to federal changes in policy. *See, e.g.*, Margaret H. Lemos & Ernest A. Young, *State Public-Law Litigation in an Age of Polarization*, 97 TEX. L. REV. 43 (2018).

149. *See generally* Shelanski, *supra* note 148.

150. The slowness of business-law responsiveness could support keeping more resilience considerations in business law than would be optimal otherwise, to ensure a minimal level of internalization of the resilience externality.

electricity are (and even there, the debate over the role of planning is robust).[151] For industries that are not persistently subject to a very high-magnitude resilience externality, it is probably more prudent to address the externality, when it does arise, in the ordinary course of business law adjudication.

C. Why Not Insurance?

Before moving on to consider the interaction between business law and resilience in detail, we must consider the tool that some readers might view as the natural option for mitigating the resilience externality: insurance. There are two versions of the claim that insurance can help with resilience. First, from the ex post perspective, the claim is that everyone harmed by the supply breakdown of an upstream supplier can protect themselves through contingent business-interruption insurance or supply-chain insurance.[152] These forms of insurance protect against losses caused by disruptions in a supplier's operations. If it were cheaper to pay insurance premiums than to internalize the resilience externality in the other ways discussed below, and if insurance covered all the relevant social losses, then one could argue that it is most efficient to outsource the resilience problem to the insurance companies.

The first problem with this argument is that even if downstream firms relied entirely on business-interruption insurance, they would become less likely to punish their upstream suppliers for resilience failures, creating "third-party moral hazard" for such suppliers.[153] But the deeper flaw is that *consumers* cannot easily obtain insurance against the share of resilience harms that cascade onto them. Even if consumer-facing *firms* came out even thanks to insurance, it would be little help to consumers facing high prices caused by a supply shortage. In this light, the ex post version of the insurance argument is insufficient to the scope of the resilience externality.

The second version of the insurance argument starts out more promisingly, but ultimately runs into the same problem. Assume that firms do purchase business-interruption insurance and supply-chain insurance for their own protection. From an ex ante perspective, one might argue that the underwriting process will push those firms to take precautions and make

151. *See generally* RICKS ET AL., *supra* note 103 (analyzing the features common to industries known as utilities or common carriers).

152. *See* Jae Lynn Huckaba, *Insurance for Cross-Border Supply Chain Risks*, HUNTON ANDREWS KURTH (Dec. 4, 2024), https://www.huntonak.com/insights/publications/insurance-coverage-for-cross-border-supply-chain-risks [https://perma.cc/AW3G-3KN9].

153. *See generally* Gideon Parchomovsky & Peter Siegelman, *Third-Party Moral Hazard and the Problem of Insurance Externalities*, 51 J. LEGAL STUD. 93 (2022).

themselves more resilient so as to drive down their premiums. This argument reflects a body of research on "insurance-as-regulation," where the central idea is that the insurance underwriting and pricing process reduces moral hazard and pushes insurance buyers to manage their own role in reducing risk.[154] Insurance-as-regulation is most effective in settings where policyholders' risky behaviors are easily observed and measured by insurers, such as when auto insurers price policies according to drivers' accident histories or, better yet, real-time data on driving habits.[155]

But the prospects for insurance-as-regulation are easily overstated. On close inspection, it becomes clear that proponents of data-driven underwriting are really advocating for a way to reduce the moral hazard generated by insurance, not actually to prevent losses better than in the absence of insurance.[156] The nature of insurance is that any coverage will cushion policyholders against loss compared to the no-insurance scenario, and so it is hard to argue that insurance will be loss-reducing.

Moreover, even if insurers had sufficient information to underwrite coverage perfectly in proportion to risk, they would still charge too little at each given risk level. This is because the insurer will only have to pay up to the policyholder's losses, not the downstream social losses that make resilience an externality. In this sense, insurance acts as a regulator only as to harms that the law otherwise holds insured actors responsible for. Otherwise, there are no losses for the insured party to insure against. This throws us back to square one: How, and to what degree, should firms be held responsible for failing to be resilient? Finally, note that insurers are generally reluctant to insure against scenarios that would cause correlated losses, such as pandemics, natural disasters, massive cyberattacks, and the failure of central platforms on which many firms rely.[157] This is a practical

154. *See, e.g.*, Omri Ben-Shahar & Kyle D. Logue, *Outsourcing Regulation: How Insurance Reduces Moral Hazard*, 111 MICH. L. REV. 197 (2012).

155. *See* Ben-Shahar & Logue, *supra* note 154; Tanguy Catlin, Xueqi Chang, Doug McElhaney & Dimitris Paterakis, *Connected Revolution: The Future of US Auto Insurance*, MCKINSEY & CO. (Oct. 27, 2023), https://www.mckinsey.com/industries/financial-services/our-insights/connected-revolution-the-future-of-us-auto-insurance [https://perma.cc/LV2M-44HM].

156. *See* Kenneth S. Abraham & Daniel Schwarcz, *The Limits of Regulation by Insurance*, 98 IND. L.J. 215, 269–71 (2022) (emphasizing the distinction between reducing insurance's net-negative impact on loss and achieving a net-positive reduction in loss).

157. *See, e.g.*, Andrew Granato & Andy Polacek, *The Growth and Challenges of Cyber Insurance*, CHI. FED LETTER No. 426, 2019, https://www.chicagofed.org/publications/chicago-fed-letter/2019/426 [https://perma.cc/KWW9-VCR5] (discussing how private insurers are reluctant to offer coverage to policyholders all exposed to failure of the same central network in the context of cyber insurance); Howard Kunreuther & Mark Pauly, *Terrorism Losses and All Perils Insurance*, 23 J. INS. REGUL. 3, 6 (2005) (discussing general causes of uninsurability including correlated risks).

reason to suspect that insurance will not do much to protect against macroeconomically significant supply shortages.[158]

III. APPLICATIONS TO BUSINESS LAW

In this Part, we investigate what business law has to do with achieving optimal resilience. We analyze five major fields in business law—torts, contracts, antitrust, corporate governance, and bankruptcy—in light of our theory of resilience. We find that the doctrinal content of these fields pervasively change firms' resilience incentives, and the ability of the market to recover robustly in the face of idiosyncratic shocks, in ways that scholars have largely overlooked. In the Sections that follow, we analyze each potentially relevant body of business law in three steps. First, we investigate how current law affects firms' resilience incentives. Second, we draw attention to possible reforms within that body of law that could better align firms' incentives with society's interest in resilience. And third, we discuss whether, all things considered, it would be wise to pursue resilience-minded reform inside that body of law as opposed to elsewhere. Even in cases where business law does not turn out to be a suitable arena for resilience-minded reform, it is analytically valuable to pinpoint the interplay between existing legal rules and resilience.

A. Tort and Contract

In searching among the standard business-law doctrines for a fix for the resilience externality, one might be tempted to look to tort law.[159] A principal, though contested, aim of tort law is to optimally reduce negative externalities.[160] But as we show in this Section, the rule barring recovery for pure economic losses—known as the economic-loss rule—limits the degree to which conventional tort law can reduce the resilience externality. This doctrinal limitation is largely justified even after accounting for the resilience externality. Still, we argue that a modified version of the public-

158. *But see* Steven L. Schwarcz, *Insuring the 'Uninsurable': Catastrophe Bonds, Pandemics, and Risk Securitization*, 99 WASH. U. L. REV. 853 (2021).

159. To forestall any confusion, we continue to use the term "resilience" here as we do elsewhere in the paper—the ability of markets to reliably and optimally meet demand for goods and services. Our topic is thus distinct from the resilience that Erik Encarnacion has addressed. *See, e.g.*, Erik Encarnacion, *Making Whole, Making Better, and Accommodating Resilience*, 108 MINN. L. REV. 1335 (2024).

160. *See, e.g.*, John C.P. Goldberg, *Twentieth-Century Tort Theory*, 91 GEO. L.J. 513, 545 (2003); ARIEL PORAT & ALEX STEIN, TORT LIABILITY UNDER UNCERTAINTY 7 (2001); W. Bishop, *Economic Loss in Tort*, 2 OXFORD J. LEGAL STUD. 1, 4 (1982); GUIDO CALABRESI, THE COST OF ACCIDENTS: A LEGAL AND ECONOMIC ANALYSIS (1970); Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 1089, 1119–20 (1972).

nuisance tort could help address the resilience externality without the usual downsides accompanying recovery for pure economic losses. We close by comparing public-nuisance law to potential parallel approaches in contract law.

1. Obstacles to Liability

The law of wrongs between strangers might seem perfectly suited to forcing firms to internalize the harms their failure to act reliably imposes on third parties. Tort law permits victims to seek compensation for many of the risks otherwise imposed on them without cost.[161] Negligence law requires actors to take reasonable care to avoid causing others physical injury, and reasonable care is often read to mean taking cost-justified precautions.[162] Nuisance doctrine requires actors to desist from substantially and unreasonably interfering with another's enjoyment of property, a rule employed (if imperfectly) to address the negative externalities associated with pollution.[163]

One could therefore imagine successful negligence suits filed against companies whose carelessness caused substantial economic harm to those relying on them, even indirectly. Southwest Airlines' mass cancellations in 2022 harmed businesses counting on tourists who never arrived; trucking companies and many others lost significant revenue when the global shipper Maersk was insufficiently prepared for cyberattacks.[164] Tort law might resolve the resilience externality if all parties harmed by these actions could seek compensatory damages.

But they cannot. Courts have sharply curtailed tort law's reach, rendering it mostly unable to address the resilience externality under current law.[165] The vast majority of U.S. courts have concluded, in the words of the Third Restatement, that "[a]n actor has no general duty to avoid the unintentional

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161. RESTATEMENT (THIRD) OF TORTS: LIAB. FOR PHYSICAL AND EMOTIONAL HARM § 7 (AM. L. INST. 2010) [Hereinafter THIRD RESTATEMENT: PHYS. & EMOT. HARM] ("An actor ordinarily has a duty to exercise reasonable care when the actor's conduct creates a risk of physical harm.").

162. *Id.* § 3; *see also* WILLIAM M. LANDES & RICHARD A. POSNER, THE ECONOMIC STRUCTURE OF TORT LAW 13 (1987).

163. *See* DAN B. DOBBS, PAUL T. HAYDEN & ELLEN M. BUBLICK, THE LAW OF TORTS § 399 (2d ed. 2024) [hereinafter DOBBS'S LAW OF TORTS]; RESTATEMENT (SECOND) OF TORTS § 822 (AM. L. INST. 1979).

164. *See* Andy Greenberg, *The Untold Story of NotPetya, the Most Devastating Cyberattack in History*, WIRED (Aug. 22, 2018), www.wired.com/story/notpetya-cyberattack-ukraine-russia-code-crashed-the-world [https://perma.cc/P7MT-9SXG].

165. *See* John Armour & Jeffrey N. Gordon, *Systemic Harms and Shareholder Value*, 6 J. LEGAL ANALYSIS 35, 37–38 (2014).

infliction of economic loss on another."[166] That is, actors have no duty to avoid unintentionally causing others "pure economic losses"—losses that do not arise from physical injury to their person or property.

The economic-loss rule comes in two flavors.[167] First, a party to a contract generally cannot claim tort remedies for the economic losses arising from its counterparties' careless failure to perform.[168] Second, a victim of carelessly inflicted pure economic loss rarely has a claim against a stranger whose carelessness caused the loss.[169] The downstream victims of Southwest would thus typically have no recourse in tort.[170] This is so whether the harm arose because of an active wrong on the part of the injurer—an act of misfeasance, for example crashing into a bridge—or failure to affirmatively help another—an instance of nonfeasance, for example, failing to comport with a contract.[171] In either case, because the actor has no duty to avoid causing the injury, she is not responsible for the harm.[172]

Though the economic-loss rule weakens tort law's ability to address the resilience externality, there are good reasons for courts to maintain it in most situations. First, unlike when it comes to physical injury, not all economic losses are social costs.[173] For example, Southwest Airlines' 2022 failures harmed some firms in destination cities, which suffered lost sales, but may

166. RESTATEMENT (THIRD) OF TORTS: LIAB. FOR ECON. HARM § 1, at 1 [Hereinafter THIRD RESTATEMENT: ECON. HARM]; *see also, e.g.*, S. Cal. Gas Leak Cases, 441 P.3d 881 (Cal. 2019) (confirming applicability of pure-economic loss rule in California); Aikens v. Debow, 541 S.E.2d 576 (W. Va. 2000) (same in West Virginia).

167. *See* Catherine M. Sharkey, *In Search of the Cheapest Cost Avoider: Another View of the Economic Loss Rule*, 85 U. CIN. L. REV. 1017 (2018); DOBBS'S LAW OF TORTS, *supra* note 163 § 608.

168. THIRD RESTATEMENT: ECON. HARM, *supra* note 166 § 3.

169. For exceptions, see *id.* §§ 4–6, 8. The primary exceptions involve situations in which a defendant knowingly and carelessly acts in a professional capacity for the defendant's pecuniary benefit as well as to benefit the plaintiff. *See id.* §§ 4–6; *S. Cal. Gas Leak Cases*, 441 P.3d at 887.

170. *See* THIRD RESTATEMENT: ECON. HARM, *supra* note 166, § 1; *id.* § 7.

171. On this distinction, see THIRD RESTATEMENT: PHYS. & EMOT. HARM, *supra* note 161, § 37; *id.* § 37 cmt. c; H.R. Moch Co. v. Rensselaer Water Co., 159 N.E. 896, 898 (N.Y. 1928) (Cardozo, J.) (contrasting "launch[ing] a force or instrument of harm" from "refus[ing] to become an instrument for good").

172. *See* DOBBS'S LAW OF TORTS, *supra* note 163, § 613 ("Like its cousin, the stranger rule, the contracts version of the economic loss rule is a no-duty rule, eliminating the tort duty to use care but leaving the defendant subject to liability in contract if actionable breach can be shown.").

173. *See* Bishop, *supra* note 160; Jef De Mot, *Pure Economic Loss*, *in* 1 ENCYCLOPEDIA OF LAW AND ECONOMICS: TORT LAW AND ECONOMICS 201 (Michael Faure, ed., 2d ed. 2009); STEVEN SHAVELL, ECONOMIC ANALYSIS OF ACCIDENT LAW (1987); LANDES & POSNER, *supra* note 162; *see also* THIRD RESTATEMENT: ECON. HARM, *supra* note 166, § 1, Reporter's Note c. Scholars have observed that this rationale is not adequate to account for the special treatment of economic losses as losses stemming from physical injury may also have pecuniary benefits for others that are ignored in assessing damages. *See, e.g.*, Sharkey, *supra* note 167. For those who explain tort law on grounds other than correcting for externalities, yet other reasons might justify the economic-loss rule. *See, e.g.,* John C.P. Goldberg & Benjamin C. Zipursky, *The Moral of* Macpherson, 146 U. PA. L. REV. 1733, 1833 (1998).

have helped businesses in departure cities, where some of those customer dollars were now spent.[174] Although economic losses will entail some social losses, applying tort law's compensatory approach for plaintiff losses would mean imposing liability on defendants exceeding social harm in many cases.[175]

Second, courts will often find it hard to determine which party in a supply chain is the cheapest-cost avoider on whose shoulders primary liability should rest.[176] Key market participants could—and, we posit, often should—invest more in resilience. In 2017, Maersk could have invested more in cybersecurity precautions, for instance. But Maersk's counterparties, and those dependent on them, should also bear some responsibility to hedge risks when they are in the best position to do so. The danger of shortages can be addressed by producers, purchasers, or through joint arrangements. Take Toyota as one example. After facing severe shortages in the wake of the 2011 Tōhoku earthquake, the carmaker invested in stockpiling and crisis preparation, allowing it to maintain production targets for months in the face of the global semiconductor shortage of 2021.[177] Other carmakers responded to the 2021 shortage by investing in dedicated chip suppliers.[178] Assigning the full fault of chip shortages to chip producers relieves purchasers of countervailing (and sometimes efficient) responsibilities to take precautions, and vice versa. The point also holds for more distantly situated actors. The more attenuated the relationship between

174. *See* De Mot, *supra* note 173, at 204.

175. Bishop is wrong in asserting that in many cases "private economic loss caused by a tortious act is not a cost to society." Bishop, *supra* note 160, at 4. As subsequent scholars have pointed out, this claim relies on assumptions about frictionless transfers between resources that are unlikely to hold true in the real world. *See* Mario J. Rizzo*, The Economic Loss Problem: A Comment on Bishop*, 2 OXFORD J. LEGAL STUD. 197 (1982). But the claim that pure economic losses claimed by plaintiffs will often exceed social costs seems reasonable, if subject to some exceptions. *See* De Mot, *supra* note 173, at 206–07.

176. *See* Hadley v. Baxendale (1854) 156 Eng. Rep. 145, 151–52 (denying recovery for expectation damages where crankshaft provider's delay caused mill to shut down, in part because millers will often hold extra crankshafts on hand); Giuseppe Dari Mattiacci, *The Economics of Pure Economic Loss and the Internalisation of Multiple Externalities*, *in* 9 TORT AND INSURANCE LAW: PURE ECONOMIC LOSS 167 (Willem van Boom et al., eds. 2004); Mario J. Rizzo, *A Theory of Economic Loss in the Law of Torts*, 11 J. LEGAL STUD. 281, 291–93 (1982).

177. *See* Neal E. Boudette, *Toyota Sales Jump, but G.M. and Ford's Rebounds Are Weaker*, N.Y. TIMES (Apr. 1, 2021), https://www.nytimes.com/2021/04/01/business/auto-sales-chip-shortage.html [https://perma.cc/QT32-FE4V]. Eventually, even Toyota's chip stockpile ran out, and it too was forced to cut production. *See* Neal E. Boudette, *Toyota, Hurt by the Chip Shortage, Will Reduce Output 40% in September*, N.Y. TIMES (Oct. 15, 2021), https://www.nytimes.com/2021/08/19/business/toyota-production-slowdown-chip-shortage.html [https://perma.cc/HKV7-BNEJ].

178. Tom Krisher, *GM Reaches Computer Chip Supply Deal with GlobalFoundries*, AP NEWS (Feb. 9, 2023), https://apnews.com/article/technology-general-motors-co-production-facilities-new-york-busi ness-8dec8a8cf29b00851402deeaca640c6a [https://perma.cc/TX7Y-EZNX].

the initially careless actor and harmed strangers, the less well positioned the initial actor will be to know how consequential its decision will be.[179]

Third, many economic-loss cases threaten to cost more in adjudication than they will achieve in deterrence.[180] Such claims are likely to present extremely tricky factual questions that the court system is poorly placed to answer. It is hard enough to assess fault and causality when it comes to medical malpractice or products-liability; the empirical challenges grow substantially when we consider the ricocheting nature of losses stemming from a failure of resilience.[181] Imagine trying to adjudicate, and reasonably compensate, the millions or billions of plausible economic-loss claims arising from the *Ever Given* container ship blocking the Suez Canal.[182] Many of these claims would be too small to be worth the adjudication costs, and would include many plausible but false claims designed to settle.[183]

These justifications for the economic-loss rule apply in the majority of cases. But they also point to situations in which courts might helpfully use tort law to address the resilience externality.[184] In the following Section, we tentatively propose that courts use a variation of the public-nuisance tort to address the resilience externality by holding injurers liable for pure economic losses when a central actor materially and unreasonably violated a contractual duty (or materially failed to perform), causing significant social harm. We call our proposed variant of the tort "economic public nuisance."

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179. *See* Thomas J. Miles, *Posner on Economic Loss in Tort:* EVRA Corp v. Swiss Bank, 74 U. CHI. L. REV. 1813, 1826 (2007).

180. *See id.* at 1829; Rizzo, *Theory of Economic Loss*, *supra* note 176.

181. *See* THIRD RESTATEMENT: ECON. HARM, *supra* note 166, § 1 cmt. c ("Economic losses proliferate more easily than losses of other kinds. Physical forces that cause injury ordinarily spend themselves in predictable ways; their exact courses may be hard to predict, but their lifespan and power to harm are limited. A badly driven car threatens physical harm only to others nearby. Economic harm is not self-limiting in this way."). Cardozo famously warned that permitting recovery for pure economic loss would lead to "liability in an indeterminate amount for an indeterminate time to an indeterminate class." Ultramares Corp. v. Touche, 174 N.E. 441, 444 (N.Y. 1931) (Cardozo, J.).

182. *See* Vivian Yee & James Glanz, *How One of the World's Biggest Ships Jammed the Suez Canal*, N.Y. TIMES (Jul. 19, 2021), https://www.nytimes.com/2021/07/17/world/middleeast/suez-canal-stuck-ship-ever-given.html [https://perma.cc/PB8D-T9B6]; Ngyuyen Khoi Tran, Hercules Haralambides, Theo Notteboom & Kevin Cullinane, *The Costs of Maritime Supply Chain Disruptions: The Case of the Suez Canal Blockage by the 'Ever Given' Megaship*, 279 INT'L J. PROD. ECON., 2025, art. no. 109464, at 11.

183. On the former, see LANDES & POSNER, *supra* note 162, at 254.

184. Our proposal finds echoes in the liability scheme proposed by Aneil Kovvali, though his proposal focuses on holding officers responsible for (some) disasters, does not use contracts as a lever to locate legal duties, and does not draw on the historical tort of public nuisance, among other differences. *See* Kovvali, *supra* note 24, at 221, 226–27.

2. Economic Public Nuisance

The tort of public nuisance, which permits select plaintiffs to seek relief for "an unreasonable interference with a right common to the general public," is a promising vehicle to address the resilience externality.[185] The paradigm public-nuisance suit, from which the tort originated, is one seeking abatement of an obstruction of a public road or waterway.[186] Although the tort has changed significantly since its medieval origins, it was at first—to put it anachronistically—an attempt to address supply-chain bottlenecks. States have since used it to address a wide range of harms, most prominently, in recent years, those resulting from the sale of narcotics and toxic industrial products.[187]

Courts should apply the public-nuisance tort to force central and responsible actors to internalize some of the resilience externality when such actors cause substantial economic loss through unreasonable breach of contract, or unreasonable failure to substantially perform.[188] As we have seen, central enterprises can, by failing to prepare for disaster, inflict harm on broad portions of the economy.[189] When those failures are substantial, unreasonable, and interfere with a service or product upon which much of society depends, courts should construe them as unlawfully interfering with a public right.

This approach is consistent with the admittedly complex and at times paradoxical spirit of public-nuisance doctrine.[190] Public-nuisance doctrine resists ready definition, but its heartland of cases addresses interference with public spaces or resources, such as toxic spills poisoning bodies of water or

185. RESTATEMENT (SECOND) OF TORTS, *supra* note 163, § 821B. As Catherine Sharkey has noted, some courts and commentators argue that public nuisance is an exception to the typical economic-loss rule, an approach seemingly justified by the Third Restatement. *See* Catherine M. Sharkey, *Public Nuisance as Modern Business Tort: A New Unified Framework for Liability for Economic Harms*, 70 DEPAUL L. REV. 431 (2020); THIRD RESTATEMENT: ECON. HARM, *supra* note 166, § 8.

186. *See* RESTATEMENT (SECOND) OF TORTS, *supra* note 163, at § 821B cmt. a; Leslie Kendrick, *The Perils and Promise of Public Nuisance*, 132 YALE L.J. 702, 713 (2023).

187. *See* Kendrick, *supra* note 185, at 708–09; John C.P. Goldberg, *On Being a Nuisance*, 99 N.Y.U. L. REV. 864, 865–66 (2024); State *ex rel*. Jennings v. Monsanto Co., 299 A.3d 372, 375 (Del. 2023); *In re* Nat'l Prescription Opiate Litig., 452 F. Supp. 3d 745, 773–74 (N.D. Ohio 2020); People v. ConAgra Grocery Prods. Co., 227 Cal. Rptr. 499, 514 (Ct. App. 2017).

188. There is a danger that if damages were only collectable in situations of breach, the contracting parties would collude to suppress the breach or modify the contract to repair it. That is so because, in our proposed version of the tort, only a government actor—and not the non-breaching party to the contract—could collect damages. To reduce the risk of collusion, even substantial failure to perform should be deemed actionable if the other elements of the tort are present. We thank Ketan Ramakrishnan for helpful comments on this point.

189. *See supra* Part I.

190. *See* Hanoch Dagan & Avihay Dorfman, *Public Nuisance for Private Persons*, 74 U. TORO. L.J. 198, 202 (2024) (noting that the uses of public-nuisance law have been doctrinally "messy").

accidents blocking roads.[191] The public's current reliance on central economic actors resembles its historic reliance on public spaces and thoroughfares. Electricity, petroleum, telecommunications data, the payments system, and advanced computing equipment—to take a few examples—are universal and essential inputs into the daily lives of virtually all Americans.[192] Placing heightened duties on companies that provide these essential products to reasonably fulfill their commitments fits with a venerable U.S. legal tradition of deeming some businesses, such as utilities, waterways, and common carriers, as "affected with a public interest" and vested with heightened common-law duties.[193]

Historical fit aside, a tort of economic public nuisance would helpfully increase public resilience while avoiding the ills of an open-ended duty to avoid causing others pure economic loss. To that end, courts should tailor the definitions of dutyholders, breach, rightsholders, and remedies to match the goals of economic public nuisance.

a. Dutyholders and Breach

Courts should apply economic public-nuisance duty only on central corporations that face limited competition, or otherwise have highly distorted appropriation of resilience benefits. Resilience externalities are generally the highest in such central markets.[194] Actors in these markets are well placed to recognize that their carelessness may have significant social costs, and best placed to reduce the cost of accidents.[195] Because these firms are central, there are (definitionally) large swaths of society that rely on them and cannot take efficient preventative measures to guard against severe service failures. For example, it is more efficient for an electrical transmission operator to guard against severe blackouts than it is for every

191. *See* Goldberg, *supra* note 187, at 919–21; Dagan & Dorfman, *supra* note 190, at 210–11; Anthony J. Sebok, *Making Sense of Abatement as a Tort Remedy*, 73 DEPAUL L. REV. 525, 533 (2024).

192. *See, e.g.*, Dew-Becker, *supra* note 65, at 2110 tbl.1 (listing "Electric power generation, transmission, and distr[ibution,]" "Truck transportation," "Monetary authorities and depository credit intermed[iation,]" and "Wired telecommunications carriers" as among the most central industries in the modern economy).

193. *See* William J. Novak, *Law and the Social Control of American Capitalism*, 60 EMORY L.J. 377, 401 & n.122 (2010); DOBBS'S LAW OF TORTS, *supra* note 163, § 234; *see, e.g.*, Sw. Pub. Serv. Co. v. Artesia Alfalfa Growers' Ass'n, 353 P.2d 62, 67 (N.M. 1960) (electric utility could not contract with customers to avoid liability for its negligent operations).

194. *See supra* Part I.

195. This type of reasoning has led courts to embrace strict products liability. *See* Keith N. Hylton, *The Law and Economics of Products Liability*, 88 NOTRE DAME L. REV. 2457, 2463 (2013) ("The deterrence rationale holds that strict products liability provides an incentive for the party best able to control product accidents to take steps to minimize their occurrence."); Catherine M. Sharkey, *Modern Tort Law: Preventing Harms, Not Recognizing Wrongs*, 134 HARV. L. REV. 1423, 1438–40 (2021) (book review).

power purchaser (or parties that rely on those purchasers) to buy emergency generators.[196] The same is likely true of preparation for catastrophic failures by internet providers, telephone network operators, and couriers, among others.[197]

To focus and locate this duty, courts should find a defendant liable for economic public nuisance only if the defendant has breached (or substantially failed to perform) a contract in an unreasonable and substantially harmful manner. Under this approach, a defendant would be liable for failing to take cost-justified actions to comply with the contract, resulting in substantial social harm. There are several reasons to tailor liability in this manner. In the absence of a contract, courts would have no principled way in which to cabin an injurer's duty to avoid nonfeasance. How would a court determine how many widgets a central producer should supply (and to whom), on what date a courier should deliver a package, or what amount of electricity a transmission operator should dispatch?[198]

In addition, a rule that rendered central actors liable for *all* harms to peripheral parties (rather than substantial harms) would not target the least-cost avoider. Although it is likely that central actors are the cheapest cost avoiders for extremely large disruptions in their services, peripheral actors are often the cheapest cost avoiders for accidents involving modest disruptions. Local actors are aware of their idiosyncratic needs and resources, and thus are often best able to prepare for moderate service disruptions.[199] Holding central actors liable for all losses from their service disruptions, however small, would thus likely lead them to inefficiently reduce their activity levels or otherwise engage in precautions better undertaken by other parties. Finally, this definition of breach is similar to that in typical public-nuisance suits, which require an unreasonable interference with a public right.[200]

Understanding contracts to independently create a tort duty to the public is unusual, but not unprecedented. Though courts typically hold that duties originating in contract are not redressable in tort, there are many exceptions,

196. *Cf.* Koch v. Consol. Edison Co. of New York, 468 N.E.2d 1 (N.Y. 1984); Catherine M. Sharkey, *The Irresistible Simplicity of Preventing Harm*, 16 J. TORT L. 134, 155–61 (2023) (discussing application of least-cost-avoider rationales to the *SoCalGas Leak Cases*).

197. *See* Dew-Becker, *supra* note 65, at 2110 tbl. 1.

198. Common-law tort suits against common carriers for failure to deliver goods interstate are preempted by federal law. *See* 49 U.S.C. § 14706.

199. *See* Sharkey, *supra* note 167, at 1041; Miles, *supra* note 179, at 1817–20. For example, it seems appropriate for hospitals or public-transport operators to be responsible for retaining some backup generation ability to deal with brief power interruptions that are far more consequential for them than most recipients.

200. RESTATEMENT (SECOND) OF TORTS, *supra* note 163, § 821B, cmt. e; Kendrick, *supra* note 185, at 755–58.

particularly when courts deem the parties to have a "special relationship," as between a professional and a client, a common carrier and a customer, and a bailee and bailor.[201] These are the same types of parties that usually cannot disclaim tort liability by contract, and there is substantial overlap with those parties deemed "affected with a public interest," and so considered by tort law to have greater obligations to the public.[202] On top of that, courts in some arenas interpret contracts with the interests of independent third parties in mind.[203] That is especially the case when it comes to equitable relief, as we discuss more below.[204] These doctrinal traditions point to a history of courts deeming certain contracts, especially those with powerful actors, as affected with public responsibility.

b. Rightsholders

For prudential reasons, courts should restrict economic public-nuisance suits to government plaintiffs.[205] That is a narrower class of plaintiffs than allowed by traditional public-nuisance doctrine, which permits suits by economic-loss victims that were specially harmed by the defendant's conduct.[206] Permitting only government officials to sue would reduce the risks of overdeterrence and over-adjudication, as well as the unpredictable contortions of the doctrine concerning who counts as "specially harmed," about which courts have reached little agreement.[207] In addition, the specially harmed parties in these types of cases would be particularly inapt plaintiffs because allowing them to recover would reduce their own incentives to take adequate precautions against supply disruptions.

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201. *See* THIRD RESTATEMENT: ECON. HARM, *supra* note 166, § 3; *id.* at cmt. g; DOBBS'S LAW OF TORTS, *supra* note 163, § 615; *see, e.g.*, Smith Maritime, Inc. v. L/B Kaitlyn Eymard, 710 F.3d 560 (5th Cir. 2013) (per curiam); Springfield Hydroelec. Co. v. Copp, 779 A.2d 67, 70 (Vt. 2001).

202. *See* DOBBS'S LAW OF TORTS, *supra* note 163, § 234 ("Historically, businesses affected with a public interest, including some professional bailees, carriers, and public utilities could not contractually avoid liability for their own negligence.").

203. *See* Aditi Bagchi, *Other People's Contracts*, 32 YALE J. ON REG. 211 (2015); Omri Ben-Shahar, David A. Hoffman & Cathy Hwang, *Nonparty Interests in Contract Law*, 171 U. PA. L. REV. 1095 (2023); *id.* at 1097 & n.4; David A. Hoffman & Cathy Hwang, Essay, *The Social Cost of Contract*, 121 COLUM. L. REV. 979, 994–99 (2021).

204. RESTATEMENT (SECOND) OF CONTRACTS § 357 (AM. L. INST. 1981) ("In granting [equitable] relief, as well as in denying it, a court may take into consideration the public interest."); Sogefi USA, Inc. v. Interplex Sunbelt, Inc., 535 F. Supp. 3d 548, 555 (S.D.W. Va. 2021).

205. RESTATEMENT (SECOND) OF TORTS, *supra* note 163, § 821C cmt. a ("[I]t is essential to relieve the defendant of the multiplicity of actions that might follow if everyone were free to sue for the common wrong.").

206. *See id.*; THIRD RESTATEMENT: ECON. HARM, *supra* note 166, § 8; DOBBS'S LAW OF TORTS, *supra* note 163, § 403.

207. *See* THIRD RESTATEMENT: ECON. HARM, *supra* note 166, § 8, cmt. c. ("What injuries are 'special,' or 'distinct in kind,' is unavoidably a matter of judgment rather than rule.").

c. Remedies

Historically, courts have permitted government bodies in public-nuisance cases suing in their role as governments—rather than as specially harmed victims—the remedy of abatement, rather than of damages.[208] This equitable remedy aims, in the words of several recent courts, "to eliminate the hazard that is causing prospective harm to the plaintiff."[209] This will sometimes be a satisfactory remedy. For example, a court could in effect order specific performance, requiring the defendant to carry out its contractual obligations. If the government quickly recognizes and acts on the economic public nuisance, this may be an effective response. But in other situations, performance or abatement will be impossible. If a utility or telecommunications firm inadequately prepared for a storm, it may simply not be able to service customers, whatever a court tells it to do. Or a company's failure to invest in resilience may manifest in subtle, difficult to disentangle respects that are resistant to direct remediation.

In these circumstances, the better approach may be to award the government what Catherine Sharkey and Guido Calabresi have termed "societal damages" or "socially compensatory damages."[210] If specific performance or abatement is impossible, courts and juries should award the net social damage caused by central actors' careless failures.[211] The idea is that if breach of contract imposes negative externalities on downstream parties, the prospect of damages should push the parties to internalize those costs.[212] Jury estimates will no doubt be imprecise, as they often are. But calibrating overall social harms will be less onerous than parsing thousands or millions of individual claims, and well within the purview of what we accept when juries calculate punitive damages.[213] Indeed, Sharkey has

208. *See* Sebok, *supra* note 191, at 539; Kendrick, *supra* note 185, at 714, 748–49.

209. *See In re* Nat'l Prescription Opiate Litig., 622 F. Supp. 3d 584, 606 (N.D. Ohio 2022), *rev'd and remanded*, 2025 WL 354758 (6th Cir. Jan. 31, 2025) (quoting People v. ConAgra Grocery Prods. Co., 227 Cal. Rptr. 3d 499, 569 (Ct. App. 2017)).

210. *See* Catherine M. Sharkey, *Punitive Damages as Societal Damages*, 113 YALE L.J. 347 (2003); Ciraolo v. City of New York, 216 F.3d 236, 246 n.7 (2d Cir. 2000) (Calabresi, J., concurring).

211. *See* Sebok, *supra* note 191, at 539, 542–43 (noting that when abatement is "impossible or otherwise inadequate" courts occasionally award compensation to government plaintiffs).

212. For a similar argument under opposite circumstances, see generally Hoffman & Hwang, *supra* note 203. They observe that sometimes performance of a contract greatly increases negative externalities borne by the public. For example, contracts to perform public gatherings during the worst of the COVID-19 pandemic. They find some cases where courts reform contracts on account of such externalities. *Id. But see* Anthony J. Casey & Anthony Niblett, *The Limits of Public Contract Law*, 85 LAW & CONTEMP. PROBS. 51 (2022) (arguing that courts are ill-suited to this contract modification role).

213. *See* Sharkey, *supra* note 210, at 447 n.388.

argued that punitive damages can be explained in part as an attempt to force tortfeasors to internalize the costs borne by nonparties.[214]

In comparing injunctive relief to socially compensatory damages, we must consider how these remedies would affect behavior before and after a disaster. Before a disaster, the prospect of socially compensatory damages would likely promote resilience.[215] But once supply shocks have struck and performance has become difficult, more flexible injunctive relief might help counterparties manage the fallout and avoid driving each other into bankruptcy. Every remedy regime faces a tradeoff between providing ex ante incentive to prepare and ex post flexibility to survive a crisis.

This tradeoff raises the question of whether the ex ante perspective or ex post perspective is more important for assessing the overall resilience contribution of tort law. Our view is that this depends on the nature of the shock at hand. In the case of supply shocks caused entirely by unpreventable circumstances (e.g., unforeseeable natural disasters), the ex post perspective is more important because no amount of ex ante caution could secure resilience at proportionate prices. But in the case of shocks caused or exacerbated by insufficient preparation, the ex ante perspective is more relevant. Indeed, this distinction explains why our proposed duty is to avoid *unreasonable* breach or substantial failure to perform. We are not suggesting that central actors should be given a duty to engage in inefficient precautions.

Courts can play a critical role by recognizing which set of circumstances more aptly characterizes the situation at hand. Courts can modulate the remedy, enforcing relatively harsh remedies in cases where the breaching party could have better invested in preparedness but allowing more flexible forbearance in cases where the breaching party could not have reasonably put itself in a better position to perform.[216]

None of this is to suggest that economic public-nuisance suits will entirely address the resilience externality. The externality is pervasive, and not limited to the type of central actors we view as appropriate to consider for the tort. The externality may also manifest in failures to prepare that are not visible in failures to perform. But even as a second-best to solutions in resilience regulation, economic public nuisance suits would likely reduce

214. *See id.* at 365.

215. For example, Galdin finds, in the context of pharmaceutical manufacturing, that contract penalties would substantially decrease shortages. Prices would increase to account for the penalties, but not enough to offset substantially increased consumer welfare. *See* Galdin, *supra* note 53, at 50. We address arguments that social compensatory liability would have perverse consequences below.

216. On the use of negligence as a standard-setting law, see Mark Geistfeld, *Tort Law in a World of Scarce Compensatory Resources*, 124 MICH. L. REV. 59 (2025).

the severity of the resilience externality by forcing central firms to internalize more of the cost of their failure to reliably supply the market.

d. Potential Perverse Incentives

A worry with our proposed economic public-nuisance tort is that even as it forces some firms to internalize the resilience externality it may also generate perverse incentives that would harm resilience or otherwise reduce welfare. By making it costlier to enter and remain in essential markets, the tort will lower the number of actors providing these goods or services, potentially exacerbating the resilience externality. In addition, by linking liability to contract violations, the law will push firms to vertically integrate, skirting liability by hiding agreements within a single entity. Such vertical integration may have complex and at times harmful consequences for resilience, among other potential downsides.[217] Firms may also simply reduce the number of contracts they enter into, irrespective of vertical integration, reducing output.

These are reasonable concerns. Still, we think our proposal is well tailored to reduce these worries. The tort is targeted at a narrow subset of central firms that are either de jure or de facto utilities, and thus typically attract entrants (and reward incumbents) through supracompetitive profits.[218] That lure reduces the concern that firms will flee markets in which they are subject to public-nuisance liability. Indeed, the tradeoff between reduced competition and heightened safety is endemic to essential markets like electricity and banking.[219] Nor will utility regulation solve the resilience externality on its own. Not all of these central firms—for example, semiconductor manufacturers—are regulated as utilities. Much of utility regulation is aimed at distinct problems, like market power, rather than resilience.[220] Regulation may also be systematically insufficient, at least in

217. *See infra* Section III.B.

218. *See supra* notes 65–67, 192 and associated text. *See also generally* Aneil Kovvali & Joshua C. Macey, *Hidden Value Transfers in Public Utilities*, 171 U. PA. L. REV. 2129 (2023); MARK ELLIS, AM. ECON. LIBERTIES PROJECT, RATE OF RETURN EQUALS COST OF CAPITAL (2025), https://www.economicliberties.us/wp-content/uploads/2025/01/20250102-aelp-ror-v5.pdf [https://perma.cc/63DF-CQZN].

219. *See generally* Dean Corbae & Ross Levine, *Competition, Stability and Efficiency in Financial Markets*, *in* FED. RSRV. BANK OF KAN. CITY, JACKSON HOLE ECONOMIC POLICY SYMPOSIUM PROCEEDINGS 357, 359 (2018); NAT'L ACADS. OF SCIS., ENG'G & MED., THE ROLE OF NET METERING IN THE EVOLVING ELECTRICITY SYSTEM 155 (2023) (describing the "regulatory compact" in the electricity sector).

220. *See* George L. Priest, *The Origins of Utility Regulation and the Theories of Regulation Debate*, 36 J.L. & ECON. 289, 292 (1993).

some political environments, in which case the economic public-nuisance tort can thermostatically bolster incentives to remain resilient.[221]

As for the risk that companies will vertically integrate, which we consider more in Section III.B, antitrust enforcement by government and private parties will remain necessary to prevent harmful mergers.[222] Should courts or legislatures create or employ an economic public-nuisance tort, antitrust enforcers would have to be especially sensitive to vertical mergers involving central players subject to the tort's reach. Finally, the tort may on the margin reduce the incentive for certain firms to contract, but should do so in a modest (and, we expect, justified) fashion given its narrow applicability to central firms, requirement of substantial and unreasonable failure to perform, and availability only to government plaintiffs.

3. Alternative Solutions in Contract Law

By identifying public duty with specific contracts, our proposed economic public-nuisance tort naturally raises the question of whether contract is the better body of law (or at least, an additional one) to address the resilience externality. The answer depends in large part on the posture of the case and what type of remedies are at stake.

When specific performance is an adequate remedy, contractual counterparties will be well positioned to secure relief for themselves and the public at large. Counterparties will generally be the first to know about breach or planned breach, and will often be interested in performance. Several contract doctrines helpfully address the resilience externality by favoring specific performance when it would be beneficial to the public at large. This is visible in the Uniform Commercial Code, which permits specific performance when "the goods [at issue] are unique."[223] Breaches by sole suppliers of critical inputs are precisely those that threaten to be most damaging to third parties and the macroeconomy. In addition, the Restatement provides that courts "may take into consideration the public interest" when weighing whether to order specific performance, and several recent decisions issued in times of crisis have taken supply-chain effects seriously in ordering injunctive relief.[224]

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221. *Cf.* Shelanski, *supra* note 148, at 1742 (arguing that robust antitrust enforcement can help protect consumers in times of weak regulation). Of course, there is the opposite danger—that utilities will be over-regulated. But in that case, compliance with regulation would almost always be judged reasonable for purposes of the tort and so impose no greater liability.

222. *See infra* Section III.B.

223. *See* U.C.C. § 2-716(1) (A.L.I. & UNIF. L. COMM'N 2022).

224. *See* RESTATEMENT (SECOND) OF CONTRACTS, *supra* note 204, § 357 illus. 5(c); Ben-Shahar et al., *supra* note 203.

In *Sogefi USA, Inc. v. Interplex Sunbelt, Inc.*, for example, the district court temporarily ordered the breaching auto-part supplier defendant to perform in part because the "failure to timely deliver the Parts to [plaintiff] will likely cause [plaintiff] as well as its customers—and potentially other supply chain participants—to shut down production, potentially causing layoffs and economic harm throughout this automotive supply chain."[225] Similarly, in *Almetals, Inc. v. Wickeder Westfalenstahl, GmbH*, the district court found that the public interest favored specific performance because "[d]enying the injunction places at risk the operations at [plaintiff], and . . . numerous customer assembly plants. This would be disastrous, irreparably damaging [the plaintiff] . . . and causing further detriment to the economy."[226]

But what about when specific performance is impossible or inadequate? Then the best hope for contract law is to avoid the resilience problem ex ante rather than resolve it ex post. Contract terms can encourage suppliers to invest by attaching rewards and penalties to resilience. By making a long-term, costly commitment to a particular supplier, a buyer may be able to garner commitments to adaptability and cooperation in return.[227] The seller might commit to maintaining supply even in adverse market conditions, for which the buyer compensates her with higher prices during normal times. This paradigm of long-term contracting at above-market prices is sometimes referred to as the "Japanese system" of subcontracting.[228]

In theory, buyers can try to ensure resilience either by offering rewards for reliability or by establishing remedies for failure to perform. For example, in a study of the global supply chain for generic drugs, Galdin proposes enforcing penalties for failure to supply, which "may allow reliable suppliers to benefit from higher profit margins, thereby incentivizing investments in the production process."[229] According to her model, a penalty of half "the average firm's anticipated market profit would decrease the probability of shortages by 35% and diminish the fraction of unmet demand by 45%."[230] Economically, rewards or penalties should be interchangeable alternatives at the relevant magnitudes. But legal doctrine does not draw the same equivalence. While rewards for contractual

225. Sogefi USA, Inc. v. Interplex Sunbelt, Inc., 535 F. Supp. 3d 548, 555 (S.D.W. Va. 2021).

226. Almetals, Inc. v. Wickeder Westfalenstahl, GmbH, No. 08-10109, 2008 WL 4791377, at *10 (E.D. Mich. Oct. 29, 2008). Our thanks to Anna Gelpern for pointing us to this decision, which we discuss at greater length below.

227. *See* Jennejohn, *supra* note 24, at 296.

228. *See* Curtis R. Taylor & Steven N. Wiggins, *Competition or Compensation: Supplier Incentives Under the American and Japanese Subcontracting Systems*, 87 AM. ECON. REV. 598 (1997).

229. Galdin, *supra* note 53, at 48.

230. *Id.* at 50.

resilience are always permissible, contract law bars penalty clauses, precluding damages that might approach the magnitude of the resilience externality.[231] This is not the venue to evaluate the cases for and against penalty clauses on their full merits.[232] For our present purpose of achieving optimal resilience, it suffices to observe that firms can remain on safe legal footing by negotiating bonus payments for supply reliability rather than penalty clauses for supply failures.

B. Antitrust

The discussion of the role of contracts in resilience opens the question of the role of firm boundaries in the resilience externality. How does settling supply agreements inside the firm through vertical integration compare to explicit supply agreements between distinct firms? Put differently: How does collapsing the separate interests of buyers and sellers into a single interest affect the resilience externality? The area of the law in which this question has the most practical importance is antitrust.

In this Section, we argue that resilience effects should be given more weight in vertical merger analysis, as one of us has previously argued regarding horizontal mergers.[233] Mergers combining upstream and downstream companies in highly competitive industries seem likely on balance to reduce risk by allowing the upstream party to capture more of the value of resilience. But this factor can have the opposite sign in weakly competitive industries, where vertical mergers can harm resilience by foreclosing competition.

To set the stage for this analysis, some background on merger law is in order. Under the Hart-Scott-Rodino Act, parties to a merger costing above a certain dollar threshold must file with the Department of Justice and Federal Trade Commission for the transaction to be evaluated under Section 7 of the Clayton Act.[234] The agencies then assess whether the effect of the merger "may be substantially to lessen competition, or to tend to create a

231. *See, e.g.*, Lake River Corp. v. Carborundum Co., 769 F.2d 1284, 1288 (7th Cir. 1985) (discussing the common law's hostility to penalty clauses).

232. On this topic, see generally Aaron Edlin & Alan Schwartz, *Optimal Penalties in Contracts*, 78 CHI.-KENT L. REV. 33 (2003); Alan Schwartz, *Keynote Address: Modern Supply Chains and Outmoded Contract Law*, 68 AM. U. L. REV. 1503 (2019); Charles J. Goetz & Robert E. Scott, *Liquidated Damages, Penalties and the Just Compensation Principle: Some Notes on an Enforcement Model and a Theory of Efficient Breach*, 77 COLUM. L. REV. 554 (1977).

233. *See generally* Bloomfield, *supra* note 55.

234. 15 U.S.C. § 18a.

monopoly."[235] As one of us has argued, how a transaction affects risk may sometimes be properly considered in merger review.[236]

The leading antitrust concern with a vertical merger is that the merging firm might engage in, or threaten, foreclosure carried out either by the upstream party (input foreclosure) or the downstream party (customer foreclosure).[237] That is, the merged firm may have the incentive and ability to harm rivals it sells to, or buys from, by changing how it does so. For example, a car manufacturer Y might merge with a producer of widget X, an input into car manufacturing. If the producer of widget X has market power, the merged entity could withhold it from other carmakers, or raise its price to rivals, potentially increasing market prices. That would give the merged firm an advantage as a car manufacturer, perhaps by diverting sales from other carmakers. Or, if car manufacturer Y had market power, it could stop buying from widget X's rivals, potentially driving them out of the market or reducing their ability to invest in R&D. Either way, the integrated firm may be able to raise rivals' costs, which can increase prices, degrade quality, and reduce output.[238]

A related worry is that the merger might reduce entry into the upstream market, the downstream market, or both.[239] For example, an upstream firm may have entered the downstream market but for the merger, thus reducing competition compared to the counterfactual world. Alternatively, the ability of the post-merger firm to foreclose rivals may also deter potential rivals from entering.

The classic defense of a vertical merger is that it will allow the firm to eliminate double marginalization, that is, the integrated firm will have the incentive to provide the previously traded goods or services without a markup, thereby making the merged entity more efficient.[240] A chain of monopolies compounds monopoly deadweight loss while a single monopolist only exacts the deadweight loss once. The view that vertical mergers were always, or almost always efficient, long championed by the Chicago School, has been influential, and antitrust enforcement against such mergers has been limited.[241]

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235. 15 U.S.C. § 18.

236. *See* Bloomfield, *supra* note 55, at 96–103.

237. *See* D. Bruce Hoffman, Acting Dir., Bureau of Competition, Vertical Merger Enforcement at the FTC (Jan. 10, 2018), https://www.ftc.gov/system/files/documents/public_statements/1304213/hoffman_vertical_merger_speech_final.pdf [https://perma.cc/3BRB-YNBS]; 2023 MERGER GUIDELINES, *supra* note 47, § 2.5.

238. *See* Steven C. Salop & David T. Scheffman, *Raising Rivals' Costs*, 73 AM. ECON. ASSOC. PAPERS & PROC. 267 (1983); 2023 MERGER GUIDELINES, *supra* note 47, § 2.5.A.

239. 2023 MERGER GUIDELINES, *supra* note 47, § 2.5.A.

240. *See* Paul L. Joskow, *Vertical Integration*, 55 ANTITRUST BULL. 545 (2010).

241. *See* Steven C. Salop, *Invigorating Vertical Merger Enforcement*, 127 YALE L.J. 1962 (2018).

Prompted in part by recent scholarship showing that vertical mergers harm competition in many plausible situations, the agencies have begun to police such mergers more vigorously.[242] In their 2023 Merger Guidelines, the DOJ and FTC presented an updated and more aggressive approach to assessing vertical mergers.[243] According to the Guidelines, mergers in which one of the merging parties would have monopolistic control over a critical input used by the other and its rivals are presumptively anticompetitive.[244]

Some vertical mergers pose serious competition concerns. At the same time, there is an appealing theoretical intuition that vertically integrated firms might be more resilient than non-vertically integrated firms. Such firms might be more motivated to mitigate supply shocks affecting their upstream inputs than non-integrated suppliers that contract with downstream buyers or transact through a market.[245] The logic is that the input may be more valuable to the downstream firm—because it is an essential component of higher value-added goods or services—than the price it pays the upstream supplier would indicate.

In line with this theory, researchers have generally found that firms are more likely to vertically integrate if they trade goods or services that are specifically helpful to one of the merging parties.[246] Firms tend to integrate in response to cost uncertainty, and especially so in the context of asset-specificity.[247] At least according to one study, after integration such firms

242. *See id.*; Margaret E. Slade, *Vertical Mergers: A Study of Ex Post Evidence and Ex Ante Evaluation Methods*, 58 REV. INDUS. ORG. 493 (2021); Fernando Luco & Guillermo Marshall, *The Competitive Impact of Vertical Integration by Multiproduct Firms*, 110 AM. ECON. REV. 2041 (2020); Illumina, Inc. v. Fed. Trade Comm'n, 88 F.4th 1036, 1053 (5th Cir. 2023) (applying modern incentive-and-ability foreclosure analysis).

243. Alexandra Charbi & Juan Rojas, *Merger Enforcement Policies of the Second Trump Administration: Early Developments and Priorities*, AM. BAR ASSOC. (Aug. 29, 2025), https://www.americanbar.org/groups/antitrust_law/resources/newsletters/merger-enforcement-policies-second-trump-admin [https://perma.cc/JFU5-TNE4].

244. *See* 2023 MERGER GUIDELINES, *supra* note 47, § 2.5.A.2; Steven C. Salop, Some Comments for Improving the 2023 Draft Merger Guidelines 31–32 (Sept. 12, 2023) (unpublished manuscript), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4571388 [https://perma.cc/K9E7-AKUK].

245. Laura Alfaro, Pol Antrás, Davin Chor & Paola Conconi, *Internalizing Global Value Chains: A Firm-Level Analysis*, 127 J. POL. ECON. 508 (2019) ("Whether a firm integrates upstream or downstream suppliers depends crucially on the elasticity of demand it faces. Moreover, integration is shaped by the relative contractibility of stages along the value chain, as well as by the firm's productivity").

246. *See, e.g.*, Paul Joskow, *Vertical Integration and Long-Term Contracts: The Case of Coal-Burning Electric Generating Plants*, 1 J.L. ECON. & ORG. 33 (1985) (finding that coal-burning power plants either vertically integrate or enter long-term contracts with their coal suppliers to mitigate price and availability fluctuations of their key input); Marvin B. Lieberman, *Determinants of Vertical Integration: An Empirical Test*, 39 J. INDUS. ECON. 451 (1991).

247. Jon A. Garfinkel & Kristine Watson Hankins, *The Role of Risk Management in Mergers and Merger Waves*, 101 J. FIN. ECON. 515 (2011).

experience lower costs and consequently need to carry less financial slack.[248]

Part of the appeal of vertical integration is to avoid costly bargaining about how to allocate losses in the face of unforeseen supply disruptions. A study of the airline industry found that major airlines tend to use vertically integrated regional carriers (instead of third-party regional carriers) on routes with the most rain and snowfall, likely because integrated carriers are more flexible in response to schedule adjustments.[249] Supplier holdups in the face of the oil price shock of the 1970s also seems to have motivated consumer-facing firms to vertically integrate their supply chains.[250] The uncertainty of contract enforcement can play a similar role to the uncertainty of supply availability or price. A recent study of manufacturing in India found that in states with more congested courts, manufacturers bring more intermediate production in-house rather than relying on third-party suppliers who may be difficult to hold liable for breach.[251]

Given those potential resilience benefits, it might seem that, in theory at least, antitrust authorities should weigh traditional harms from foreclosure or entry deterrence against resilience benefits from integration.[252] That would be empirically challenging but conceptually straightforward, weighing the social benefit of resilience against other social harms of increased foreclosure risk (such as increased price).

But reality is more complicated. When an upstream and downstream firm merge, the merged entity will internalize both parties' interests. But the post-merger firm will not internalize the interests of rivals in either market, and in fact the merger may render the upstream (downstream) component of the firm more adverse to the rest of the downstream (upstream) market than it was before, and more likely to cause disruptions to them.

For example, consider the *Almetals v. Wickeder* case discussed briefly above.[253] Almetals was in the business of buying and finishing a complex metal product called clad metal and selling it to automobile supply

248. *See id.*

249. *See* Silke Januszewski Forbes & Mara Lederman, *Adaptation and Vertical Integration in the Airline Industry*, 99 AM. ECON. REV. 1831 (2009); Nuri Ersahin, Mariassunta Giannetti & Ruidi Huang, *Supply Chain Risk: Changes in Supplier Composition and Vertical Integration*, 147 J. INT'L ECON., 2024, art. no. 103854.

250. *See* Joseph P.H. Fan, *Price Uncertainty and Vertical Integration: An Examination of Petrochemical Firms*, 6 J. CORP. FIN. 345 (2000).

251. *See* Johannes Boehm & Ezra Oberfield, *Misallocation in the Market for Inputs: Enforcement and the Organization of Production*, 135 Q.J. ECON. 2007, 2009 (2020).

252. That is, if one assumes that these benefits would be cognizable under Section 7 of the Clayton Act. For further discussion of when projected increases or reductions in risk are cognizable under Section 7, see Bloomfield, *supra* note 55, at 96–103.

253. Almetals, Inc. v. Wickeder Westfalenstahl, GmbH, No. 08-10109, 2008 WL 4791377 (E.D. Mich. Oct. 29, 2008).

companies. In 1997, Almetals agreed to be the exclusive distributor of a clad metal produced by Wickeder, which was the only firm that could mass produce the specific product Almetals required.[254] In 2000, Wickeder purchased one of Almetals's rival distributors, and in 2005 it offered to buy Almetals as well.[255] That deal fell through, and after Wickeder merged with its own closest competitor in the clad-metal industry, the merged company terminated its agreement with Almetals and began imposing increasingly onerous terms of trade for remaining purchases.[256] According to the district judge in the case, Wickeder's terms would likely put Almetals out of business and disrupt supply to its customers, who relied on just-in-time goods and a complex product approval process.[257]

Here, vertical integration seemed likely to *increase* the risk of disruption, at least temporarily. Wickeder, the upstream company—and a monopolist—bought a downstream distributor and began raising its rivals' costs. At least in the short term, that threatened to disrupt supply to automobile part suppliers, and ultimately automobile manufacturers. Wickeder apparently planned to use its new distributor branch to fill that gap, consistent with its foreclosure incentive. But as the district court found, there was good reason to believe that transitioning to a new distributor would take time, and cause significant disruption in the interim. Wickeder's vertical integration did nothing to internalize those disruption pains.[258]

If Wickeder had also merged with Almetals (its initial downstream distributor), might that have lessened the risk of disruption? Perhaps to some degree, but that gets us to the second problem with viewing vertical mergers as intrinsically increasing resilience. As we have argued, horizontal competition generally increases resilience by reducing the degree to which post-crisis market power acts as a hedge on inadequate preparation, and by retaining rival firms to fill gaps created by idiosyncratic shocks to individual competitors. To the degree that vertical mergers reduce competition, they also generally reduce resilience, at least in concentrated markets. So foreclosure is not just harmful on traditional grounds, like increasing price, but is harmful because it can reduce resilience. The upshot is that analyzing

254. *See id.* at *3.
255. *See id.*
256. *See id.*
257. *See id.* at *6–7.
258. Ultimately, the district court issued a permanent injunction directing Wickeder to specifically perform its contract, which the court read as requiring more favorable terms to Almetals. *See id.* The United States similarly argued in its case against the AT&T/Time Warner merger that the merged entity would have the incentive and ability to foreclose rivals, potentially resulting in television blackouts, or at least the threat of such blackouts. *See* United States v. AT&T, Inc., 916 F.3d 1029, 1036, 1040 (D.C. Cir. 2019).

vertical mergers is complex even when just considering resilience effects, let alone weighing all the traditional foreclosure harms.

Considering resilience effects in vertical merger review will therefore be challenging, and will likely turn on empirical estimates that are currently not well understood. The basic variables in the equation would be (1) the net risk benefits of reducing the resilience externality via vertical integration (as it differs by industry and competitive posture); (2) the expected foreclosure harms' effect on horizontal competition (again, differing by market and industry); (3) the degree to which such competition harms increase risk; and (4) normal merger-efficiency analysis. Much work remains to be done to the empirics of variables (1) and (3), and finding reliable econometric identification strategies will be hard to come by.

Still, we can consider which types of vertical mergers are likely of greatest and least concern on resilience grounds. Mergers that give downstream firms (those closer to consumers) the incentive and ability to engage in customer foreclosure—harming competition in the upstream market—are especially concerning in the long run, because competition among input suppliers is key for preserving resilience, particularly in central markets.[259] Mergers that favor input foreclosure are, as *Almetals* suggests, more concerning in the short run, as they may lead to temporary supply disruptions. By contrast, mergers combining upstream and downstream companies in highly competitive industries seem likely on balance to reduce risk by allowing the upstream party to capture more of the value of resilience, which might otherwise be especially diluted because of price competition.[260]

When both the upstream and downstream merging parties are monopolists, the merger may do little to reduce resilience because competition is already non-existent, and the increased internalizing arguments are especially strong.[261] Finally, resilience analysis will be more likely to favor vertical mergers that link end-consumers upstream, rather than mergers connecting two layers further upstream. The idea is that downstream firms are closer proxies of the class of beneficiaries of resilience than upstream firms, because the market signals they receive are

259. See our discussion, *supra* Section I.B, of centrality and the importance of firms that are upstream of most of the economy. The Almetals case exemplified this problem, too, as the upstream firm there (Wickeder) had merged with its "closest competitor," making downstream firms even more reliant on it. *See Almetals*, 2008 WL 4791377, at *4. On the relevance of necessary inputs in antitrust law more generally, see Day, *supra* note 87.

260. *Cf.* D. Daniel Sokol, *Vertical Mergers and Entrepreneurial Exit*, 70 FLA. L. REV. 1357, 1363–64 (2018).

261. The analysis will be different if there is evidence that other firms wish to enter either the upstream or the downstream market and the merger would give the merged firm the incentive and ability to foreclose those potential rivals.

the least diffuse. So when upstream firms merge with end-consumers, the internalization is especially valuable. Mergers among upstream firms, though, may encourage foreclosure without as much corresponding internalization.

As this analysis illustrates, recognizing the resilience externality points to consequences of antitrust enforcement that have been hitherto largely ignored. Firm boundaries and market competition help determine the nature and scope of the resilience and business-stealing externalities. At the same time, courts and regulators will not always have the empirical tools to incorporate resilience analysis into their work. This reality underlines the importance of future investigation into the relationship between mergers and resilience—and of recognizing the limits of our current knowledge.

C. Corporate Law

Throughout this Article, we discuss the various legal and economic dynamics that motivate firms to prepare (or not) for shocks. But when we refer to "firms" as unitary entities for shorthand convenience, we gloss over the question of which parties control the firm and whether their interests differ. Examining corporate law allows us to isolate exactly which stakeholders tend to make the resilience-related decisions that we have identified. By applying lessons from corporate law to our study of resilience, we may be able to identify which ownership and governance structures best promote optimal resilience at the firm level.

1. Shareholders vs. Managers

The first question to ask is whether shareholders and managers might differ in their approach to resilience. U.S. law and business practice generally treat shareholders as owning the firm.[262] Because of the nature of their investment stake—unlimited upside, limited downside—and the typical diversification of their position, shareholders have a structural reason to maximize expected income in a risk-neutral manner. Managers, by contrast, tend to be risk averse.[263] To illustrate, consider just one tactic by which firms protect against downside risk: diversifying acquisitions into

262. The force of this stylized fact holds notwithstanding cogent arguments that shareholders do not actually own the firm. For an example of such an argument, see David Ciepley, *The Anglo-American Misconception of Stockholders as 'Owners' and 'Members': Its Origins and Consequences*, 16 J. INST. ECON. 623 (2020).

263. *See* John C. Coffee, Jr., *Shareholders Versus Managers: The Strain in the Corporate Web*, 85 MICH. L. REV. 1 (1986) (describing the central conflict between shareholders and managers as a conflict over risk preference).

a second industry or product line. Managers may favor diversifying acquisitions for the protection they offer against firm-specific risk, but shareholders, who can diversify regardless through a stock portfolio, often find them wasteful, preferring that each portfolio firm specialize narrowly according to its competitive advantage.[264] Some of the most famous shifts in late twentieth-century corporate governance involve shareholders developing techniques to make managers adopt their risk-neutral perspective, such as paying stock-based compensation. Accordingly, the prevalence of diversifying acquisitions declined.[265] We should expect that the same is true of other, less visible means of protecting against firm-specific risk—which is another name for investing in resilience.

One of the most important ways that firms can invest in resilience is by adding production capacity so as to withstand a supply shock. Shareholders and managers differ greatly in their attitude to that strategy. Shareholders, who have the option to redeploy capital into other industries, tend to evaluate performance according to metrics like return on invested capital and profit margin, while managers are more likely to measure performance by gross profits.[266] As one investment expert explains, "[S]imply making money is too modest a goal. The reason is that the investment could have produced a profit by being spent elsewhere."[267] The implications for business strategy are profound. Most importantly, managers will tend to favor—but shareholders oppose—actions that increase production volume or add capacity to produce under varied circumstances, but the cost of which reduces profit margins per dollar of invested capital. Instead, shareholders will tend to prefer restricting output and producing lower volumes at higher margins. This preference—referred to as "capital discipline"—courts the risk of scarcity and exacerbates resilience concerns.[268]

Capital discipline is especially visible in cyclical industries, where shareholders are concerned that excessive investment might cause prices to

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264. *See* Yakov Amihud & Baruch Lev, *Risk Reduction as a Managerial Motive for Conglomerate Mergers*, 12 BELL J. ECON. 605, 606, 608 (1981); Note, *The Conflict Between Managers and Shareholders in Diversifying Acquisitions: A Portfolio Theory Approach*, 88 YALE L.J. 1238, 1241 (1979).

265. Edward B. Rock, *Adapting to the New Shareholder-Centric Reality*, 161 U. PA. L. REV. 1907, 1921 (2013).

266. *See* Michael J. Mauboussin & Dan Callahan, *ROIC and the Investment Process: ROICs, How They Change, and Shareholder Returns*, MORGAN STANLEY INV. MGMT. COUNTERPOINT GLOB. INSIGHTS (June 6, 2023) (explaining the appeal of ROIC to investors). Note that gross profits can be maximized by lower profit margins at higher volumes.

267. *Id.* at 1.

268. *See* Mark N. Cooper, *The Failure of Federal Authorities to Protect American Energy Consumers from Market Power and Other Abusive Practices*, 19 LOY. CONSUMER L. REV. 315, 354 (2007) ("The companies call it 'capital discipline,' but it means a tight market and a permanent condition of excess profits.").

crash. In the 2010s, shale oil prices boomed and drilling companies expanded production to take advantage of the high prices. When prices later crashed and many companies went under, investors resolved not to make the mistake of "over-investing" in response to high prices again. When oil prices once again spiked in the 2020s, market participants cited "capital discipline" as the top reason why producers held back on investing in output growth.[269] In metals and mining, investors cite capital discipline and consequent tight supplies as a reason for market overperformance since a write-down on prior over-investment in 2014.[270] Investors in semiconductors likewise hew closely to the capital-discipline mantra in the face of fears of overcapacity.[271] After the semiconductor manufacturer Texas Instruments announced plans for significant new investments in response to federal subsidies, the activist hedge fund Elliott Management revealed a stake in the company and released a letter urging the company to commit to capital discipline and "prudent capacity management" in order to raise its free cash flow per share, "the best measure to judge a company's performance."[272] Elliott's letter dramatically illustrates the tension between resilience policy and investor interests. Investors like Elliott prefer conditions of relative scarcity, higher prices, and the ability to reallocate the extra capital to other endeavors.

The same preference for a high-margin, low-output strategy that motivates capital discipline can also motivate anticompetitive behavior between would-be competitors, whether explicit or tacit.[273] The strategy of low output with high margins discussed above does not work if one's competitors undercut the price and sell more output at a lower margin. Not

269. *See Dallas Fed Energy Survey: Special Questions*, FED. RSRV. OF DALL. (Mar. 23, 2022), https://www.dallasfed.org/research/surveys/des/2022/2201#tab-questions [https://perma.cc/76XS-CP5X]. *But see* Anusar Farooqui, *What Capital Discipline?*, POL'Y TENSOR (Oct. 21, 2022), https://policytensor.substack.com/p/what-capital-discipline [https://perma.cc/L7TU-BJST].

270. *See* Annie Ao et al., *Industry Top Trends 2023: Metals and Mining: Positive Credit Momentum Slows with Big Demands on Capital*, S&P GLOB. RATINGS (Jan. 23, 2023), https://www.spglobal.com/ratings/en/research/pdf-articles/230123-industry-top-trends-2023-metals-and-mining-101571726 [https://perma.cc/DJC6-GBSB].

271. *See* Alex Irwin-Hunt, *Chip Producers Now Face Overcapacity Risk*, FDI INTEL. (Nov. 16, 2022), https://www.fdiintelligence.com/content/data-trends/chips-producers-now-face-overcapacity-risk-81651 [https://perma.cc/3WB5-T8R4].

272. Letter from Jesse Cohn, Elliot Inv. Mgmt., Managing Partner & Jason Genrich, Elliot Inv. Mgmt., Partner & Senior Portfolio Manager, to Bd. Members of Texas Instruments Inc., (May 28, 2024), https://elliottletters.com/assets/downloads/Elliotts-Letter-to-the-Board-of-Texas-Instruments.pdf [https://perma.cc/59RV-BTSB].

273. Firms even use the language of "discipline" to communicate collusive intent. *See* Gaurab Aryal, Federico Ciliberto & Benjamin Leyden, *Colluding in Plain Sight: Study Finds Airlines Use Earnings Calls to Coordinate Capacity Reductions*, PROMARKET (Mar. 8, 2018), https://www.promarket.org/2018/03/08/colluding-plain-sight-study-finds-airlines-use-earnings-calls-coordinate-capacity-reductions/ [https://perma.cc/33BC-UHTG].

coincidentally, capital-intensive industries have been prone to price and/or output fixing. The competition law literature recognizes that high prices achieved by explicit cartelization or "interdependent behavior among oligopolists" is likely welfare-reducing, even if it may motivate some of the investments that lead to oligopoly status in the first place.[274] The additional point we add here is that insofar as price fixing is linked with output reduction, it also hurts resilience compared to a counterfactual with lower prices and higher output. Coordinated output reduction might be especially likely under common ownership of competitors, which suggests an additional reason (resilience) to worry about the anticompetitive effects of common ownership that other scholars have emphasized.[275]

Corporate law scholarship is home to a longstanding and multifaceted debate about the relative virtues of shareholder-led and manager-led governance. The preceding discussion of how investors and managers differ in their conception of profitability suggests an under-explored consideration in that debate. Corporate investment policies long associated with managerial excess—like diversifying acquisitions and investment in redundant capacity—might be due for reevaluation in light of their resilience benefits. In turn, the modern "shareholder-centric reality" of corporate law might be due for an update.[276] Corporate-governance reform proposals offered in other contexts gain extra credibility in light of their resilience benefits. For example, requiring or incentivizing shareholders to hold their stakes for longer time horizons—effectively aligning shareholders with the internal perspective of managers and employees—would reduce the appeal of reallocating capital to other sectors and make investments in spare capacity more palatable.[277]

2. Externalities Beyond the Firm

Of course, resilience is an externality whose effects spill beyond the firm, meaning that neither shareholders nor managers internalize all the damage

274. *See* Louis Kaplow, *An Economic Approach to Price Fixing*, 77 ANTITRUST L.J. 343, 360–61 (2011).

275. *See* Edward B. Rock & Daniel L. Rubinfeld, *Common Ownership and Coordinated Effects*, 83 ANTITRUST L.J. 201, 214–19 (2020) (discussing how common ownership might facilitate tacit collusion); Einer Elhauge, *How Horizontal Shareholding Harms Our Economy—and Why Antitrust Law Can Fix It*, 10 HARV. BUS. L. REV. 207 (2020); José Azar, Martin C. Schmalz & Isabel Tecu, *Anticompetitive Effects of Common Ownership*, 73 J. FIN. 1513, 1525–28 (2018) (providing evidence of anticompetitive effects of common ownership in the airline industry).

276. *See* Rock, *supra* note 265.

277. *See* Leo E. Strine, Jr., *One Fundamental Corporate Governance Question We Face: Can Corporations Be Managed for the Long Term Unless Their Powerful Electorates Also Act and Think Long Term?*, 66 BUS. LAW. 1 (2010); Patrick Bolton & Frederic Samama, *Loyalty-Shares: Rewarding Long-Term Investors*, J. APPLIED CORP. FIN., Summer 2013, at 74, 86.

of failing to be resilient. In other words, no matter whether shareholders or managers are in charge, corporations will likely still be misaligned with society's interest in resilience.[278] This Section considers several mechanisms for bridging the gap between corporations' interest in resilience and society's.

Limited liability is one of the root causes of the gap between the internal perspective of whoever governs the firm and society's external perspective. There are many good reasons to maintain limited liability.[279] But those reasons do not necessarily justify the fact that limited liability is provided *for free*. As Michael Simkovic observes, limited liability represents a form of underpriced insurance for corporate externalities.[280] If firms had to pay to insure themselves against the harms they might impose on third parties that exceed the firm's own ability to pay, (1) the premiums could be redistributed to compensate those harmed and (2) the difference in prices paid by different firms for limited liability would provide useful information about the "differences in residual risk that are known or suspected by industry participants, but unknown to regulators or the public."[281]

Alternatively, there is a case for imposing some liability on shareholders, directors, and/or officers for a firm's resilience failures. This proposal would modify our proposal for a tort of economic public nuisance, but apply the liability to those aforementioned individuals in addition to the firm itself.[282] Henry Hansmann and Reinier Kraakman argue for unlimited, proportionate shareholder liability for corporate torts.[283] Aneil Kovvali argues for a liability regime where directors and officers would be personally liable for actions or inactions that render an essential business unable to continue operations during a crisis.[284] For the same agency-cost reasons that shareholders incentivize directors and officers to mind the stock price, directors and officers are probably better positioned than shareholders to notice and fix poor resilience planning. Also, as individuals, directors and

278. *See* Steven L. Schwarcz, *Misalignment: Corporate Risk-Taking and Public Duty*, 92 NOTRE DAME L. REV. 1, 3 (2016).

279. *See generally* STEPHEN M. BAINBRIDGE & M. TODD HENDERSON, LIMITED LIABILITY: A LEGAL AND ECONOMIC ANALYSIS (2016).

280. *See* Michael Simkovic, *Limited Liability and the Known Unknown*, 68 DUKE L.J. 275, 288 (2018).

281. *See id.* at 283.

282. *See supra* Section III.A.2.

283. *See* Henry Hansmann & Reinier Kraakman, *Toward Unlimited Shareholder Liability for Corporate Torts*, 100 YALE L.J. 1879, 1893–94 (1991).

284. Kovvali, *supra* note 24, at 221, 226–27, 227 n.129. In this case, firms would have to be barred from indemnifying their directors and officers against liability. *Cf.* 8 DEL. CODE ANN. tit. 8, § 102(b)(7) (West 2025) (preventing Delaware corporations from waiving director and officer liability for acts including breaches of the duty of loyalty, bad faith action, intentional misconduct, and knowing violations of law).

officers would be motivated by the risk of bearing even a relatively small quantum of liability compared to what it might take to shock shareholders into action. Putting smaller sums at risk is one solution to the problem of over-deterrence discussed in Section III.A, where large tort damages might dissuade investment into essential firms.

An additional approach to aligning manager interests with resilience would be to follow the example of Environmental, Social, and Governance (ESG) measures and attempt to link executive compensation with indicators of resilience. The majority of S&P 500 companies now tie executive compensation to some measure of environmental, social, or governance issues.[285] Rather than motivate executives with potential liability for lack of resilience ex post, the compensation approach would aim to reward managers for investing in resilience ex ante.

In applying an ESG-like framework to resilience, one should keep in mind several concerns that critics have raised about ESG more generally. First, by incentivizing executives to perform on certain measurable dimensions, companies may create distorted incentives that neglect other important but hard-to-measure dimensions of resilience.[286] Second, managers exert influence on the board that sets compensation, and so managers may design outcome targets suited to their own interests. The remedy to this concern is to make performance metrics transparent to outsiders, whereas few companies actually disclose their specific ESG targets.[287] Third, and most profoundly, ESG-based compensation usually exists side-by-side with profit- or valuation-based compensation and provides no framework for reconciling the inevitable conflicts between the two paradigms (except insofar as the larger weight on profit and valuation implicitly swamp the importance of ESG).[288]

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285. *See* Merel Spierings, *Linking Executive Compensation to ESG Performance*, HARV. L. SCH. F. ON CORP. GOVERNANCE (Nov. 27, 2022), https://corpgov.law.harvard.edu/2022/11/27/linking-executive-compensation-to-esg-performance/ [https://perma.cc/V9PY-4VTV]. However, those companies that disclose the weight of ESG goals for overall executive pay assign it a modest weight: "between less than 1% to 12.5%, with most companies assigning a weight between 1.5% and 3%." Lucian A. Bebchuk & Roberto Tallarita, *The Perils and Questionable Promise of ESG-Based Compensation*, 48 J. CORP. L. 37, 41 (2022). There is also some sign of a pullback in ESG-linkage in the second Trump administration. *See* Kenza Bryan, Andrew Hill & Malcolm Moore, *Big Companies Backtrack on Climate Goals in Bosses' Pay*, FIN. TIMES (Mar. 21, 2025), https://www.ft.com/content/f33ad127-c021-4583-8b3a-13d317c9849c [https://perma.cc/2Y33-UMRH]; Ross Kerber, *Under Pressure, U.S. Companies Back Off DEI Pay Metrics*, REUTERS (Jul. 9, 2025), https://www.reuters.com/sustainability/sustainable-finance-reporting/under-pressure-us-companies-back-off-dei-pay-metrics-2025-07-09/ [https://perma.cc/US7G-28N5].

286. *See* Bebchuk & Tallarita, *supra* note 285, at 61–63.

287. *See id.* at 68.

288. *See* Aneil Kovvali & Yair Listokin, *Valuing ESG*, 49 BYU L. REV. 705, 708–11, 727 (2024) (describing the conflict between ESG goals and profit goals and firms' ambiguity about how they resolve such conflicts).

The above critiques suggest three central design principles for resilience-related compensation incentives. The measure of resilience that triggers compensation should be meaningful, transparent, and denominated in monetary terms. A meaningful (and difficult-to-game) measure would be one that corresponds to the full resilience externality imposed by the firm's actions. This could include measures of firm and/or industry-wide output, measures of non-performance rates over a relevant time period, and measures of capacity utilization (where lower utilization would indicate excess available capacity). Furthermore, the company should articulate how much it values each incremental unit of improvement on the target measure in order to give managers clear guidance on how to balance resilience and profit. Aneil Kovvali and Yair Listokin offer examples of putting dollar values on the emission of a ton of carbon or on each dollar of average pay gap between male and female employees.[289] Firms could similarly disclose their dollarized valuation of each unit of resilience—ideally, in line with industry-specific estimates of the social value of resilience. This would give clarity both to managers themselves and to external investors deciding how much to credit the firm for its resilience efforts in the course of ESG-style investing. However, given the lack of existing empirical consensus on the proper social valuation of resilience, the prospects of setting a dollar value in executive compensation appear murkier than in the analogous setting of environmental governance, where estimates of the social cost of carbon are widespread and sophisticated.[290]

Finally, it is important to note a potential limiting principle on shareholder self-interest in the face of societal externalities. Even diversified shareholders should be averse to firms taking risks that threaten *systemic* harms to the broader economy, to which those shareholders remain exposed.[291] Risk-taking by "too big to fail" banks is the clearest example where self-interested shareholders should be opposed to systemic externalities, but risks to the supply of macroeconomically critical inputs, of the sort discussed throughout this Article, should also bring the shareholder perspective in line with society's. The limit of this argument is

289. *See id.* at 736–37.

290. *See, e.g.*, NAT'L CTR. FOR ENV'T ECON., U.S. ENV'T PROT. AGENCY, REPORT ON THE SOCIAL COST OF GREENHOUSE GASES: ESTIMATES INCORPORATING RECENT SCIENTIFIC ADVANCES (2023) (documenting state-of-the-art estimates of the social cost of carbon), https://www.epa.gov/system/files/documents/2023-12/epa_scghg_2023_report_final.pdf [https://perma.cc/8R3B-6RKP]; NAT'L ACADS., VALUING CLIMATE DAMAGES: UPDATING ESTIMATION OF THE SOCIAL COST OF CARBON DIOXIDE (2017) (reviewing a decade of methodological advances in estimating the social cost of carbon), https://nap.nationalacademies.org/catalog/24651/valuing-climate-damages-updating-estimation-of-the-social-cost-of [https://perma.cc/WP6X-32WY].

291. *See* John Armour & Jeffrey N. Gordon, *Systemic Harms and Shareholder Value*, 6 J. LEGAL ANALYSIS 35, 39 (2014).

that even diversified shareholders do not bear all the negative externalities generated by their portfolios, and to the extent they do bear some, their incentives for action are muddled by conflicts of interest between the mutual funds they manage and/or companies they own.[292] In the final analysis, we think the above proposals regarding empowering managers relative to shareholders, and nudging both shareholders and managers through ESG-like instruments, could mitigate the resilience externality faced by firms.

D. Bankruptcy

In this Section, we examine bankruptcy law's possible contributions to the resilience externality. When financial or economic distress prevents a firm from paying its obligations, bankruptcy law provides the rules for splitting the firm's available cash flow and/or asset value among competing claimants. Bankruptcy law's central role in resolving distress suggests a possible relationship to the choices—like investing in resilience—that might prevent distress in the first place (or create it, if investment was excessive). Indeed, bankruptcy is among the precise outcomes that firms can expect to face as a consequence of failing to invest in resilience. In claiming that there is a widespread resilience externality, part of what we are implicitly saying is that prevailing bankruptcy law does not sufficiently encourage firms to avoid disruptions. To some extent, of course, this is because most disruptions don't lead to bankruptcy. But even if firms were to calculate that possible disruptions might lead to bankruptcy, they would still under-prepare because not all the stakeholders affected by bankruptcy are represented in or served by it. In other words, bankruptcy has externalities—for many of the same reasons that a lack of resilience does.

1. Creditors vs. Owners vs. Third Parties

In bankruptcy, equity owners stand to lose some or all of their investment. Generally, the stronger the rights allocated to creditors, the more likely are equity owners to lose all of their stake. In this way, owners are motivated to avoid bankruptcy in some rough proportion to how bad it will be for them. In a cross-country comparison, Viral Acharya and coauthors find that in legal regimes with stronger creditor rights, firms tend to make more risk-reducing investments (such as diversifying acquisitions),

292. *See* Roberto Tallarita, *The Limits of Portfolio Primacy*, 76 VAND. L. REV. 511 (2023) (making this argument in the specific case of asset managers as hypothetical stewards of climate governance). *See generally* John D. Morley, *Too Big to Be Activist*, 92 S. CAL. L. REV. 1407 (2019).

thereby lowering the risk of distress.[293] Acharya and coauthors frame these risk-reducing moves as value-destructive insofar as they forego productive investment. While this may be so, the same tendency appears salutary from a resilience-oriented perspective. Strong creditor rights push owners to anticipate internalizing *more* of the costs of bankruptcy, even if they still won't fully internalize the costs that fall on third parties. Further supporting the notion that owners modify their risk-seeking in light of expected bankruptcy costs, Radhakrishnan Gopalan and coauthors find that firms begin taking more risks when one of their directors experiences a relatively short, low-cost bankruptcy at another firm where they concurrently serve as a director.[294] If experience suggests that bankruptcy will be brief and low-cost, owners and their appointed directors become more likely to push the envelope of risk. The tentative implication is that strong creditor rights may push equity owners to internalize more of the resilience externality.

Still, equity owners and creditors are not the only parties that can suffer from bankruptcy. Distress and bankruptcy can harm suppliers, customers, competitors, and indirect counterparties multiple levels above or below the distressed firm in the supply chain. The loss of a bankrupt customer (or supplier) is the most direct channel by which bankruptcy imposes costs on other firms. Distress can also increase the costs of credit to an industry, as lenders may fear that similar structural conditions that affected the first distressed firm might likewise harm its peers.[295] Finally, distress can be transmitted geographically to physically proximate firms in entirely unrelated markets. Shai Bernstein and coauthors exploit random assignment of bankruptcy cases to judges with higher-than-average liquidation tendencies to disentangle bankruptcy outcomes from local economic conditions.[296] They find that liquidation leads to decreases in employment at businesses in the same census block.[297]

In light of the evidence that bankruptcy imposes significant costs on third parties, and the fact that those affected parties have little means to influence

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293. *See* Viral V. Acharya, Yakov Amihud & Lubomir Litov, *Creditor Rights and Corporate Risk-Taking*, 102 J. FIN. ECON. 150 (2011).

294. *See* Radhakrishnan Gopalan, Todd A. Gormley & Ankit Kalda, *It's Not So Bad: Director Bankruptcy Experience and Corporate Risk-Taking*, 142 J. FIN. ECON. 261 (2021). Measures of risk in this analysis were corporate financial policies such as book value of leverage, cash holding, and equity issuance; outcomes of firm risk such as cash flow volatility, stock volatility and distress; and measures of acquisition activity.

295. *See* Emilia Garcia-Appendini, *Financial Distress and Competitors' Investment*, 51 J. CORP. FIN. 182 (2018).

296. *See* Shai Bernstein, Emanuele Colonnelli, Xavier Giroud & Benjamin Iverson, *Bankruptcy Spillovers*, 133 J. FIN. ECON. 608 (2019).

297. *Id.*; *see also* Efraim Benmelech, Nittai Bergman, Anna Milanez & Vladimir Mukharlyamov, *The Agglomeration of Bankruptcy*, 32 REV. FIN. STUD. 2541 (2019) (finding that firms with greater geographic exposure to bankrupt retailers are more likely to close stores in affected areas).

the firm's choices, it might seem that one way to mitigate the harm of bankruptcy would be to make the stakeholders who control the firm bear some of the externalities as least-cost avoiders. On the margin, this could mean making bankruptcy law more favorable to creditors and less favorable to equity owners, in order to trigger the sort of owner-driven risk aversion documented by Acharya and coauthors. Of course, the upper limit of such creditor-favorability is the scenario where equity owners lose their full investment, as limited liability permits no additional recovery from equity. This outcome still leaves a significant chunk of third-party costs externalized—and further illustrates the downside of limited liability.[298]

Even in a scenario where creditors seize the full value of the bankrupt firm, there remains the question of whether they should reorganize the firm as a going concern or liquidate its assets. The academic literature on reorganization vs. liquidation generally focuses on which is worth more for the owners themselves (which, in bankruptcy, will often include the former creditors).[299] But the liquidation debate tends to neglect consideration of which course is more valuable for society as a whole, accounting for the perspective of the various third parties introduced above.[300] Even within that relatively narrow frame, comparisons of creditor recovery between cases assigned to more and less liquidation-friendly judges suggest that creditors do worse than the counterfactual when judges opt for liquidation against creditors' preference.[301]

Expanding the scope to consider counterparties, downstream customers, and their interest in resilience, the case against liquidation becomes even stronger. Liquidation disrupts business continuity, forcing upstream suppliers to find new customers and downstream customers to find new suppliers. Whoever buys the cast-off pieces of the bankrupt firm may eventually be able to replace its role in the supply network, but not without lag and disruption. The implication is that, from a welfare perspective, bankruptcy law should be more skeptical of liquidation than it currently is.

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298. *See supra* notes 280–84 and associated text (discussing the effect of limited liability on resilience).

299. *See, e.g.*, Douglas G. Baird, *The Uneasy Case for Corporate Reorganizations*, 15 J. LEGAL STUD. 127, 139 (1986) ("The justification for reorganizations usually begins with the observation that many firms are worth more if kept intact (or largely intact) than if sold piecemeal.").

300. *But see* Lynn M. LoPucki & Joseph W. Doherty, *Bankruptcy Survival*, 62 UCLA L. REV. 970, 973 (2015) (arguing that bankruptcy does and should attend to "the massive economic and social costs that company failure imposes on employees, suppliers, customers, and communities"); Elizabeth Warren, Essay, *Bankruptcy Policymaking in an Imperfect World*, 92 MICH. L. REV. 336, 355 (1993) (noting all the stakeholders harmed by business bankruptcy).

301. *See* Samuel Antill, *Do the Right Firms Survive Bankruptcy?*, 144 J. FIN. ECON. 523 (2022) (studying creditor recovery outcomes in sales pursuant to Section 363(b), which can go forward without creditor approval).

At the least, this means doubling down on pre-existing arguments for reforming courts' excessive liquidation preference.[302] Going further, it might mean developing doctrine to support denying even creditor-approved liquidation plans when the projected value of liquidation is not substantially higher than the projected value of reorganization.[303] That is, in any close comparison, the positive externalities of reorganization, or at least of hybrid approaches like going-concern sales, should tip the scales.[304]

2. Creditors vs. Creditors

Thus far, our analysis has considered the winners and losers of bankruptcy at the highest level of abstraction: between owners and creditors, between claimholders and third parties, and between reorganization and liquidation as the outcome of the process. But most of the nitty gritty material of a bankruptcy case involves contests *between creditors* as to the relative strength of their claims. In this domain, too, supply-chain resilience is at stake. In fact, here we find the closest that federal bankruptcy law comes to explicitly addressing the resilience implications of bankruptcy. The relevant terrain is that of "critical vendor claims."

A critical vendor claim is a bankruptcy mechanism by which the debtor seeks to prioritize payments to certain "critical" suppliers on the grounds that the debtor cannot obtain certain goods from any other supplier, making a healthy relationship with the critical vendor essential to its prospects for rehabilitation under Chapter 11.[305] A critical vendor claim facilitates a bargain where the debtor prioritizes that vendor's pre-petition claim in exchange for the vendor's promise to keep doing business with the debtor post-petition.[306] A critical vendor order allows the vendor's claim to be paid

302. *See, e.g.*, *id.*; LoPucki & Doherty, *supra* note 300 (recommending assigning cases to judges with experience in large bankruptcies in order to raise predicted survival rates).

303. It is important to note that in some cases there will be countervailing resilience benefits of liquidation. In particular, the liquidation of a monopolist could result in increased competition which we have previously argued is conducive to resilience. *See supra* Sections I.A, III.C.

304. *But see* Lynn M. LoPucki & Joseph W. Doherty, *Bankruptcy Fire Sales*, 106 MICH. L. REV. 1, 811 (2007) (documenting the relatively low creditor recoveries achieved in going-concern sales). We do not have a considered view on how going-concern sales stack up to reorganizations as a matter of creditor recovery, but both are far superior to liquidation as a matter of resilience.

305. *See In re* Kmart Corp., 359 F.3d 866 (7th Cir. 2004) (providing the leading modern authority on the viability of critical vendor claims).

306. The critical vendor order typically provides that if the vendor ceases doing business with the debtor, it must refund any payments it received under the order. *See* Connie Boland et al., *Risk Mitigation in Supply Chain Contracts: Critical Vendor, Reclamation and Pipeline Claims*, THOMPSON HINE: LEGAL UPDATES (May 26, 2020), https://www.thompsonhine.com/insights/risk-mitigation-in-supply-chain-contracts-critical-vendor-reclamation-and-pipeline-claims/ [https://perma.cc/3P7X-SKTC].

as an "administrative expense" of the proceeding—that is, much sooner than other creditors' claims. Critical vendor claims are common and large—in the landmark Kmart bankruptcy, Kmart raised $2 billion in total debtor financing and paid out $300 million in critical vendor payments.[307]

Critical vendor claims are justified under a "doctrine of necessity" that arose out of an older "necessity of payment" rule.[308] Developed in nineteenth-century railroad cases, that rule allowed the trustee to pay the debts of suppliers who threatened to disrupt the continued operation of the railroad by withholding essential goods or services.[309] But courts and commentators disagree on whether the necessity of payment rule survived the Bankruptcy Act of 1978.[310]

Supposing that critical vendor orders are potentially justifiable by some section of the Code, the question is: under what circumstances, exactly? First, critical vendor orders might only be authorized with proof that the vendor would otherwise cease dealings with the debtor. This principle was deemed necessary in two major cases, *Kmart* and *CoServ*.[311] But this principle wrongly assumes the creditor would not continue to make profitable sales to the debtor in the future, even if it lost money on pre-bankruptcy shipments. As two scholars put it, "Rational creditors understand sunk costs."[312] Second, it might be necessary to show that paying the critical vendor will yield a net economic benefit to the debtor.[313] Third, and most relevant to resilience concerns, one might ask whether the critical

307. *Kmart*, 359 F.3d at 869; *see also* LYNN M. LOPUCKI & CHRISTOPHER R. MIRICK, STRATEGIES FOR CREDITORS IN BANKRUPTCY PROCEEDINGS 423 (4th ed. 2003) ("Although some courts have criticized distributions to pre-petition creditors other than pursuant to a confirmed plan as being inconsistent with the Bankruptcy Code, these payments are increasingly being authorized early in the case.").

308. *See* Miltenberger v. Logansport Ry. Co., 106 U.S. 286 (1882).

309. *See In re* B & W Enters., Inc., 713 F.2d 534, 537 (9th Cir. 1983) ("The rule may be invoked by trustees as justification for the payment of pre-petition debts paid under duress to secure continued supplies or services essential to the continued operation of the railroad.").

310. For many years, courts invoked the necessity of payments rule under Section 105 of the Bankruptcy Code, which allows a court to "issue any order, process, or judgment that is necessary or appropriate." 11 U.S.C. § 105(a). But in *Kmart*, the Seventh Circuit limited the scope of the Section 105 power as "not creat[ing] discretion to set aside the Code's rules about priority and distribution." *Kmart*, 359 F.3d at 871. Yet the Seventh Circuit left open the possibility that similar orders could be justified under Section 363(b), which provides that the trustee "may use, sell, or lease, other than in the ordinary course of business, property of the estate." *Id.* at 871–72. The Supreme Court has declined to resolve a circuit split on the statutory authorization for critical vendor orders. *See* Handleman Co. v. Capital Factors, Inc., 543 U.S. 986, 987 (2004) (mem.) (denying certiorari).

311. *See Kmart*, 359 F.3d at 872–73; *In re* CoServ, L.L.C., 273 B.R. 487, 499 (Bankr. N.D. Tex. 2002).

312. Mark J. Roe & Frederick Tung, *Breaking Bankruptcy Priority: How Rent-Seeking Upends the Creditors' Bargain*, 99 VA. L. REV. 1235, 1256 (2013). *But see* Hal R. Arkes & Catherine Blumer, *The Psychology of Sunk Costs*, 35 ORG. BEHAV. & HUM. DECISION PROCESSES 124 (1985).

313. *See* Travis N. Turner, Kmart *and Beyond: A "Critical" Look at Critical Vendor Orders and the Doctrine of Necessity*, 63 WASH. & LEE L. REV. 431, 472, 476 (2006).

vendor order is necessary to keep the *vendor* in business. It is not uncommon for critical vendor arguments to include the assertion that the vendor will not survive the non-payment of pre-petition claims.[314] If the vendor really is "critical"—that is, if it supplies an irreplaceable product that the debtor cannot survive without—then the vendor's own bankruptcy would be a sufficient condition for the first justification above: the vendor would otherwise cease dealings with the debtor (because it would go out of business). The vendor's bankruptcy would also plausibly trigger the second justification above: its dissolution would impede the prospects of reorganization and thereby harm the expected recovery for all other creditors.[315]

A bankruptcy court could go further and ask whether a critical vendor's failure would set off a chain reaction and harm its other customers. In many industries, an upstream firm supplies a unique or difficult to substitute input to multiple downstream competitors. Where the upstream firm is the vulnerable vendor, the full array of downstream users stand to suffer—either because the supplier fails in the first place, or because it tries to extract the original debtor's share of profit from the remaining competitors.[316] Ford used this precise reasoning to justify the congressional bailout of its rivals in 2008. Though Ford was not itself distressed, its CEO argued that if GM and Chrysler were allowed to fail, their part suppliers—upon which Ford also depended—would fail, leading to disruptions at Ford almost immediately.[317]

Congress should clarify the availability of critical vendor payments more generally, and in doing so should consider specifying that part of what makes a vendor critical is the risk that its failure would propagate distress through the supply chain. On the other hand, Congress should consider the

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314. *See, e.g.*, Andrew J. Currie & Sean McCann, *Hold on to Those Payments, Critical Vendors:* Capital Factors v. Kmart, AM. BANKR. INST. J., June 2003, at 1, 1 ("[T]he vendor will be unable to survive non-payment of pre-petition claims, and will thereafter cease to supply the debtor.").

315. A potential counterargument here is that if the vendor really is so critical to the debtor (and/or to other firms), we should not be troubled if it must file for bankruptcy because it will surely be worth reorganizing. This counterargument may be convincing over the long-term, but neglects the short-run costs of financial distress. *See, e.g.*, Gordon Phillips & Giorgo Sertsios, *How Do Firm Financial Conditions Affect Product Quality and Pricing?*, 59 MGMT. SCI. 1764 (2013) (finding that airline sector product quality diminishes during times of financial distress even as it reverts after filing for bankruptcy); Samuel Antill, Jessica Bai, Ashvin Gandhi & Adrienne Sabety, *Healthcare Provider Bankruptcies* (Nat'l Bureau of Econ. Rsch., Working Paper No. 33763, 2025), https://www.nber.org/system/files/working_papers/w33763/w33763.pdf [https://perma.cc/FX3G-JDHW] (finding that healthcare provider bankruptcies "increase healthcare staff turnover, worsen care, and harm patients").

316. *See* S. Alex Yang, John R. Birge & Rodney P. Parker, *The Supply Chain Effects of Bankruptcy*, 61 MGMT. SCI. 2320, 2330 (2015) (discussing the "abetment effect," where due to the failure of one sales channel (the debtor), the supplier extracts more surplus from the remaining sales channels, pushing those firms into bankruptcy).

317. *See* Acemoglu et al., *supra* note 10, at 1978.

possibility that outlawing critical vendor payments might incentivize firms to multisource critical inputs rather than relying on a single supplier. Like many insurance-like legal mechanisms, critical vendor payments are helpful for resolving distress ex post but may create moral hazard ex ante. Congress's most recent move in this area was to grant automatic administrative-priority status to suppliers, whether or not "critical," who shipped any goods to the debtor within twenty days of its bankruptcy.[318] With the caveat that services might be as critical to the debtor's survival as physical goods, elevating trade creditors over financial creditors is a good development for prioritizing continuity of business and mitigating bankruptcy cascades through the supply chain.

CONCLUSION

Trade shocks are nothing new. Plague, war, flooding, drought, fire, and earthquakes have made life hard for humans as long as we have been alive.[319] But key players can prepare for many of these disasters, and when they do they provide large benefits to others, much of which they do not capture or account for. This resilience externality, which we identify in this Article, has been too long understudied in the legal literature. Once you notice it, you see it everywhere—from traditional business-law regimes like tort, contract, and antitrust through more focused frameworks, like the Strategic Petroleum Reserve authority, that we call resilience regulation. We have argued that the resilience externality is significant and ubiquitous, leading to an overly fragile world.

Fortunately, as it does in facing other externalities, the law offers powerful tools to correct these failures. Using a mix of regulatory responses and tailored alterations to business law, officials and courts can bolster resilience by shaping markets and harnessing the government's strength in planning and stockpiling. We have offered new approaches in five major areas of business law and proposed a framework for striking the right balance between modified business-law doctrines, which can largely be undertaken by courts, and new resilience regulations, which federal and state governments should take up. We have also highlighted the types of markets that most call for intervention, particularly those that are measurably central, suffer from principal-agent problems, and are exposed to moral hazard.

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318. *See* 11 U.S.C. § 503(b)(9) (2006).

319. In the law-review tradition of citing even self-evident factual claims, see generally WALTER SCHEIDEL, THE GREAT LEVELER: VIOLENCE AND THE HISTORY OF INEQUALITY FROM THE STONE AGE TO THE TWENTY-FIRST CENTURY (2017).

Many empirical questions about the resilience externality remain unanswered. How big is the externality, and how much does it vary by market? Are there any markets in which the countervailing business-stealing externality predominates? We have also left many areas of the law untouched in this Article. How, if at all, should the resilience externality change our approach to labor law, insurance regulation, trade treaties, intellectual property, and government subsidies for manufacturing? How might more democratic, and less market-oriented, conceptions of resilience alter our approach to the externality? We hope that we and other scholars will take up these questions in future work.