Intermediary Influence and Competition: Berkshire versus KKR


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INTRODUCTION

The American financial services industry employs innumerable intermediaries working for investors and savers, such as accountants, advisors, agents, bankers, brokers, consultants, directors, funds, lawyers, managers, and rating agencies. They charge considerable fees to facilitate exchanges by easing searches and synthesizing or validating complex information. Their influence has been studied from numerous perspectives, including behavioral finance, industrial economics, and public-choice theory. Such treatments illuminate why financial intermediaries exist, what value they add, and what costs they impose, from the perspective of how clients act, how market structures work, and how laws and policies are formulated.

To this substantial literature comes a welcome supplement: Intermediary Influence thanks to Professor Kathryn Judge. Providing a singular account of intermediary influence as a source of sustained pricing power, Judge’s article warns of excessive transaction costs, a net direct loss to the constituents of intermediaries (on both sides), and an indirect net social loss. Such

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2 See generally, for example, Rosemary L. Batt and Eileen Appelbaum, The Impact of Financialization on Management and Employment Outcomes (Upjohn Institute, Feb 2013), archived at http://perma.cc/ACG5-QL56.
an outcome is in tension with prevailing thought in microeconomics, which prescribes and predicts that market forces spontaneously and inexorably pressure for transaction cost minimization. After all, as Professor Ronald Coase taught nearly a century ago, rational economic actors will self-rely when the costs of intermediation exceed the gains. This is the rationale for the existence of firms: they organize economic activity.

Economists dating to the writing of Coase’s seminal work, The Nature of the Firm, assume that institutional arrangements evolve to minimize transaction costs, yet Judge highlights how the influence of financial intermediaries often produces persistently high transaction costs. Her intuition is that contemporary transaction costs are heavy with fees charged by intermediaries who seek to maximize economic gain in settings in which their expertise and positions enable them to promote institutional arrangements that yield high fees despite the existence of lower-cost alternatives. Judge uses examples from several contexts—those of real estate agents, stockbrokers, mutual funds, and stock exchanges—to illustrate how intermediary influence is accumulated and wielded. While acknowledging that financial intermediaries often add value and earn fees commensurate with benefits, Judge simultaneously explains how the phenomenon of intermediary influence should be incorporated into theories of economic behavior and explores how market participants and policymakers might respond in high-fee environments. Among the various important responses are competitive and regulatory tools that increase transparency, enabling participants to shop comparatively in order to avoid excessive fees.


7 Judge, 82 U. Chi. L. Rev. at 589-90 (cited in note 4).

8 See id at 583-88.

9 See id at 600-01.

10 See id at 602-10.

11 See Judge, 82 U. Chi. L. Rev. at 598-600 (cited in note 4).

12 See id at 635-42.

13 See id at 638.
In this Essay, I offer an additional context in which intermediary influence manifests itself, yet is accompanied by potential competitive and regulatory pressures of the kind that Judge envisions constraining excessive fees. In this market, acquirers are diverse, and they include financial bidders such as private equity firms as well as strategic buyers like rivals in similar sectors and diversifying conglomerates. These acquirers’ propensities to use intermediaries and generate costs vary: many incur significant and frequent fees, while others eschew them. Sellers of businesses and others affected by the acquisition process, including shareholders, lenders, employees, and other stakeholders face radically different cost structures.

The acquisition industry is characterized by the traits that, as Judge shows, typify intermediary influence: transaction constituents are often one-time players who rely heavily on acquisition intermediaries. These intermediaries are in turn repeat players in oligopolistic markets who engineer complex, opaque transactions that require specialized knowledge. But the industry is not limited to intermediaries wielding influence and earning high fees; it also includes rivals who keep costs low. This Essay highlights two powerhouses representing opposite ends of the spectrum of financial intermediation: Berkshire Hathaway, the conglomerate built by Warren Buffett that eschews financial intermediation, and Kohlberg Kravis Roberts (KKR), the pioneering private equity firm that thrives on such intermediation. The juxtaposition illustrates both the intermediary influence that Judge describes and the efficacy of her prescription to counter it with transparent low-cost rivals.

After presenting this comparison and drawing related implications, this Essay offers broader reflections on Judge’s work, principally by posing four questions: How much should we expect financial intermediaries’ fees to decline due to technological advances in light of countervailing factors such as globalization and complexity that may sustain high fees? Is it feasible to distinguish the influence on institutional arrangements of specific intermediaries from the influence and effects of other participants? Is intermediary influence invariably exerted primarily to benefit intermediaries or instead to aid producers or even consumers? And can the causal arrow be discerned— that is, is it clear that certain

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14 See id at 614–16.
15 See Judge, 82 U Chi L Rev at 618–20 (cited in note 4).
institutional arrangements exist because of intermediary influence, or might institutional arrangements such as oligopolistic industry structures cause the influence? This Essay stresses that, far from constituting criticism of Judge’s work, such questions warrant further research precisely because her work is so important and fruitful.

I. THE PROMISE OF LOW-COST RIVALS

A Wall Street saying quips that while transactions generate fees, fees often generate transactions. An acute example occurs when a company is encouraged to make an acquisition to diversify and gain synergies, only to be later encouraged to divest the business to unify focus and to shed the shackles of bureaucracy. In the world of private equity epitomized by KKR, it is common to see the same company bought and sold multiple times over a decade or so, generating considerable repeat fees for the intermediaries who design and administer such transactions.16 While conglomerates sometimes follow the buy-and-flip approach, strategic buyers (and Berkshire, to a fault) generally prefer a buy-and-hold route with fewer intermediaries and lower costs.17 As competitors in the acquisitions market, it should be possible for Berkshire and other strategic buyers to dampen the fees of KKR and other private equity firms, at least if there are enough participants and if fees are disclosed for scrutiny. Neither condition currently prevails, but policy might be nudged in those directions.

A. Anti-intermediation: Berkshire Hathaway18

Berkshire, a fifty-year-old conglomerate under Buffett’s leadership and now America’s third-largest public company, almost never uses intermediaries. Despite its stock being very

16 See Steven N. Kaplan and Per Strømberg, Leveraged Buyouts and Private Equity, 23 J Econ Persp 121, 129 (2009) (finding that secondary buyouts: ‘sales from one private equity firm to another’ are the second-most common investment-exit method).
17 See George P. Baker and George David Smith, The New Financial Capitalists: Kohlberg Kravis Roberts and the Creation of Corporate Value 168 (Cambridge 1998) (The documented behavior of successful conglomerates shows that they tended to be opportunistic buyers but reluctant sellers of companies. So long as constituent business units continued to meet minimal corporate performance criteria, they were unlikely to be sold.).
18 For additional analysis of Berkshire, see generally Lawrence A. Cunningham, Berkshire’s Disintermediation: Buffett’s New Managerial Model, 50 Wake Forest L Rev (forthcoming 2015), archived at http://perma.cc/NS5R-QZER (examining Berkshire’s anti-intermediation policies and suggesting that these policies may shape future generations of similar firms); Lawrence A. Cunningham, Berkshire beyond Buffett: The Enduring Value of Values (Columbia 2014) (examining how Berkshire’s distinctive corporate culture informs its success). See also generally Lawrence Cunningham, Minus the Middleman:
widely held and its market capitalization nearing half a trillion dollars,19 Berkshire has scarcely borrowed money;20 despite being built through the serial acquisition of some seventy subsidiaries over fifty years,21 Berkshire has rarely hired a business broker;22 and despite employing nearly 350,000 people,23 it hardly ever uses consultants of any kind.24 As Berkshire’s vice chairman, Charlie Munger, once explained to me, the company follows these practices because it takes Professor Coase seriously. Why others don’t is likely due to a combination of factors, including managerial interests (agency costs), the allure of debt, and legal pressures to reduce liability risk and also due to intermediary influence.

While American companies borrow heavily to boost returns and gain tax advantages,25 Berkshire shuns debt as costly and constraining, preferring to rely on itself and use its own money.26 It generates abundant earnings and retains 100 percent of them it has not paid a dividend in nearly fifty years.27 In 2014, Berkshire’s net worth grew by $18.3 billion all of which was available for reinvestment28 Its time horizon is forever because it commits to owning its subsidiaries indefinitely a promise backed by a record of not selling a single one in forty years.29

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22 Cunningham, Berkshire beyond Buffett at 213 (cited in note 18).


24 Lawrence A. Cunningham, Buffett’s and Berkshire’s Anti-bureaucracy (Columbia Law School, June 17, 2015), archived at http://perma.cc/636E-X86L.


26 See Berkshire 2014 Report at *118 (cited in note 21) (We use debt sparingly and, when we do borrow, we attempt to structure our loans on a long-term fixed-rate basis. We will reject interesting opportunities rather than over-leverage our balance sheet.). But see id at *113 (We also issue debt in the ordinary course of business to fund business operations, business acquisitions and for other general purposes.).


29 Cunningham, The Philosophy of Warren E. Buffett (cited in note 18) (Unique among its rivals in the acquisition market, Berkshire has not sold a subsidiary in 40 years, and pledges not to do so unless a business is doomed.); Berkshire 2014 Report at *119 (cited in note 21).
Thanks to its long time horizon, Berkshire's deferred taxes total over $60 billion. These amount to interest-free government loans without covenants.

The principal leverage at Berkshire is insurance float. This refers to funds that arise because Berkshire receives premiums up front but need not pay claims until later, if it all. Provided that insurance is underwritten with discipline, float is akin to borrowed money but cheaper, and it comes without due dates or covenants. At Berkshire, float now totals $84 billion, which is used to buy businesses that continue to multiply Berkshire's value.

All these sources of funds can be transferred among Berkshire subsidiaries, so those with excess cash support those with capital needs all tax free and without the frictional costs of debt. Berkshire and its subsidiaries become self-reliant, self-disciplining financing machines. (Two of Berkshire's capital-intensive subsidiaries, a railroad and a public utility, borrow significant sums, but none of their debt is guaranteed by Berkshire.)

American corporations rely heavily on intermediaries, such as business brokers and investment bankers, who charge fees and have incentives to get deals done; firms also use accountants, consultants, and lawyers to conduct due diligence before closing. Berkshire rarely uses bankers or brokers, and it does limited due diligence. Instead, Berkshire relies on a network of relationships, including previous sellers of businesses. Buffett is self-reliant,

Regardless of price, we have no interest at all in selling any good businesses that Berkshire owns. We are also very reluctant to sell sub-par businesses as long as we expect them to generate at least some cash and as long as we feel good about their managers and labor relations.

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31 Andrea Frazzini, David Kabiller, and Lasse H. Pedersen, Buffett's Alpha *11 '12 (National Bureau of Economic Research, Nov 2013), archived at http://perma.cc/82JU-DHF8 (identifying Berkshire Hathaway's two main liabilities [as] debt and insurance float . . . [with] 36% of Berkshire's liabilities consisting of insurance float on average:).
32 See id at *12.
34 See id at *8.
36 See id at *10 n 38 (identifying Burlington Northern Santa Fe and Berkshire Hathaway Energy together as accounting for $55 billion of Berkshire's $74 billion total debt; Berkshire 2014 Report at *12 (cited in note 21).
thanks to gargantuan reading that gives him broad business knowledge and an investment philosophy that values companies based on old-fashioned business analysis rather than market-based proxies such as price-earnings multiples.39

Most acquirers of businesses promptly implement operational changes and related engineering to integrate a business, find synergies, and cut costs. Berkshire acquires only companies for which no such changes are needed, and it never pursues such a strategy.40

Indeed, contrary to the practice at most sizable American corporations, Berkshire has no centralized procedures or departments, no hierarchies for reporting or budgeting, and no middle managers.41 All such functions are handled in the company’s individual units. In fact, Berkshire headquarters employs just twenty-five people.42 And Berkshire gives the CEOs of its subsidiaries almost unbridled discretion over operations.43 Once a year, Buffett sends them the same one-page letter with six broad mandates on it, such as protect Berkshire’s reputation: and report bad news early.:44 Many speak to Buffett only once a year others less often.:45

Today, corporate America’s boards are intermediaries between shareholders and management.46 Directors are monitors involved in specific strategic decisionmaking.47 They meet monthly, using many committees,48 which in turn hire accountants, consultants, and lawyers. American directors are well paid, averaging salaries of $263,748 annually including considerable

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39 See id at 342.
40 See Berkshire 2014 Report at *40 (cited in note 21) (describing the Berkshire acquisition policy as seeking to pay a fair price for a good business that the Chairman could pretty well understand:). The rare exceptions occurred early in Buffett’s career, such as the 1977 acquisition of The Buffalo News, which faced considerable competitive pressure. See Miles, The Warren Buffett CEO at 235 (cited in note 38).
41 See Berkshire 2014 Report at *86 (cited in note 21).
42 Id at *6, 125.
43 See Berkshire Hathaway Inc: 2009 Annual Report *5 (Warren E. Buffett, 2010), archived at http://perma.cc/9FVJ -8KW8 (We tend to let our many subsidiaries operate on their own, without our supervising and monitoring them to any degree:).
44 Cunningham, 50 Wake Forest L Rev at *9 (cited in note 18).
45 Cunningham, Buffett’s and Berkshire’s Anti-bureaucracy (cited in note 24). See also Miles, The Warren Buffett CEO at vi (cited in note 38) (Warren’s CEOs do not have to call Omaha daily or provide weekly reports. . . Of course, most of them want to talk to Buffett and check in periodically. But they don’t have to:).
47 See id at 1506.
48 See id at 1490-94.
stock compensation and company-purchased liability insurance. Berkshire's board, in contrast, follows the old-fashioned advisory model: It comprises friends and family, who are directors because they are interested in Berkshire. They do not oversee management, but rather provide support and advice. There are few committees, no hired advisors, and only two or three meetings per year. Berkshire pays its directors essentially nothing and provides no insurance. But Berkshire's directors are significant shareholders, each of whom bought the stock with their own cash.

As Professor Judge notes, most American corporate equity is owned by large financial intermediaries such as mutual funds, hedge funds, and pension funds. Stock trading is frequent and portfolios are regularly rebalanced to maintain diversification. As Judge observes, this generates significant fees for intermediaries as well as frictional costs for investors. Most of Berkshire's shareholders either own the stock directly or hold it through family-oriented firms that concentrate in Berkshire stock. Berkshire's share turnover is low and Berkshire stock is many shareholders' largest holding. All this minimizes the role and costs of intermediaries, from stockbrokers to exchanges.

Corporations are hierarchies, with shareholders owning a residual claim on firm assets in the form of an equity stake after liabilities are covered by assets. That inherent separation of ownership from control provides a fertile environment for financial intermediaries to flourish. In contrast, Buffett defines Berkshire
as a partnership, declaring from the outset: _Although our form is corporate, our attitude is partnership._ 59 This is a legacy from Buffett’s start: he was running a partnership that, in 1965, acquired Berkshire, which then began acquiring other companies en route to becoming the galactic corporation that it is today. 60 Buffett retained that partnership spirit, a profound disintermediation that views the corporation as a conduit through which shareholders own its assets and not merely an equity stake. 61 Such conceptions are the polar opposite to the chain of intermediation in many contemporary financial sectors that Judge criticizes. 62

Most corporate boards set their dividend policies to follow a regular periodic amount invariant to business conditions and to split the stock when price exceeds an affordable trading range, in order to keep shareholders interested in trading it. 63 Berkshire’s dividend policy varies with corporate ability to reinvest earnings profitably, which has meant no dividends since 1969; it has polled shareholders on whether they approve of this policy (they do). 64 It does not split the stock to keep the price low. On the contrary, consider a spectacular example of Berkshire’s anti-intermediation policy: In 1996, when Berkshire’s stock traded at $34,900, two money managers designed a unit trust that would buy the stock and issue fractional units designed to trade at a low price. They would charge fees for this service that would draw new traders to Berkshire, increasing transaction costs. To knock out these middlemen, Berkshire amended its charter to rename its existing common stock as Class A and add a Class B with fractional rights. 65 It vowed to offer as many shares as necessary to fill orders — which it did, killing demand for the unit trust. 66

Berkshire’s savings from omitting the middleman include the direct costs of fees and interest plus the vastly larger indirect costs of relying on advisors whose incentives are to encourage more action — more debt, deals, trading, services, and fees. While Buffett and Munger are responsible for much of this practice, it

60 See id at *24–28.
61 See id at *117.
62 See Judge, 82 U Chi L Rev at 624–30 (cited in note 4).
63 See Cunningham, 50 Wake Forest L Rev at *7 (cited in note 18).
64 See Berkshire 2014 Report at *38 (cited in note 21) (describing a tally of proxy votes in which 98 percent of the shares represented voted to keep the no-dividend policy).
66 See id at 503.
has been internalized across the institution and is likely to endure after successors assume control.67 The more interesting question is not whether such habits can endure at Berkshire but rather why they are not more widely practiced. Judge is right to explain that intermediary influence is a factor; consequently, public policy should be designed to encourage proliferation of the Berkshire model.

B. Prointermediation: Kohlberg Kravis Roberts

KKR, a forty-year-old leveraged buyout firm and the historical driving force behind today’s massive private equity industry, is both an intermediary and a progenitor of intermediaries.68 Its business model and philosophy are at the other end of the spectrum from those of Berkshire in nearly every important way. Having arranged for the purchase and sale of thousands of companies, it has structured mountains of debt, generated enormous fees from merger advisory services in thousands of transactions, and reaped additional gains from innumerable advisory and consulting services.69

KKR’s business model involves creating a series of separate funds that buy, run, and sell a discrete number of individual companies, relying throughout on massive borrowing.70 A typical fund deal is financed with at least 70 percent debt.71 Moreover, virtually all equity — all but 1 to 5 percent — is staked not by the firm but by outside investors and solicited in private placements facilitated by intermediaries, including pension plans, university endowments, sovereign wealth funds, banks, and insurance companies.72 In form, funds are dubbed “partnerships,” with KKR as the general partner and each such equity investor a limited partner;

67 Cunningham, Minus the Middleman (cited in note 18).
68 See Eileen Appelbaum and Rosemary Batt, Private Equity at Work: When Wall Street Manages Main Street 21’24 (Russell Sage 2014).
69 See id at 24’27.
71 Appelbaum and Batt, Private Equity at Work at 2 (cited in note 68).
but the attitude is hierarchical, with the general partner calling all the shots in a setting rife with conflicts of interest.\textsuperscript{73}

As general partner, KKR is less an investor than a multiline intermediary. As an intermediary, KKR collects 2 percent of investors' equity through a management fee; plus 20 percent of the return on investment above a hurdle rate (typically 8 percent), which is dubbed carried interest.\textsuperscript{74} In addition, the intermediary can levy extensive fees for a wide variety of activities that it might engineer, such as board service on acquired companies, strategic consulting, executive search, merger advice, or arrangement of debt financing.\textsuperscript{75} Intermediary influence in such settings is enormous and essentially uncheckable, with the press being among the few bulwarks against excess.\textsuperscript{76}

KKR's time horizon for deals is short- or medium-term, not long-term\textsuperscript{77} and never indefinite. Rather, purchases and subsequent steps are all conducted with a focus on exiting by maximizing profits and minimizing duration.\textsuperscript{77} Purchases are not made without an exit strategy\textsuperscript{78} ideally a premium-priced public offering orchestrated by the intermediary or an arranged sale to a strategic buyer or another financial buyer.\textsuperscript{78} As with most other activities that KKR conducts on behalf of the funds and companies it buys, the firm charges fees for making such arrangements.\textsuperscript{79} When buying and selling, KKR and other private equity firms favor formal valuation models, such as earnings multiples,
rather than traditional business analysis of the kind that Berkshire and other long-term investors apply.\textsuperscript{80}

Operational change is usually part of every takeover plan. While KKR and other leveraged buyout operators may look for incumbent managers to remain in place, weak management is often blamed for a target’s struggles, and the takeover includes re-shuffling or replacing the management.\textsuperscript{81} In every case, intervention is deep, as the intermediary provides close direction to managers to execute the plan and conducts careful monitoring to ensure execution.\textsuperscript{82} Cost reductions are often part of the plan, meaning that the intermediary directs not only management changes but also plant closings, layoffs, research and development cuts, product terminations, pension reductions, and other radical business surgeries with clear-cut short-term gains.\textsuperscript{83} The long-term prudence of such steps is generally not considered.\textsuperscript{84}

Financial engineering is at the heart of many KKR deals, all involving substantial and costly intermediation.\textsuperscript{85} Often pejoratively dubbed \textit{asset stripping}, standard examples are sale-leaseback arrangements\textsuperscript{86} and dividend recapitalizations.\textsuperscript{87} These transactions are designed and implemented by numerous intermediaries operating between the company and investors’ intermediaries such as the general partner, leasing agents, lessees.

\textsuperscript{80} Fraser-Sampson, Private Equity as an Asset Class at 192’93 (cited in note 77) (describing how buyout firms perform \textit{full financial due diligence} \ldots including commissioning a report from an investigating accountant:).

\textsuperscript{81} See Kaplan and Strømberg, 23 J Econ Perspat 131’32 (cited in note 16) (\textit{P}rivate equity investors do not hesitate to replace poorly performing management. \ldots \textit{O}ne-third of chief executive officers of these firms are replaced in the first 100 days while two-thirds are replaced at some point over a four-year period:).

\textsuperscript{82} See id at 131 (\textit{P}rivate equity investors control the boards of their portfolio companies and are more actively involved in governance than public company boards:).

\textsuperscript{83} See id at 132: Private-equity firms use their industry and operating knowledge to identify attractive investments, to develop value creation plans for those investments, and to implement the value creation plans. A plan might include elements of cost-cutting opportunities and productivity improvements, strategic changes or repositioning, acquisition opportunities, as well as management changes and upgrades.

\textsuperscript{84} See id at 133 (discussing the possibility that the changes implemented by the buyers prioritize short-term over long-term returns).

\textsuperscript{85} See Baker and Smith, The New Financial Capitalists at 169 (cited in note 17).

\textsuperscript{86} See Appelbaum and Batt, Private Equity at Work at 71’72 (cited in note 68) (describing sale-leaseback arrangements as \textit{selling} the property \textit{of the} company, \textit{returning} the proceeds to the \textit{PE} investors, and then \textit{requiring} the portfolio company to lease back and pay rent on the property it used to own:).

\textsuperscript{87} Id at 68’71, 286’87.
and all their agents (including accountants, bankers, and lawyers). Each receives compensation for services, the most substantial of which goes to the chief intermediary: the general partner. In the process, moreover, costs are borne by other constituents of the portfolio companies, including employees, suppliers, customers, communities, and creditors, who are unrepresented by intermediaries.

Since KKR is more an intermediary than an investor, it is inclined toward greater risk taking than an investor would tolerate. High leverage is appealing because the rewards from boosting returns on equity can be considerable, while excessive debt that leads to bankruptcy inflicts little pain. Whether a company prospers or fails, KKR earns fees for itself and generates fees and interest for other intermediaries, including financial institutions that participate in the process of designing and marketing costly debt.

KKR’s intermediary influence is considerable. For example, along with other industry titans, it effected important vocabulary changes commonly used to describe the industry and its principal fuel: the pejorative label junk bonds has been successfully replaced with the congenial term high-yield bonds; and the term leveraged buyout operator has been changed to private equity fund. More measurably, federal law treats the carried interest that KKR earns as capital gain taxed at 20 percent rather than ordinary income taxed at as much as twice that rate. Moreover,

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88 See, for example, id at 74–76 (describing the fallout from the private equity takeover of The Hertz Corporation, including multiple stock offerings that were handled by intermediaries).
89 Id at 90 (The hierarchy of claims on the rewards from investing in portfolio companies guarantees that the general partners of [private equity] funds will capture a disproportionate share of the value extracted from these companies:).
90 Appelbaum and Batt, Private Equity at Work at 282 (cited in note 68) (While workers, vendors, creditors, and companies lost jobs, income, or solvency [in the private equity firm’s intervention in several businesses], the [private equity] owners walked away virtually unscathed:).
91 See Batt and Appelbaum, The Impact of Financialization at *27 (cited in note 2).
92 See id at *24.
94 See William Alden, Rethinking the Term Private Equity (NY Times, Jan 31, 2013), archived at http://perma.cc/ZE7P-FN4M. The industry appears to be reconsidering the private equity label due to uncertain connotations. See id.
these intermediaries elude regulatory oversight, despite considerable efforts to increase transparency and control.⁹⁶

Berkshire, in turn, pushes back on intermediaries, including rivals like KKR. Buffett, who has written vigorous indictments of the excessive fees of financial intermediaries,⁹⁷ has publicly and formally objected to specific KKR fees. In 1996, when Buffett served on the board of The Gillette Company, of which Berkshire and its affiliates owned 11 percent, Gillette agreed to acquire KKR’s share of Duracell International for $7.82 billion in stock.⁹⁸ KKR’s bill was double that of Gillette’s advisors⁹⁹ (though in line with market pricing), and Buffett strongly objected to the size of the bill.ⁱ⁰⁰ Although outvoted by the rest of the board, Buffett went on record as opposing intermediary pricing power.ⁱ⁰¹ Berkshire’s record is unmistakable.

Despite many differences, Berkshire and KKR are both buyers of businesses and are therefore rivals. What they offer to sellers of businesses, however, differs greatly. Berkshire stakes all the capital necessary to offer a permanent, autonomous home in a distinctive corporate culture free of short-term pressures.ⁱ⁰² KKR stakes little funding, borrowing most and bringing in limited partners, and offers an operational and financial plan to deliver rapid and sizable fees to itself along with debt discharge and returns to outside investors.ⁱ⁰³ Outcomes vary: not all Berkshire companies prosper (although no companies are sold) and KKR has both triumphs and failures (although all companies are sold).ⁱ⁰⁴ In the popular imagination and among many in the media, the

⁹⁷ See Warren E. Buffett and Lawrence A. Cunningham, The Essays of Warren Buffett: Lessons for Corporate America 171’74 (Carolina Academic 3d ed 2013). Munger has bitingly criticized leveraged buyouts and junk bonds. See id at 133’34, 208’11.
⁹⁸ See Buffett Unable to Shave Fees in Duracell Deal (LA Times, Nov 27, 1996), archived at http://perma.cc/P2D4-ZKBZ; Kenneth N. Gilpin, Gillette to Buy Duracell for $7 Billion (NY Times, Sept 13, 1996), archived at http://perma.cc/LTW5-FJ7N.
⁹⁹ See Kilpatrick, Of Permanent Value at 436 (cited in note 50) (Of the fees, $10 million went to [Gillette advisor] Morgan Stanley and Co. and $20 million to Kohlberg Kravis Roberts and Co., the buyout firm which owned 34% of Duracell.).
¹⁰⁰ See Buffett Unable to Shave Fees in Duracell Deal (cited in note 98).
¹⁰¹ Id.
¹⁰³ See id.
¹⁰⁴ Ironically, Berkshire staked funds in one of the largest and worst KKR deals ever, involving TXU Energy, an electric utility, for $44.37 billion in 2007. The deal soon collapsed, causing Berkshire an after-tax loss of nearly $1 billion. See Peter Lattman, A Record Buyout Turns Sour for Investors (NY Times, Feb 28, 2012), archived at http://perma.cc/2Z8W-3AQV.
Berkshire model has been preferred over the KKR way to the consternation of the latter’s devotees.\textsuperscript{105}

Besides commanding their own fees and returns, KKR and its industry stress returns to shareholders above all else in corporate life including the welfare of employees, retirees, suppliers, and customers.\textsuperscript{106} While the Berkshire model is also “investor first: embracing an owner orientation” the long-term focus enables aligning shareholder returns with those of other constituents. Suppose labor costs are high: if the endgame is two years, all cuts must be made in two years, necessitating layoffs and wage freezes; but if the horizon is indefinite, cuts can be made gradually over a decade, which might be done with attrition and lower raises. Nor is the Berkshire approach altruistic; rather, it is congruent with generating high and sustained returns on capital for shareholders. The Berkshire model aspires to be win-win.

There are downsides to the Berkshire model.\textsuperscript{107} The self-reliance in acquisitions runs the risk of error given the absence of significant cross-checks.\textsuperscript{108} The autonomy reposed in subsidiary managers sometimes proves misplaced absent vetting or oversight.\textsuperscript{109} The decentralized structure can produce impositions on customers or employees at the hands of other employees or distributors, or of other corporate constituents.\textsuperscript{110} Likewise, KKR acquisitions can yield win-win outcomes in which managers, investors, employees, and others all gain from a transition. But on balance, Berkshire’s anti-intermediation has proven spectacularly enriching\textsuperscript{111} and KKR’s heavy intermediation is prone to excess for the reasons that Judge stresses.\textsuperscript{112}

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\textsuperscript{105} See, for example, Baker and Smith, The New Financial Capitalists at 28’29 (cited in note 17).
\textsuperscript{107} See generally Lawrence A. Cunningham, Berkshire’s Blemishes: The Visible Costs and Upshot of Buffett’s Unique Managerial Model, 2016 Colum Bus L Rev (forthcoming) (on file with author).
\textsuperscript{108} See id at *6’9.
\textsuperscript{109} See id at *9’12. See also Edward Greene and Olivia Schmid, Duty-Free Insider Trading?, 2013 Colum Bus L Rev 369, 402 (describing an investigation against David Sokol, a Berkshire senior executive, for insider trading, in which charges were eventually dropped).
\textsuperscript{111} See Cunningham, Berkshire’s Blemishes at *28 (cited in note 107).
\textsuperscript{112} See Anders, Merchants of Debt at 272’73 (cited in note 83) (discussing the failure of KKR’s high-leverage model). See also Judge, 82 U Chi L Rev at 585’88 (cited in note 4).
The differences between Berkshire and KKR reflect a fundamental cultural contrast. In the KKR model, heavy debt and associated covenants and due dates not only boost immediate returns but also impose a stringent discipline on management, forcing executives not only to keep costs down, but also to divest any business that might fetch a price higher than the value they had placed on it. Besides not seeking immediate profit boosts, Berkshire's culture requires no such external discipline: Thrift is an inherent value. It induces cost minimization without the need for covenants to impose discipline. And the idea of selling a business is antithetical to the sense of permanence intended to hold Berkshire together in perpetuity. In contrast to the thick corporate culture that pervades Berkshire's subsidiaries, KKR companies have no common corporate culture.

KKR is not a company in the same sense that Berkshire is, nor is it a firm in the sense that Coase used that term. Berkshire is a corporate entity owned by its shareholders and it comprises hundreds of operating businesses and other investments to be held indefinitely. Berkshire is a successful version of the conglomerate business model of the 1970s that firms like KKR participated in dismantling, seeing them as bloated and unfocused. Unlike Berkshire, KKR is not a conglomerate organized for perpetual life and has no ability to reallocate capital across its portfolio companies as Berkshire does across its subsidiaries. Rather, KKR consists of a series of distinct limited partnerships organized as equity funds with finite lives of rarely more than a decade. Unlike conglomerates, which seek to retain the businesses they acquire, KKR desires to divest them profitably and relatively rapidly. Berkshire prospers from anti-intermediation while KKR benefits from prointermediation.

(providing an example of how a prointermediation stance can lead to self-serving behaviors by intermediaries).

114 Id at 100 (There was certainly no overarching headquarters bureaucracy, and no common corporate culture among KKR's holdings.).
115 For a description of Berkshire's business activities, see Berkshire 2014 Report at *45 (cited in note 21). For a list of Berkshire's subsidiaries, see id at *125-27.
117 See id at 171 (Nor could KKR transfer cash from one company to another, so that one corporation might support another's operations or investments. Since each investment had separate equity holders, any attempt to intermingle activities in separate companies was fraught with difficulties.).
118 See id at 169-70 (charting KKR's business structure and holding periods for its buyouts).
119 See Kaplan and Strömberg, 23 J Econ Persp at 128 (cited in note 16).
Judge calls for more information to enable constituents to compare the costs of alternative intermediary services. It would be desirable for sellers of businesses as well as other constituents to have greater clarity about the fees associated with private equity transactions offered by KKR and its peers. But if intermediary influence or other forces persist in keeping the industry opaque, competitive rivals such as Berkshire do exert pressure. These rivals should stimulate questions by prospective sellers and entice negotiated reductions by private equity firms. More competition of this sort would therefore be a desirable counterweight to intermediary pricing power.

Few companies exhibit Berkshire’s thoroughgoing disintermediation, but tailored versions of the model stress its virtues at such well-known, conscious emulators as Markel Corporation and Leucadia National Corporation. More recent variations are emerging in the technology sector, such as at Google in its reorganization as Alphabet Inc, designed on the Berkshire model. Promising derivations appear among shareholder-activist hedge funds, such as Pershing Square Capital Management, which can meet the goals of some private equity deals particularly identifying and curing business problems without incurring acquisition costs. Allowed or encouraged to flourish, such competition should put downward pressure on private equity fees. (They might not provoke public disclosure, of course, which Judge rightly notes may instead require regulation.)

II. Questions

Whether considering either companies like Berkshire and KKR in the acquisitions market or the examples that Professor Judge offers of real estate agents, brokers, funds, and exchanges, traditional theories help evaluate financial intermediation and related institutional arrangements. But Judge’s impressive accomplishment is to unite these disparate examples and approaches under the single heading of intermediary influence and

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120 See Judge, 82 U Chi L Rev at 636 (cited in note 4).
121 See Jason Zweig, Like Buffett, Another Folksy Investor Turns Patience into Profit (Wall St J, May 22, 2015), archived at http://perma.cc/LH35-KEDB.
125 See Judge, 82 U Chi L Rev at 636 (cited in note 4).
to explain how it arises, how it is exercised, what some of the costs are, and how participants might respond. As with most such serious intellectual endeavors, the claims are innovative, important, and interesting and they also raise questions, including those discussed in the following sections.

A. Scope and Uniqueness of the Puzzle

First, Judge posits a prodigious puzzle to explain, but the puzzle may be more modest than it seems. Intermediaries reduce search costs and match end users with providers. Judge suggests that Internet technology should make searching and matching easier so that intermediary fees should fall. She sees the opposite in many financial sectors, suggesting that the puzzle is more pronounced there. Yet technology is not the only factor that influences the costs of searching and matching that intermediaries can neutralize. Globalization and complexity may increase search costs and complicate matching as well. In many contemporary industrial settings besides finance, supply chains have fragmented and intermediaries have proliferated. Moreover, Internet technology may reduce some costs but raise others. For example, websites that help buyers compare prices promise consumer savings but are funded by referral fees that often skew results so that users need other sites to compare the comparisons. More broadly, problems with intermediary influence are not unique to the financial services sector but plague all markets, including those in which producers or manufacturers exert influence.

B. How to Isolate Influence?

Second, Judge’s examples of intermediaries suggest a degree of influence, but it can be difficult to isolate intermediary influence on laws or norms from the influence of other participants. For example, multiple intermediary sectors may each benefit

126 Id at 574 (noting that intermediaries _bridge information asymmetries, enable parties to find one another, and otherwise make it easier for parties to overcome the many barriers to transacting_).

127 See id at 585.

128 See id at 585’86 (noting that it is surprising, in view of advances in technology that bridge information asymmetries, that real estate agents are still compensated about as much, in real dollars, as they were in the pre-Internet era).

129 See Costly Comparison (Economist, July 11, 2015), archived at http://perma.cc/CEA4-4YLT.

130 See generally George A. Akerlof and Robert J. Shiller, Phishing for Phools: The Economics of Manipulation and Deception (Princeton 2015) (exploring and providing examples of firms distorting markets by appealing to human psychology).
from a particular outcome, and it is challenging to discern which exercises the relevant influence in shaping institutional arrangements. After fixed brokerage fees were replaced by competitive rates in 1975 (to give an instance that Judge presents prominently), stockbrokers steered customers toward mutual funds instead of individual stocks because mutual funds were more lucrative—an apparent exercise of stockbroker intermediary influence.131

But a number of concurrent influences might have contributed to the same effect, including advertising by the mutual fund industry132 as well as urging by academic proponents of modern portfolio theory’s directive for individuals to diversify133 and by management consultants who contended that mutual funds were superior to conglomerates as a means of achieving such diversification.134 Above all, while Judge posits that the change in fee structure was partly responsible for the shift from individual to institutional stock ownership, that propensity is a characteristic of a fully developed economy and stock market, independent of brokerage-fee structures.135

Or consider auditing: Accountants may enjoy influence to assure that public companies must obtain audits of their financial statements. But many other participants push for such certifications, too, including investors, academics, and regulators who legitimately appreciate the distinct consumer benefits of third-party testing.

As another example, certain intermediary sectors may not be united on how to exercise their influence. The retail money-management industry may be divided between actively managed...
mutual funds and passively managed index funds.\textsuperscript{136} On some matters, their interests converge and their collective influence is directed to a joint end; on others, intermediary interests diverge, with offsetting results.

C. Who Really Gains?

Third, Judge suggests that intermediary influence translates into economic gain for intermediaries, but her illustrations are instances of broader patterns in the economics of intermediaries that often benefit and sometimes cost end users. Take two general models of middlemen.\textsuperscript{137} In one, which is particularly attractive to producers, middlemen bundle delivery of a company’s product with their own expert services. The middleman may be both a salesman and a professional. Consider a dentist conducting a checkup who then recommends an implant, or an optometrist giving an eye exam along with a prescription for glasses. Patients ask physicians for advice based on trust, stressing the professional role more than the merchandising one. By training and ethics, the doctor’s motivation is to provide the appropriate product; by economic incentive, it is to sell the most expensive good that is appropriate. In most cases, the patient’s and physician’s goals are aligned, although premium pricing often results and physicians exert influence on institutional arrangements to facilitate such exchanges. Manufacturers of dental implants and eyewear benefit, too, enhancing their pricing power while outfitting patients with desired necessities. This pattern parallels how mutual funds have benefited greatly from stockbroker influence.

In a second form of intermediation, customers pay middlemen for the installation of manufactured products’ such middlemen include automotive repair shops, electrical contractors, and computer-hardware consultants. Invoices separate parts from labor and customers focus on labor, searching and negotiating for low hourly rates more than examining or haggling over the choice or price of goods. The intermediary’s incentives are aligned with customer interests to an extent, since reputations are on the line to make repairs and installations that are safe and reliable. But to the extent that price is a factor, incentives are to recommend


\textsuperscript{137} See Lawrence A. Cunningham, Torkell Eide, and Patrick Hargreaves, Quality Investing: Owning the Best Companies for the Long Term *56*’58 (Harriman House forthcoming 2015) (on file with author).
the most profitable inputs, which may impair customer interests while helping manufacturers. In the financial services sector, auditors may recommend installing SAP risk management software and rating agencies may endorse SAS stress testing software for banks. When auditors and rating agencies wield influence in such settings, they may generate higher fees for themselves but they also confer pricing power on producers, and the exact distribution of the gains eludes precise measurement.

D. Industry Structure and Causation

Finally, Judge implies that the influence of financial intermediaries often manifests itself in industry structure, particularly in oligopolistic features. Yet it is not always clear whether influence leads to oligopoly or oligopoly leads to influence. Oligopolies in many sectors often result from products that deliver distinct consumer benefits. Examples among financial intermediaries are auditors and debt-rating agencies, which provide test-based certifications of specialized information that investors cannot verify themselves. An oligopolistic structure can arise from requirements of professionalization and scale rather than industry influence.

As a broader category, consider producers of modest essentials: inputs that cost little in context but that are vital. Cheap machine tools used in aerospace manufacturing, enzymes added to food products such as yogurt, and industrial gases employed in processes such as steelmaking all represent a tiny fraction of the user’s production costs, but each is essential. Providers therefore command pricing power, with the result that the industry is dominated by large, reputable firms with oligopolistic industry structures. Though not exactly middlemen, these providers share something in common with financial intermediaries: when

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138 See, for example, Judge, 82 U Chi L Rev at 621 & n 211 (cited in note 4) (discussing the outsized influence exerted by financial intermediaries on the formation of the Volcker Rule, which could have direct implications for institutional arrangements that would affect intermediary profitability and institutional design:).

139 See id at 618 (‘Two factors’ the number of participants in an industry and whether industry participants are collectively organized for other purposes’ affect the probability that intermediaries will succeed in promoting favorable institutional arrangements:).


141 Cunningham, Elde, and Hargreaves, Quality Investing at *61 (cited in note 137).

142 See id.
raising capital, both auditing and rating fees are small in context but are nevertheless an unavoidable prerequisite.

Oligopolistic intermediaries do tend to produce competition among rivals that is more benign than vigorous. Firms that possess oligopoly power, especially those that provide relatively uniform products, know that they will be competing for decades to come.\textsuperscript{143} The result is competitive behavior that promotes industry stability more than it leads to price wars among rivals. This is true not only of auditing and rating firms but also of suppliers of industrial gases and makers of other modest essentials.\textsuperscript{144} So the challenging question is whether intermediary influence causes institutional arrangements that create pricing power and high fees, or whether institutional arrangements cause such intermediary influence.

\textbf{CONCLUSION}

Professor Judge paints a rich picture, using an appealing combination of broad strokes and pointillism to shed new light on an old setting. She offers insightful accounts of specific features of the financial services industry, such as why real estate agents still command premium prices, why stockbrokers were able to maintain anticompetitive fixed commissions for so long, and why mutual funds proliferate while charging fees that exceed the funds’ value to investors. She steps back to explain general features of the financial landscape that give intermediaries potentially excessive pricing power, and catalogues the considerable costs. And she notes potential policy responses, including stimulating private market actors to react.

In this Essay, I have extended Judge’s insights with an illustration from the acquisitions market, depicting one firm (KKR) that epitomizes intermediary influence, in contrast to a rival (Berkshire) the anti-intermediary par excellence. The juxtaposition affirms the portrait of intermediary influence that Judge paints as well as the potential for correction through lower-priced competition and fee disclosure that she posits.

Judge stresses that her accounts of intermediary influence are partial explanations and that there are degrees of both their

\textsuperscript{143} See id at *63. See also Browning and Zupan, Microeconomics at 358 (cited in note 140) (describing the strong mutual interdependence of firms in an oligopolistic market, meaning that a firm’s actions ... have a noticeable effect on its rivals, and so they are likely to react in some way:) (emphasis omitted).

\textsuperscript{144} See Cunningham, Eide, and Hargreaves, Quality Investing at *60’63 (cited in note 137).
influence and their effects. This modesty explains the existence of some of the unanswered questions I have highlighted. The importance of Judge's work is in showing why pursuing answers to such questions is warranted to gauge the puzzle's size; isolate the specific influence; measure the relative gains; and examine which comes first: intermediary influence that commands high fees or institutional arrangements that condone them.
Appendix to Innovation Sticks: The Limited Case for Penalizing Failures to Innovate

Ian Ayres† & Amy Kapczynski††

This Appendix first describes the data and methodology employed in our automobile-fatality analysis. It then supplements Parts II and III of our Article by providing additional examples of innovation penalties in action in addition to background calculations for the fatality analysis.

I. DATA AND METHODOLOGY

Our automobile-fatality analysis is based on fatality rates per 100,000 registered vehicles by vehicle manufacturer for the years 2000 to 2011. After calculating base fatality rates, we adjust these rates to account for regional variation in fatality rates and between-manufacturer variation in vehicle distribution across the United States.

The crash-fatality data are from the National Highway Traffic Safety Administration’s (NHTSA) Fatality Analysis Reporting System (FARS), which includes a comprehensive report of every fatal accident in the United States. Each vehicle involved in the accident is required to fill out an accident report. We use four variables in our analysis: car make (manufacturer), body type, number of total fatalities in the crash, and number of fatalities in the vehicle.

We limit our analysis to passenger vehicles—that is, vehicles with a FARS body-type code under forty. This includes cars, SUVs, vans, and light trucks. Vehicles with codes of forty or over include semitrailer trucks, buses, motor homes, tractors, and motorcycles.1 Notably, we eliminate vehicles, not crashes. For

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This Appendix supplements Ian Ayres and Amy Kapczynski, Innovation Sticks: The Limited Case for Penalizing Failures to Innovate, 82 U Chi L Rev 1781 (2015).

example, for an accident involving a motor home and a pickup truck, we retain the pickup data but not the motor home data.

We limit our analysis to thirty-seven manufacturers, which represent 99.4 percent of vehicles involved in fatal crashes from the years 2000 to 2011. The manufacturers that we do not consider are either out of business (for example, American Motors and Plymouth) or too rare to produce reliable fleet-size data (for example, Maybach and Ferrari).

Each vehicle-level observation in the FARS data includes two data points regarding fatalities: total fatalities in the crash and fatalities inside the vehicle. From these two numbers, we can further determine external fatalities—people killed while inside other cars or while walking or bicycling—which is equal to total fatalities minus fatalities inside the vehicle. This external-fatalities number can be further decomposed into (1) external fatalities outside vehicles—meaning pedestrians or bicyclists—calculated by subtracting the total number of fatalities inside all vehicles from the total number of fatalities in crashes; and (2) external fatalities inside vehicles, which is the total number of external fatalities minus the external fatalities outside vehicles.

An example might help illustrate these numbers. Consider a crash with five fatalities. The crash involves three cars: A (one fatality), B (two fatalities), and C (zero fatalities). There are two additional fatalities outside of cars. The total-fatality number assigned to all three cars is five. The fatality-in-vehicle numbers are one, two, and zero, respectively. The external-fatality number for A is four, for B is three, and for C is five. The external-fatality (not-in-vehicle) total number is two for all cars. And the external-fatality (in-vehicle) total number is two less than the external-fatalities number, or two, one, and three, respectively.

Because crashes often include more than one vehicle, our total-fatality numbers are often double counted, and external-fatality numbers may also be counted more than once. We attribute the entire accident to each vehicle involved, a practice that is consistent with the regulatory doctrine.

To develop a normalized scale on which to compare manufacturers, we utilize vehicle-registration data from a survey conducted by the Federal Highway Administration (FHWA). The FHWA’s Nationwide Household Travel Survey (NHTS) asked Americans in 2001 and 2009 the makes of their cars, among other things. The number of observations in the surveys was 69,000
in 2001\textsuperscript{2} and 150,000 in 2009.\textsuperscript{3} Because the sampling was not purely random, the NHTS provides analytic weights that represent how many real households are represented by each household surveyed.

From these data, we determine fleet proportion by manufacturer. We linearly interpolate fleet proportion between survey years and use the fleet proportion in 2001 for 2000 and the fleet proportion in 2009 for 2010 and 2011. The year 2009 was the only one that included the manufacturers Smart and Land Rover, so our numbers for those manufacturers reflect only the years 2009 to 2011.

By multiplying the fleet proportion by the number of registered vehicles in the United States—data aggregated from state records by the US Department of Transportation (DOT)—we obtain the total number of registered vehicles in the country by make.

Using the sum of each type of fatality (total, in vehicle, external, inside-car external, and outside-car external) by manufacturer and year as well as the total number of registrations by manufacturer and year, we calculate the number of fatalities per 100,000 registered vehicles by manufacturer. These are our unadjusted fatality rates.

However, some manufacturers may sell more cars in comparatively more dangerous parts of the country than other manufacturers, thus introducing an upward bias to their fatality rates. To control for regional variation in fatality rates and manufacturer variation in vehicle location, we divide the country into four regions consistent with the US Census Bureau’s delineation of geographic regions.\textsuperscript{4} Using the fatality data and the DOT’s state-by-state registration data, we determine how much above or below the weighted-mean fatality rate each region is each year, when the weight is the region’s proportion of national registrations. Then, using the NHTS data, we determine the distribution of vehicles by manufacturer across the four regions. The 2001 and 2009 vehicle distributions are averaged to compute each manufacturer’s distribution for all years, which we

\textsuperscript{2} Federal Highway Administration, \textit{Introduction to the 2009 NHTS (DOT)}, archived at http://perma.cc/V8UF-PVN2.


\textsuperscript{4} See \textit{Census Regions and Divisions of the United States} (Census Bureau), archived at http://perma.cc/29E7-78SQ.
assume does not change. Using these two pieces of information, we can calculate an adjusted rate (fatalities per 100,000 registered vehicles) for each car using the formula:

\[(\text{adjusted rate})_{iy} = (\text{unadjusted rate})_{iy} - \Sigma (\text{share}_{ir} \times \text{adjustment}_{or}),\]

in which \(i\) indexes manufacturer, \(y\) year, and \(r\) region; \(\text{share}\) is that car manufacturer’s market share in that region; and \(\text{adjustment}\) is the difference between each region’s fatality rate and the national weighted mean. We subtract rather than add in order to adjust manufacturers’ rates down if their cars are more prevalent in high-fatality regions. We then use these adjusted rates in our analysis.

Our data, then, comprise the thirty-seven manufacturers over twelve years, and each manufacturer-year includes data on the estimated total number of registrations in that year and each of the fatality rates per 100,000 registered vehicles.

II. SUPPLEMENT: ADDITIONAL EXISTING EXAMPLES

A. California’s Zero Emission Vehicle Mandate

Another example in the fuel-efficiency area illustrates the potential of sticks that are much more ambitious and also more technology specific. In 1990, California introduced the Zero Emission Vehicle (ZEV) mandate, requiring carmakers operating in California to develop automobiles with zero emissions.\(^5\) The 1990 version of ZEV required 2 percent of California sales to be zero emissions by 1998, 5 percent by 2001, and up to 10 percent by 2003; manufacturers faced a $5,000 penalty per vehicle that was short of the requirement.\(^6\) In 1990, battery-powered electric vehicles were the only option for meeting this requirement.\(^6\) In 1990, battery-powered electric vehicles were the only option for meeting this requirement. Only General Motors was working on an electric car in the 1980s—the Impact—which was not ready for commercialization.\(^7\) Thus, the ZEV mandate was in reality a mandate to do the R & D needed to produce viable electric cars. Carmakers viewed

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\(^5\) See Philippe Larrue, *Lessons Learned from the Californian ZEV Mandate: From a "Technology-Forcing" to a "Market-Driven" Regulation* *15* (Groupement de Recherches Economiques et Sociales, June 2003), archived at http://perma.cc/6LAY-RWDZ.

\(^6\) Id at *6. Several other states also adopted the standards, increasing their effect. See id.

\(^7\) See *EVI Electric Automobile* (National Museum of American History), archived at http://perma.cc/33GR-54EC.
the mandate as extraordinarily demanding, and they insisted that it could not be met. 8

California’s ZEV program does, however, seem to have spurred research and innovation. The best evidence of this comes from patent patterns, 9 emphasizing the point that we make in our Article: carrots and sticks can be—and in many cases are and should be—combined. The number of patents for electric-vehicle-related technology increased dramatically in the period from 1992 to 1998. 10 General Motors purportedly spent $1 billion on ZEV technology during this time period. 11 Also in the early 1990s, a number of high-tech California firms sprung up to develop products for the ZEV market. 12 And within existing battery companies, researchers turned some of their attention to the electric-car market. 13

The ZEV program appears to be a good candidate for sticks for the same reasons described in our discussion of the CAFE program. 14 In addition, the ZEV program helps illustrate some of the limits of innovation sticks that we describe more theoretically in Part I of the main text. 15 The ZEV program arguably represents the government’s attempt to pick winners, and it has not been fully successful in projecting the possible pace of technological change. In 1996, California decided to suspend the 1998 and 2001 deadlines because battery technology was not progressing quickly enough. 16 The ZEV mandate was further modified to allow hybrid and other vehicles to count for partial ZEV credits. 17 In the terms we use in our Article, sticks may face credibility problems, perhaps particularly when they are applied to powerful industries. Nonetheless, these problems may not be insurmountable.

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8 See Larrue, Lessons Learned from the Californian ZEV Mandate at *7 (cited in note 5).
9 See Andrew Burke, Ken Kurani, and E.J. Kenney, Study of the Secondary Benefits of the ZEV Mandate *11-12 (University of California, Davis Institute of Transportation Studies, Aug 1, 2000), archived at http://perma.cc/D6K6-WJMA.
10 See id at *17.
12 See Larrue, Lessons Learned from the Californian ZEV Mandate at *9 (cited in note 5).
13 See id at *10.
14 See Part II.A.1 in the main text.
15 See Part I.C in the main text.
16 See Larrue, Lessons Learned from the Californian ZEV Mandate at *11-12 (cited in note 5).
17 See id at *15; Gary E. Marchant, Sustainable Energy Technologies: Ten Lessons from the History of Technology Regulation, 18 Widener L.J 831, 838 (2009).
Notably, the ZEV program continues—California has recently announced a 15.4 percent ZEV goal by 2025—and it appears to have had positive effects, although it has not had all the effects that were desired. The field of electric cars has dramatically expanded in recent years, with Chevrolet, Ford, Honda, Hyundai, Nissan, Tesla, and Toyota all offering or about to offer electric cars. Battery-powered electric cars are also no longer the only option: many car companies have announced plans for hydrogen-fuel cell cars to be released by 2016.

B. Tobacco Look-Back Penalties

In an effort to resolve litigation against the tobacco industry while generating revenue for the states and reducing the prevalence of youth tobacco use, tobacco companies and states reached a proposed settlement agreement in 1997 that included an element that would have produced failure-to-innovate incentives. While the agreement’s implementing legislation was ultimately unsuccessful, its “look-back” provisions—which were excluded from subsequent settlements—represented potential innovation sticks aimed at reducing youth-smoking rates.

Specifically, the proposed agreement established state-specific standards for reductions in youth smoking. For example, the agreement required that, within ten years after its implementation, states would have had to have effected at least a 60 percent reduction in youth-cigarette-use rates and a 45 percent reduction in smokeless tobacco use among youths. If these standards were not met, industries would have been subject to a mandatory fine calculated from the estimated profits gained from youth consumers in excess of the standards, with an inflation-adjusted maximum fine of about $2 billion for each industry. The potential fine could have been reduced by a maximum of 75 percent for tobacco companies on a showing of full implementation of measures to reduce tobacco use among youths, reasonable

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19 Id.
20 Id.
23 Proposed Tobacco Settlement (cited in note 21).
24 See id.
efforts to curtail youth tobacco use, and the absence of actions to thwart meeting the reduction standards. In theory, these lookback penalties represented a robust incentive for tobacco manufacturers to reduce youth tobacco use. However, unlike our preferred implementation, which would be technology agnostic, the proposed incentives were substantially tied to states enacting a prespecified set of provisions.

A nontraditional measure makes sense here to address the market failure associated with the incentives that companies have to increase youth smoking despite its social consequences. A stick approach is plausibly more appropriate than a carrot approach because this is a good example of an area in which we have few concerns about undercompensation and because there are many inexpensive ways for companies to reduce youth smoking (for example, by shifting ad campaigns or developing savvy antismoking campaigns targeted at youths). Additionally, if requiring companies to internalize more of the costs of youth smoking were to force some of them out of the industry or to raise the price of cigarettes, this would likely be a net gain from a welfarist or public health perspective. Again, this example raises concerns about the credibility of sticks, and it also gives us an example of a distributional concern in play: net transfers to tobacco companies in order to reduce youth smoking would likely be seen as perverse, insofar as the companies are thought—particularly in the course of the litigation in question—to bear responsibility for the problem in the first place. The issue is not merely moral; if we reward firms for reversing negative effects for which they are considered responsible, we might reasonably expect more bad effects to follow.

C. Negligent Failure to Test and the State-of-the-Art Defense in Tort Law

Companies that manufacture faulty products face liability in tort if they fail to comport with legal requirements. Tort law thus acts as a stick, and in certain dimensions it may serve as an innovation stick. Particularly relevant here are the doctrine

See id.

See Jeremy Bulow and Paul Klemperer, The Tobacco Deal, 1998 Brookings Papers on Econ Activity: Microecon, 323, 382 (1998) (arguing that "the incentives for reducing underage smoking should be directed at state governments, which would be responsible for the efficacy of antismoking programs").

See Restatement (Third) of Torts: Products Liability § 1 (1998).
regarding a company’s duty to test its products and the so-called state-of-the-art defense to tort liability. These obligations arise under state law and are not uniform across jurisdictions. For our purposes, it is sufficient to look to the Restatement (Third) of Torts (“the Restatement”) and at certain leading cases that reflect the general view of these doctrines.

Under the Restatement, there are three types of product defects: (1) design defects, which occur when the foreseeable risks of the product could be reduced by the manufacturer’s “adoption of a reasonable alternative design”; (2) manufacturing defects, or departures from the planned design; and (3) warning defects, which occur when the manufacturer could have reduced the risk of a product with instructions or warnings when the risk was reasonably foreseeable to the manufacturer.28 Courts have typically applied the duty to test indirectly, as a way to get at the existence or absence of such design, manufacturing, or warning defects.29 The manufacturer’s knowledge may be relevant to the feasibility of alternative designs or to the reasonableness of warnings, and the duty to test is a way of imputing to the manufacturer knowledge of these possible designs or warnings.30

The intuition behind the duty to test is clear: a manufacturer should not be able to shield itself from liability for defective products by failing to undertake research that would have

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28 Id at § 2, comment m.
29 See, for example, Burton v R.J. Reynolds Tobacco Co, 397 F3d 906, 920 (10th Cir 2005) (“In Kansas, the core purpose of a duty to test is to avoid production of defective products.”); Kociemba v G.D. Searle & Co, 707 F Supp 1517, 1527–28 (D Minn 1989) (stating that “[t]his Court has already held that the duty to test is a subpart of the duty to warn” and that “[t]he duty to test is a subpart of the other three duties because a breach of the duty to test cannot by itself cause any injury”). See also Russell J. Davis, Carolyn Bower, and Robert D. Hursh, 1 American Law of Products Liability § 11:4 (Thomson/West 3d ed 2005):

[A] manufacturer’s duty to test the product is subsumed under its duties to exercise reasonable care in the design and manufacture of the product and to provide adequate warnings of dangers associated with the product’s use; thus, breach of a duty to test is not a separate basis for cause of action based on a claim of negligence.

A minority of courts have found an independent duty to test. See, for example, Borel v Fibreboard Paper Products Corp, 493 F2d 1076, 1091 (5th Cir 1973) (finding that, under Texas law, “the manufacturer’s duty to test his product is well-established”); J.B. Horne v Liberty Furniture Co, 452 S2d 204, 209 (La App 1984) (“The manufacturer has an independent duty to test and inspect its product.”).

30 See Restatement (Third of Torts: Product Liability § 2, comment m (cited in note 27) (“A seller is charged with knowledge of what reasonable testing would reveal. If testing is not undertaken, or is performed in an inadequate manner, and this failure results in a defect that causes harm, the seller is subject to liability for harm caused by such defect.”).
revealed such defects. Customers have little ability to conduct testing on their own, making manufacturers, in tort parlance, the cheapest-cost avoiders, particularly when the negative effects of these products are complex and difficult to discern.\(^{31}\)

In its application, however, the duty to test presents difficulties. In particular, how are courts to know how much testing is adequate? Critics have argued that the case law provides few clear guidelines regarding the extent of the duty to test.\(^{32}\) Courts tend to speak generally about the foreseeability of the possible harm and the practicability of testing,\(^{33}\) and their conclusions often turn on very specific facts such as the existence of warning signs that should lead a reasonable manufacturer to further investigate.\(^{34}\) Notably, courts often speak of the importance of the manufacturer's status as an expert in a particular field.\(^{35}\)

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\(^{31}\) See, for example, Wendy E. Wagner, *Choosing Ignorance in the Manufacture of Toxic Products*, 82 Cornell L. Rev 773, 798 n 86 (1997); Dalehite v United States, 346 US 15, 52 (1953) (Jackson dissenting) (“Where experiment or research is necessary to determine the presence or the degree of danger, the product must not be tried out on the public, nor must the public be expected to possess the facilities or the technical knowledge to learn for itself of inherent but latent dangers.”).

\(^{32}\) See, for example, Lars Noah, *Platitudes about “Product Stewardship” in Torts: Continuing Drug Research and Education*, 15 Mich Telecomm & Tech L Rev 359, 365 (2009) (stating that “case law offers essentially no guidance about the contours of such a duty to test”); Daniel R. Cahoy, *Medical Product Information Incentives and the Transparency Paradox*, 82 Ind L J 623, 641 (2007) (noting that “courts rarely engage in hindsight analysis to imagine what studies might have uncovered defects that were not reasonably foreseeable at the time”).

\(^{33}\) See E.L. Kellett, *Manufacturer’s Duty to Test or Inspect as Affecting His Liability for Product-Caused Injury*, 6 ALR3d 91 (1966) (“Many cases have recognized or applied the general rule that a manufacturer has a duty to test and inspect his products, at least where the nature of the product is such that damage from its use is foreseeable, and where tests or inspections are practicable and would be effective.”).

\(^{34}\) See, for example, Huggins v Stryker Corp, 932 F Supp 2d 972, 987 n 14 (D Minn 2013) (“[A] reasonably prudent manufacturer will be deemed to know of reliable information generally available or reasonably obtainable in the industry or in the particular field involved. Such
Innovation Sticks: Appendix

invokes the potential of yardsticks to reduce information costs, as we describe in our Article.\textsuperscript{36} If a court can determine, for example, that most car companies do rollover tests to ensure the safety of their seat belts, then this could serve as evidence that a company that failed to do such tests breached its duty to undertake reasonable tests.\textsuperscript{37} Tort law commonly uses custom in an industry to define appropriate standards of care.\textsuperscript{38} We imagine an analogous approach, in which custom is determined not with respect to the design of products but rather with respect to the design of R & D programs. While this might be difficult in nonhomogeneous industries, for industries in which firms are in relevant ways similar or in which differences can be accounted for, recourse to custom could help identify a minimum level of R & D that should be required.\textsuperscript{39} The results will surely be imperfect.\textsuperscript{40} The critical question, however, is how the results would compare to the alternative, in which firms have perverse incentives not to conduct R & D that might discover dangers even though they are in the best position to discover those dangers.

The state-of-the-art defense raises issues similar to those of the duty to test, but in a different posture. Here, companies can escape liability if they show that their products were state of the art such that there was no feasible better design or better warning information need not be limited to that furnished by experts in the field, but may also include material provided by others.

\textsuperscript{36} See Part I A in the main text.

\textsuperscript{37} See Hopper \textit{v} Crown, 646 S2d 933, 945–46 (La App 1994) (holding that a forklift manufacturer "breached its duty to test and experiment commensurate with the danger" when it failed to test the safety of a doorless forklift, knowing that its competitors offered forklifts with doors for safety purposes). This example illustrates that in certain applications, such as those described in our analysis of automobile fatalities, tort law can be a barrier to entry. We acknowledge that such barriers may result in economic inefficiencies. However, we emphasize that tort law, as an innovation stick, is an effective tool of innovation policy that can lead to broader efficiency gains for society.

\textsuperscript{38} See Dan B. Dobbs, Paul T. Hayden, and Ellen M. Bublick, \textit{The Law of Torts} § 179 (West 2d ed 2000) ("[C]ustom may be admissible as tending to show that a party’s conduct did or did not meet the reasonable person standard of care."); Kenneth S. Abraham, \textit{Custom, Noncustomary Practice, and Negligence}, 109 Colum L Rev 1784, 1786 (2009) ("Evidence of an actor’s compliance with custom is admissible . . . to show reasonable care, and evidence of an actor’s departure from custom is admissible . . . to show negligence.").

\textsuperscript{39} See notes 49–50 and accompanying text.

\textsuperscript{40} This is true not only because custom may be difficult to discern but also because courts will make mistakes in discerning it. In addition, entire industries may underinvest in R & D, creating circularity problems. In theory, yardsticks can move the entire field to better performance because firms that can excel have an incentive to move ahead of their peers. But a dynamically efficient feedback loop of this sort would be very difficult to achieve with the blunt weapon of tort law due to the many factors that mediate the relationship between tort liability and long-term corporate decisionmaking.
given the state of knowledge at the time. The point of the defense is to provide a safe harbor to ensure that manufacturers are not penalized for undertaking tests—an activity that could otherwise be perversely deterred by tort law. But the doctrine serves this purpose well only if it correctly identifies the level of testing that is appropriate to trigger the safe harbor. Consequently, as some courts have recognized, the state of the art should be defined “in terms of what the industry as a whole knew or could have discovered by properly fulfilling their duty to test these products.”

This raises the key question for this innovation stick: What level of testing should be required before the safe harbor applies? Jurisdictions have taken two main approaches to defining the technological standard required to show that a product is state of the art. Some ask whether there was no feasible safer product, while others ask whether the defendant’s product conformed to industry standards. The former appears to impose very high information burdens on the court, but the latter seems likely to provide inadequate incentives to test. A better approach might have yardstick qualities, and it might ask courts not to determine that there was no product possibly safer than

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41 See, for example, James Boyd and Daniel E. Ingberman, Should “Relative Safety” Be a Test of Product Liability?, 26 J Legal Stud 433, 435 (1997). See also Jane Stapleton, Liability for Drugs in the U.S. and EU: Rhetoric and Reality, 26 Rev Litig 991, 1011 (2007) (“[W]here the alleged ‘defect’ consists of a failure to warn of a risk, and where such a warning was impossible given the state of the art of the epidemiological data relating to the drug at the time it was supplied, that claim of ‘defect’ will fail.”). In most jurisdictions, state-of-the-art evidence is “only a factor in determining liability,” but in a minority of states (at least twelve), it is a conclusive defense and usually operates by establishing a rebuttable presumption that the relevant product was not defective. Boyd and Ingberman, 26 J Legal Stud at 441 (cited in note 41).

42 See Wagner, 82 Cornell L Rev at 794-96 (cited in note 31). This example helps illustrate the point about baselines made above. See notes 38–40 and accompanying text. As a safe harbor, we might also conceive of this as an innovation carrot: a firm enjoys the benefit of a defense from liability if it conducts the right level of R & D.

43 Dartez v Fibreboard Corp, 765 F2d 456, 463 (5th Cir 1985) (emphasis added). See also Artis v Corona Corp of Japan, 703 A2d 1214, 1217 n 6, 1218 (DC App 1997) (citing the Dartez formulation favorably and reversing a grant of summary judgment for the defendant because the lower court failed to consider what a “competent manufacturer reasonably could have developed at the time the [product] was manufactured and sold,” despite the lack of commercially available safety measures at the time of the injury).

44 See Boyd and Ingberman, 26 J Legal Stud at 430–40 (cited in note 41) (surveying cases and jurisdictions that apply these two standards).

45 For further discussion of the inadequate incentives to test, see id at 439–40.
the defendant’s but rather to use industry standards to require above-average safety and above-average investments in R & D.\textsuperscript{46}

We do not wish to overstate the power of tort law to directly promote investments in research on product safety. Courts have found the extent of the duty to test difficult to define (though as just suggested, some of the informational problems that courts face might be minimized with yardstick approaches). Other aspects of tort liability also undermine its potential to serve as an effective tool of innovation policy. In particular, plaintiffs bear the burden of proving causation—but depending on how that requirement is construed and the level of evidence required to get to a jury, plaintiffs may be unable to make this showing in the absence of epidemiological (or similarly systematic) research that connects the product in question to the harms that the plaintiffs have suffered.\textsuperscript{47} There is thus a circularity problem: plaintiffs may be unable to prevail on a theory of failure to test unless they already know what testing would have shown.\textsuperscript{48} This can be seen as an innovation stick that is imposed on the wrong party: plaintiffs are denied relief for their injuries unless they perform expensive studies that identify the causes of those injuries, even though manufacturers are in a superior position to perform studies.

Our analysis offers reasons that courts might be appropriately cautious regarding the deployment of this particular innovation stick, and it also offers a clear account of its importance. Caution seems appropriate because courts may not know what level of R & D is appropriate. But as we have described, yardstick

\textsuperscript{46} See id at 435–36 (noting that if a test incorporates government standards, it may reduce the underprovisions and overprovisions of safety that occur under other tests).

\textsuperscript{47} See Wagner, 82 Cornell L Rev at 774–75 (cited in note 31).

\textsuperscript{48} For an expansive understanding of how causation might be understood in this context, see Zuchowicz v United States, 140 F3d 381, 386–87 (2d Cir 1998) (affirming a lower court’s decision allowing expert witnesses to testify regarding causation in a drug case, despite the fact that no epidemiological or associated clinical trial evidence was available). Epidemiological evidence is not always required. For example, courts may allow a jury to infer causation from circumstantial evidence of exposure, along with symptoms that have no other known explanation. See Dobbs, Hayden, and Bublick, The Law of Torts at § 191 (cited in note 35). Plaintiffs with unusual symptoms may thus be able to get to a jury without scientific proof of causation, while those who have symptoms that could be caused by many things—by cancer, for example—may have a much more difficult time showing causation without epidemiological proof. See Daniel A. Farber, Toxic Causation, 71 Minn L Rev 1219, 1251–53 (1987). Sometimes causation will also be unproblematic. If the plaintiff is injured in a car crash because a seat belt disengaged during a rollover, the cause of the injury will not be difficult to discern—although the appropriate level of R & D might be.
approaches—based on a kind of customary level of R & D—can help mitigate the problem. At a minimum, courts should be aware of the importance of the failure-to-test doctrine as well as of the radical underinvestment in testing that is likely to follow if companies are not obliged to test their products in reasonable ways. Courts might also begin to develop the significance of the doctrine if they invite evidence regarding industry R & D standards relevant to a particular context. Another way to make more-extensive use of tort law as an innovation stick would be to shift the burden to companies to disprove causation if they fail to undertake a defined level of minimal testing with the appropriate level of testing defined by industry. Statutes could be used to define the appropriate level of testing, reducing the information burden on courts and increasing predictability for industry. This would replicate something akin to the FDA standards forbidding the sale of drug products without certain levels of testing submitted in advance, although using not a property rule (the FDA’s ban on marketing) but rather a liability rule (in the form of compensatory tort liability). The information asymmetries between consumers and producers in such cases would appear to make such an approach very valuable, perhaps when combined with a set of traditional or nontraditional carrots.

III. SUPPLEMENT: ADDITIONAL AUTOMOBILE-FATALITIES ANALYSIS

Given that automobile fatalities involving laggard manufacturers are not well internalized—as presented in our discussion supporting Table 2 in the main text—we ask: How concretely

49 Professor Wendy Wagner has proposed a system like this for toxic torts. As she envisions it, the plaintiff would establish a prima facie case by showing:

(1) inadequate minimal testing on a product, (2) normal or foreseeable exposure to the product, and (3) serious harm that might be causally linked to exposure to the product. The plaintiff could satisfy the harm element, depending on jurisdiction, by demonstrating the existence of latent physical harms (e.g., cancer, reproductive ailments), emotional harms, medical monitoring costs, or an increased risk of latent physical harm.


50 See id at 807–09.

51 Because tort law is keyed to harm, such a model would not generate impetus to show evidence of effectiveness as FDA requirements do. Line-drawing issues—for example, about when such testing should be required (for some products but not others) and how courts would determine industry standards—would of course follow.
might a CAFE-like system be applied to internalize these costs of above-median fatality risks?

One way to internalize the costs of above-median fatalities would be to introduce financial penalties that are a function of how much a manufacturer’s historic fatality rate has exceeded the median manufacturer rate on a year-by-year basis. As with Table 2 in the main text, the per-vehicle penalties reported below in Table 1A are best construed as upper-bound estimates; enlightened regulations might phase in the penalties so that manufacturers with poor safety standards would have time to correct their ways.

By estimating the per-vehicle costs associated with excess fatalities, Table 1A dramatizes the extent of the problem.

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52 To translate the flow of annual manufacturer penalties into a one-time charge, we calculate the present value of a ten-year annuity—assuming that the average car stays on the road for ten years—at a 5 percent discount rate.

53 Our current approach also penalizes manufacturers for their stocks of cars that are on the road. While it is ultimately appropriate to have manufacturers internalize the costs of excess danger produced by their stocks of historic sales, another phase of penalties might limit manufacturer liability to those cars that were sold after the regulation went into effect.
TABLE 1A. ESTIMATES OF ABOVE-MANUFACTURER-MEDIAN FATALITY RATES AND ASSOCIATED PER-VEHICLE COSTS

<table>
<thead>
<tr>
<th>Average Fatality Rate over Median (Fatality Rate/100,000 Vehicles), Based on Twelve-Year Average</th>
<th>Per-Vehicle Time-of-Purchase Cost for Fatalities above Median, Based on ($/Vehicle), Based on Twelve-Year Average</th>
<th>Per-Vehicle Time-of-Purchase Cost for Fatalities above Median, Controlling for Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Fatalities</td>
<td>External Fatalities</td>
<td>Total Fatalities</td>
</tr>
<tr>
<td>Mitsubishi</td>
<td>7.83</td>
<td>2.62</td>
</tr>
<tr>
<td>Land Rover</td>
<td>4.67</td>
<td>4.47</td>
</tr>
<tr>
<td>Kia</td>
<td>3.71</td>
<td>1.04</td>
</tr>
<tr>
<td>Pontiac</td>
<td>3.52</td>
<td>0.06</td>
</tr>
<tr>
<td>GMC</td>
<td>3.02</td>
<td>3.51</td>
</tr>
<tr>
<td>Isuzu</td>
<td>2.67</td>
<td>0.40</td>
</tr>
<tr>
<td>Chevrolet</td>
<td>2.67</td>
<td>1.22</td>
</tr>
<tr>
<td>Hyundai</td>
<td>1.25</td>
<td>0.09</td>
</tr>
<tr>
<td>Ford</td>
<td>1.07</td>
<td>1.72</td>
</tr>
<tr>
<td>Acura</td>
<td>1.02</td>
<td>0</td>
</tr>
<tr>
<td>Dodge</td>
<td>0.72</td>
<td>2.57</td>
</tr>
<tr>
<td>Jeep</td>
<td>0.64</td>
<td>1.37</td>
</tr>
<tr>
<td>Infiniti</td>
<td>0.64</td>
<td>0.88</td>
</tr>
<tr>
<td>Nissan/Datsun</td>
<td>0.07</td>
<td>0.01</td>
</tr>
<tr>
<td>Plymouth</td>
<td>0.04</td>
<td>0</td>
</tr>
<tr>
<td>Jaguar</td>
<td>0.03</td>
<td>0.05</td>
</tr>
</tbody>
</table>

The first two columns are the twelve-year-average fatality rates over median for each manufacturer. Only manufacturers who have had a total-fatality rate over median in at least one of the years 2000 to 2011 are shown here. The second two columns show the average social costs per year, annuitized at 5 percent for ten years. This represents the average external fatalities at the time of purchase of the average vehicle made by that manufacturer and at the time of purchase for total or external fatalities. Average yearly social cost per vehicle, which we annuitize above, is calculated by dividing each manufacturer's fatality rate over the median rate by 100,000 vehicles and multiplying that number of fatalities by $7.4 million, the value of a human life as calculated by the EPA, and then averaging over 12 years. Nineteen car manufacturers produced below median for both total- and external-fatality rates for all twelve years.
The "state-based costs of death from crashes" have been an independent concern of the Centers on Disease Control and Prevention (CDC), which in 2005 estimated the state-specific costs of crash deaths. But somewhat bizarrely, the CDC’s comparison of states does not control for differences in population size. Thus, the CDC website warns that "half of all costs [from crash deaths] were found in 10 states." The CDC notes that "[t]he ten states with the highest medical and work loss costs were California ($4.16 billion), Texas ($3.50 billion), Florida ($3.16 billion), Georgia ($1.55 billion), Pennsylvania ($1.52 billion), North Carolina ($1.50 billion), New York ($1.33 billion), Illinois ($1.32 billion), Ohio ($1.23 billion), and Tennessee ($1.15 billion)."

It should hardly be surprising, however, that California and New York, because of their sheer population sizes, are ranked among the top ten most costly states in terms of fatal-crash costs even though these states rank below median in terms of both total and external fatalities. If we instead simply divide the CDC cost estimates by the number of registered automobiles in each state, we see a ranking that closely parallels the ranking in Figure 4 in our Article, with Mississippi, Arkansas, and South Carolina as the most fatal states.

In Table 2A, we present estimates for above-state-median fatality rates, calculated analogously to the estimates in Table 2 in the main text. Table 2A also reports the per-vehicle social costs at the time of purchase for fatalities over median based on

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56 State-Based Costs of Deaths from Crashes (cited in note 55).
57 Id.
58 Above-median fatality rates—both total and external—are calculated by subtracting the fatality rate for each state in each year from the median fatality rate for that year. These differences are then averaged over the twelve years in the sample. Twelve states have total- and external-fatality rates that never exceed the median rate and do not appear in the table, as their total- and external-fatality rates over median are zero.
the CDC’s cost-calculating methodology, which focuses on the social cost from health care and lost work instead of our cost-of-life approach.\textsuperscript{59} Even using the CDC’s more conservative valuation method, we find that Mississippi’s per-vehicle (point-of-sale) cost would be more than $2,300 and that its annual penalty would be more than $600 million.

\textbf{TABLE 2A. ABOVE-STATE-MEDIAN FATALITY RATES AND ASSOCIATED PER-VEHICLE COSTS}

<table>
<thead>
<tr>
<th>State</th>
<th>Average Fatality Rate over Median (Fatality Rate/100,000 Vehicles), Based on Twelve-Year Average</th>
<th>Social Cost at Time of Purchase for Fatalities over Median ($/Vehicle), Based on Twelve-Year Average</th>
<th>CDC Cost over Median per Vehicle ($/Vehicle), 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS</td>
<td>26.77</td>
<td>$15,710</td>
<td>$5,594</td>
</tr>
<tr>
<td>AR</td>
<td>17.64</td>
<td>$10,354</td>
<td>$4,248</td>
</tr>
<tr>
<td>SC</td>
<td>15.21</td>
<td>$8,926</td>
<td>$3,083</td>
</tr>
<tr>
<td>NM</td>
<td>13.17</td>
<td>$7,729</td>
<td>$2,064</td>
</tr>
<tr>
<td>WV</td>
<td>13.00</td>
<td>$7,630</td>
<td>$2,606</td>
</tr>
<tr>
<td>WY</td>
<td>11.25</td>
<td>$6,600</td>
<td>$1,131</td>
</tr>
<tr>
<td>AZ</td>
<td>11.06</td>
<td>$6,489</td>
<td>$2,598</td>
</tr>
<tr>
<td>NY</td>
<td>10.98</td>
<td>$6,446</td>
<td>$2,703</td>
</tr>
<tr>
<td>KY</td>
<td>10.72</td>
<td>$6,288</td>
<td>$2,729</td>
</tr>
<tr>
<td>NC</td>
<td>10.05</td>
<td>$5,898</td>
<td>$2,599</td>
</tr>
<tr>
<td>MT</td>
<td>9.55</td>
<td>$5,603</td>
<td>$852</td>
</tr>
<tr>
<td>LA</td>
<td>9.31</td>
<td>$5,463</td>
<td>$2,102</td>
</tr>
<tr>
<td>TN</td>
<td>9.08</td>
<td>$5,326</td>
<td>$2,010</td>
</tr>
<tr>
<td>AL</td>
<td>8.46</td>
<td>$4,966</td>
<td>$1,960</td>
</tr>
<tr>
<td>MO</td>
<td>8.26</td>
<td>$4,849</td>
<td>$1,929</td>
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<tr>
<td>OR</td>
<td>8.13</td>
<td>$4,772</td>
<td>$2,365</td>
</tr>
<tr>
<td>TX</td>
<td>7.12</td>
<td>$4,181</td>
<td>$2,134</td>
</tr>
<tr>
<td>FL</td>
<td>6.01</td>
<td>$3,524</td>
<td>$1,782</td>
</tr>
<tr>
<td>GA</td>
<td>5.12</td>
<td>$3,003</td>
<td>$1,549</td>
</tr>
</tbody>
</table>

\textsuperscript{59} For a fuller description of the CDC’s methodology, which was estimated solely for 2005 data, see Naumann, et al. 11 Traffic Injury Prevention at 384–55 (cited in note 55).
## Innovation Sticks: Appendix

<table>
<thead>
<tr>
<th>State</th>
<th>Average Yearly Social Cost of Fatalities over Median ($ Million), Based on Twelve-Year Average</th>
<th>CDC Cost over Median per Vehicle ($ Million), Based on 2005 Twelve-Year Average</th>
<th>Social Cost at Time of Purchase for Fatalities over Median, Corrected for Miles Driven ($/Vehicle), Based on Twelve-Year Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>SD</td>
<td>4.87</td>
<td>0.78</td>
<td>$2,859</td>
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<tr>
<td>ID</td>
<td>4.62</td>
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<tr>
<td>DC</td>
<td>4.58</td>
<td>1.87</td>
<td>$2,685</td>
</tr>
<tr>
<td>KS</td>
<td>4.35</td>
<td>2.42</td>
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</tr>
<tr>
<td>ME</td>
<td>2.66</td>
<td>0.76</td>
<td>$1,562</td>
</tr>
<tr>
<td>DE</td>
<td>2.58</td>
<td>1.86</td>
<td>$1,511</td>
</tr>
<tr>
<td>ND</td>
<td>2.01</td>
<td>0.71</td>
<td>$1,182</td>
</tr>
<tr>
<td>IN</td>
<td>1.43</td>
<td>1.08</td>
<td>$8837</td>
</tr>
<tr>
<td>WI</td>
<td>1.04</td>
<td>0.33</td>
<td>$609</td>
</tr>
<tr>
<td>PA</td>
<td>0.83</td>
<td>0.20</td>
<td>$485</td>
</tr>
<tr>
<td>UT</td>
<td>0.83</td>
<td>0.14</td>
<td>$485</td>
</tr>
<tr>
<td>NE</td>
<td>0.74</td>
<td>0.63</td>
<td>$435</td>
</tr>
<tr>
<td>VT</td>
<td>0.60</td>
<td>0.29</td>
<td>$352</td>
</tr>
<tr>
<td>MD</td>
<td>0.50</td>
<td>0.42</td>
<td>$292</td>
</tr>
<tr>
<td>OR</td>
<td>0.49</td>
<td>0.09</td>
<td>$289</td>
</tr>
<tr>
<td>CO</td>
<td>0.41</td>
<td>0.06</td>
<td>$241</td>
</tr>
<tr>
<td>HI</td>
<td>0.35</td>
<td>0.00</td>
<td>$206</td>
</tr>
<tr>
<td>AK</td>
<td>0.13</td>
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<tr>
<td>VA</td>
<td>0.06</td>
<td>0.00</td>
<td>$38</td>
</tr>
<tr>
<td>LA</td>
<td>0.00</td>
<td>0.04</td>
<td>$0</td>
</tr>
<tr>
<td>MI</td>
<td>0.00</td>
<td>0.19</td>
<td>$0</td>
</tr>
</tbody>
</table>

**Cunninghame: Intermediary Influence and Competition: Berkshire versus KKR**
| State | KY  | NC  | MT  | LA  | TN  | AL  | MO  | OK  | TX  | FL  | GA  | ID  | DC  | KS  | ME  | DE  | ND  | IN  | WI  | PA  | CT  | NE  | VT  | MD  | OR  | CO  | HI  | AK  | VA  | IA  | MI  |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|       | 2,800 | 4,670 | 722 | 2,680 | 3,450 | 2,890 | 2,900 | 2,000 | 8,700 | 6,710 | 3,050 | 310 | 858 | 880 | 782 | 2,09 | 1,40 | 111 | 562 | 961 | 106 | 94 | 24 | 149 | 111 | 124 | 23 | 32 | 0 | 80 |
|       | 1,220 | 1,980 | 109 | 1,030 | 1,310 | 1,140 | 1,150 | 989 | 4,450 | 3,400 | 1,570 | 51 | 69 | 33 | 434 | 59 | 103 | 40 | 438 | 114 | 148 | 18 | 119 | 12 | 20 | 8 | 119 | 18 | 18 | 0 | 11 |
|       | 379 | 614 | 59 | 418 | 435 | 409 | 410 | 142 | 908 | 840 | 375 | 32 | 52 | 0 | 90 | 4 | 1 | 11 | 179 | 66 | 97 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|       | 5,449 | 8,899 | 4,704 | 4,073 | 4,176 | 3,846 | 4,255 | 3,850 | 2,970 | 3,223 | 1,427 | 2,563 | 3,123 | 2,124 | 2,090 | 890 | 1,353 | 724 | 391 | 391 | 781 | 446 | 514 | 180 | 27 | 685 | 189 | 1,857 | 600 | 0 | 0 | 0 | 8 | 8 |
A. Accounting for Differences in Teenage and Under-the-Influence Driving

Of course, as with our manufacturer proposal, a necessary condition before imposing such a state-incentive regime would be considering the possibility that state actions could reduce the risk of fatalities. It would be inappropriate to deploy innovation sticks to incentivize manufacturer or state responses to above-median fatality rates if there were no credible actions that the manufacturer or state could take to reduce those rates. In this Section, we estimate the extent to which our above-median estimates are driven by differences in teenage-driving and under-the-influence-driving fatality rates, and we assess the extent to which a manufacturer or state might respond to such fatality-rate influences.

The fatality rates experienced by manufacturers and states might also be impacted by differences in the recklessness of their drivers. Teenage-male drivers and people driving under the influence of drugs or alcohol have dramatically higher accident rates. Manufacturers of identical automobiles might experience different fatality rates just because of differences in the extent to which manufacturers attract particularly reckless drivers. This Section empirically investigates the connection between teenage and under-the-influence driving and the elevated fatality rates of manufacturers and states. But, in contrast to the “miles driven” influence, we do not believe that innovation sticks should be adjusted for reckless-driver influences. We reach this conclusion because we believe that manufacturers and states that have disproportionately reckless drivers are likely to be able to adopt cost-effective measures to deter the recklessness or mitigate the impact of recklessness.

We begin our analysis by reporting the proportion of fatalities that come from accidents in which a teenage male was driving or in which the driver was under the influence of drugs or alcohol.

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60 Allan F. Williams has found that, in the year 2000, teenage males were roughly twice as likely to be involved in a fatal crash as teenage females per licensed driver. Allan F. Williams, Teenage Drivers: Patterns of Risk, 34 J Safety Res. 5, 6–7 (2003). The dangers of drunk driving are well documented. See, for example, Impaired Driving: Get the Facts (CDC, Jan 13, 2015), archived at http://perma.cc/BX4Z-3YQL (noting the CDC’s statistic that one-third of all traffic deaths are alcohol related).

61 See Part III.B in the main text.
Table 3A reports the five highest proportions by manufacturer and state.

**TABLE 3A. HIGHEST MANUFACTURER AND STATE PROPORTIONS OF TOTAL FATALITIES INVOLVING A TEENAGE-MALE DRIVER OR A DRIVER UNDER THE INFLUENCE OF DRUGS OR ALCOHOL**

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Percentage of Fatal Accidents Involving Teenage Males (%)</th>
<th>Manufacturer</th>
<th>Percentage of Fatal Accidents Involving Drugs or Alcohol (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acura</td>
<td>16.3</td>
<td>BMW</td>
<td>26.1</td>
</tr>
<tr>
<td>Honda</td>
<td>11.9</td>
<td>Porsche</td>
<td>25.2</td>
</tr>
<tr>
<td>Mitsubishi</td>
<td>11.7</td>
<td>Audi</td>
<td>24.8</td>
</tr>
<tr>
<td>Pontiac</td>
<td>11.1</td>
<td>Jaguar</td>
<td>22.6</td>
</tr>
<tr>
<td>Audi</td>
<td>10.7</td>
<td>Saab</td>
<td>22.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>State</th>
<th>Percentage of Fatal Accidents Involving Teenage Males (%)</th>
<th>State</th>
<th>Percentage of Fatal Accidents Involving Drugs or Alcohol (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NE</td>
<td>10.8</td>
<td>SD</td>
<td>34.3</td>
</tr>
<tr>
<td>ID</td>
<td>10.0</td>
<td>MT</td>
<td>32.5</td>
</tr>
<tr>
<td>RI</td>
<td>9.7</td>
<td>WV</td>
<td>29.9</td>
</tr>
<tr>
<td>KS</td>
<td>9.6</td>
<td>ND</td>
<td>29.8</td>
</tr>
<tr>
<td>UT</td>
<td>9.5</td>
<td>WY</td>
<td>29.3</td>
</tr>
</tbody>
</table>

Table 3A reports that more than one-quarter (26.1 percent) of fatal accidents involving a BMW occurred when the BMW driver was under the influence and that more than one-third (34.3 percent) of fatal accidents in South Dakota involved at least one driver who was under the influence. These simple statistics might suggest guidelines for action. If South Dakota or...

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62 Teenage-male totals are calculated from sex and age variables in the FARS data (age is between fourteen and twenty). Only drivers are considered. Drug and alcohol totals are calculated from the drug and alcohol flags (“drugs” and “drinking”) in the FARS data. If the “yes/no” alcohol or drug flag is missing in those data, we assume that drugs and alcohol were not a factor in the accident.
Montana wants to reduce fatalities in their states, taking action against drunk driving might be an important place to start. But a manufacturer or state might have a high fatality proportion merely because it has been inordinately successful in reducing other causes of fatalities. For example, BMW has the highest manufacturer proportion of driving-under-the-influence fatalities, but it has a below-median fatality rate (as indicated by its absence from the above-median analysis in Table 1A). If BMW wants to reduce its fatalities further, it might want to consider taking actions to deter or mitigate the impact of drug- and alcohol-related driving. The evidence presented in Table 3A, however, is not sufficient to establish that BMW has an above-median risk of under-the-influence fatalities.

Table 4A responds to this concern by reporting the likelihood ratio of teenage-male fatality rates relative to the share of a manufacturer’s or state’s cars more generally (that is, the proportion of drunk drivers involved in fatal accidents for a manufacturer or state divided by the proportion of nationally registered cars made by a manufacturer or in a state). Acura, for example, is estimated to have a teenage-male likelihood ratio of 2.19, because Acura has a 0.84 percent share of registered cars but a 1.84 percent share of fatal accidents in which a teenage male was driving. Table 4A reports the ten highest and five lowest likelihood ratios for each of the four categories.

**Table 4A. Highest Manufacturer and State Likelihood Ratios of Total Fatalities Involving a Teenage-Male Driver or a Driver Under the Influence of Drugs or Alcohol**

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Likelihood Ratio: Teenage Males</th>
<th>Manufacturer</th>
<th>Likelihood Ratio: Drugs or Alcohol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acura</td>
<td>2.19</td>
<td>Mitsubishi</td>
<td>1.72</td>
</tr>
<tr>
<td>Mitsubishi</td>
<td>2.12</td>
<td>Pontiac</td>
<td>1.49</td>
</tr>
<tr>
<td>Pontiac</td>
<td>1.75</td>
<td>Isuzu</td>
<td>1.43</td>
</tr>
<tr>
<td>Isuzu</td>
<td>1.35</td>
<td>Chevrolet</td>
<td>1.37</td>
</tr>
<tr>
<td>Chevrolet</td>
<td>1.29</td>
<td>GMC</td>
<td>1.35</td>
</tr>
</tbody>
</table>

Likelihood ratios are the manufacturers’ or states’ proportions of drunk drivers involved in fatal accidents divided by the proportion of nationally registered cars made by that manufacturer or located in that state.
Unlike the Table 3A proportions, the Table 4A likelihood ratios are independent of how successful a manufacturer or state is in reducing other types of fatalities. Hence, we see that some manufacturers that were prominent in the Table 3A proportions are absent from Table 4A's highest likelihood ratios. BMW had the highest proportion of under-the-influence fatalities but has a
likelihood ratio of only 0.83 (because while it has 0.96 percent of registered vehicles, it generates only 0.79 percent of driving-under-the-influence fatalities). Similarly, we see that Honda had the second-highest proportion of teenage-male-driver fatalities but has a likelihood ratio around 1 to 1.05. Overall, Honda is one of the safer cars (as can also be seen by its absence from the above-median analysis in Table 1A).

Stepping back, we see a strong positive correlation between the manufacturers and states that have the highest fatality likelihood ratios for teenage-male and under-the-influence driving and the manufacturers and states that have the highest total-fatality rates. Figure 1A plots the four scatter diagrams showing the extent of these correlations.

**FIGURE 1A. LIKELIHOOD RATIOS FOR TEENAGE-MALE AND UNDER-THE-INFLUENCE DRIVING AND AVERAGE FATALITY RATES, AT THE MANUFACTURER AND STATE LEVELS**

The figures collectively show surprisingly tight positive linear correlations between the likelihood ratios and the total-fatality rates—with R-squared from univariate regressions ranging from 55.9 percent to 87.4 percent. These correlations may well be driven by unaccounted-for common factors. For example,
something else about Mississippi might cause it to have both a higher alcohol-fatality likelihood ratio and a higher total-fatality rate. Nonetheless, as discussed in Part III.B in the main text, the figures suggest that above-median manufacturers and states might reduce their total-fatality rates by taking action on teen-age and under-the-influence driving.

The figures also suggest that variation in the under-the-influence-driving risk is a more important influence than in the teenage-driving risk with regard to variations in manufacturer fatality rates, but that the teenage-driving risk is a more important influence than the under-the-influence-driving risk with regard to variations in state fatality rates.64

B. An Alternative Method of Accounting for Overestimated Fatalities

In Table 2 in the main text, we estimate how many lives would have been saved annually on average if the proposed intervention succeeded at merely reducing the fatality rates of above-median manufacturers down to the median industry rate. We deflate our estimates for both the fatalities-over-median estimates and the costs by the number of single-counted fatalities divided by the number of double-counted fatalities. This method deflates every manufacturer by the same amount.

Double counting will result in manufacturers with larger market shares having higher ratios of reported accidents to actual accidents than manufacturers with smaller market shares. To understand why, consider the following stylized example of a market with two manufacturers, Toyota and Ford:65 There are eighty Toyotas and twenty Fords on the road. Drivers of each make are equally likely to get in an accident. Assume that half the cars for each make crash randomly into another car; there

64 This can be seen in Figure 1A through the fact that, for manufacturers, the under-the-influence correlation is steeper and has a better fit than the teenage correlation, while for states the teenage correlation is steeper and has a much better fit than we see for the under-the-influence correlation. It might be that teenage males are more evenly distributed across manufacturers because teens are more likely to drive whatever car their parents drive. This might explain the slightly dampened correlation. In contrast, many states have stringent teenage-driving laws that may affect accident rates directly and cause a tighter correlation. Drunk drivers are much more likely to be driving certain makes of cars, causing a close correlation between under-the-influence likelihood ratios and total accident rates. The explanatory power of the likelihood ratio is nearly as high at the state level (with an R² of 0.74 versus 0.79).

65 We thank the editors for proposing this example.
are sixteen crashes between two Toyotas, eight crashes between a Toyota and a Ford, and one crash between two Fords. For simplicity, assume that in each crash there are three fatalities: the drivers of both cars, as well as one pedestrian. The actual number of fatalities is $3 \times (16 + 8 + 1) = 75$.

The reported total fatalities for Toyota is 120: 40 internal fatalities, 40 external-in-vehicle fatalities (of which 32 were in Toyotas and 8 were in Fords), and 40 pedestrians (1 fatality for each accident involving a Toyota). The true number of fatalities in accidents in which at least one Toyota was involved is $3 \times (16 + 8) = 72$, and the overreporting ratio for Toyotas is $120 / 72 = 1.667$.

Similarly, the reported total fatalities for Ford is 30: 12 internal fatalities (8 from accidents with Toyotas and 4 from the accident between 2 Ford drivers), 8 external-in-vehicle fatalities (all from accidents with Toyotas), and 10 pedestrians (8 + 1 + 1). The true number of fatalities in accidents involving a Ford is $3 \times (8 + 1) = 27$. The overreporting ratio for Fords is $30 / 27 = 1.111$, considerably less than that for Toyota, the manufacturer with a higher market share.

To address this, we calculate manufacturer-specific overreporting ratios from the actual crash data. The denominator for each deflator is the sum of all double-counted total fatalities for a manufacturer, which we have previously calculated. The numerator is the sum of all single-counted deaths for the same manufacturer. To do this, we attribute half of the internal deaths to the manufacturer of the car involved and the remaining half of the internal deaths evenly to the other cars involved in the accident. For example, if four cars were involved in an accident with one internal fatality, half of a fatality would be assigned to the manufacturer of the car in which the person died and one-sixth of a fatality would be assigned to each of the three other manufacturers. External-in-vehicle deaths are assigned using the same rule. For pedestrian deaths, we distribute the fatalities equally—that is, if one pedestrian dies in a three-car accident involving cars of different makes, each manufacturer is assigned one-third of a pedestrian fatality. We reproduce Table 2 using this deflator, finding that the estimates for fatalities

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66 The estimates in Table 2 in the main text do this for the entire universe of crashes, dividing the number of actual deaths by the sum of all double-counted total fatalities.
over median and for costs are greater than the deflated values presented in Table 2 but less than the undeflated values.

**Table 5A. Over-Median Analysis Using Manufacturer-Specific Deflators**

<table>
<thead>
<tr>
<th>Fatalities over Median</th>
<th>Proportion of Fatalities over Median (%)</th>
<th>Yearly Cost of Fatalities over Median ($ billion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Fatalities</td>
<td>1445</td>
<td>4.8</td>
</tr>
<tr>
<td>External Fatalities</td>
<td>520</td>
<td>7.1</td>
</tr>
</tbody>
</table>

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67 This table presents results constructed using manufacturer-specific deflators to account for the overreporting of fatalities.