

LIABILITY AND ORGANIZATIONAL CHOICE*

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ABSTRACT

Scholars have long maintained that increases in liability encourage firms to contract out risky activities in order to take advantage of so-called judgment-proof strategies. These strategies allow entities to limit their liability through contractual arrangements with nearly insolvent firms. However, the use of judgment-proof firms triggers countervailing effects: it provides opportunities to externalize liability through judgment-proof firms, but the insolvency of these firms introduces distortion in care levels that can generate more liability costs. These costs may outweigh the benefits of externalizing liability, making contracting out suboptimal. A simple model of organizational decision making with judgment-proof firms is developed and applied to the oil industry, where contracting out decreased in response to heightened liability following the Exxon *Valdez* oil spill.

And from my neck so free
The Albatross fell off, and sank
Like lead into the sea.
[Samuel Taylor Coleridge, *The Rime of the Ancient Mariner*]

I. INTRODUCTION

UNLIKE the Mariner's albatross, oil does not sink and disappear into the sea. So when the Exxon *Valdez* left afloat a dark expanse of 11 million gallons of crude oil off the Alaskan coast, the albatross of legal liability

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proved to be as buoyant as the oil spill and even more far-reaching.¹ Liability and regulatory oversight for oil transportation were dramatically expanded at the federal level, and many states, for the first time, enacted oil pollution laws that allowed for unlimited corporate liability. Under a regime of unlimited liability, industry observers predicted that financially responsible carriers would cease operations off the U.S. coast—leaving those waters to feckless operators with rust-bucket ships and limited resources to prevent spills or to clean them up.²

This prediction reflects a more general claim currently circulating among law and economics scholars: increases in liability will encourage firms to contract out risky activities in order to take advantage of so-called judgment-proof opportunities.³ These opportunities arise because legal and nonlegal

¹ Hundreds of cases were filed against Exxon (now ExxonMobil Corp.), resulting in private settlements totaling over \$300 million and a consent decree with the State of Alaska and the U.S. government to restore the natural environment at a cost of approximately \$2 billion. Additionally, a jury awarded Alaskan commercial fishermen \$287 million in compensatory damages and levied a \$5 billion punitive damages award against Exxon, at the time the largest punitive award ever reached. The punitive award has since been vacated as too excessive. See *In Re the Exxon Valdez*, 270 F.3d 1215 (9th Cir. 2001).

² See, for example, Oil Pollution Liability and Compensation Act Hearings, 101st Cong., 1st Sess. 1 (1989) (statement of the Int'l Ass'n of Independent Tanker Owners (INTER-TANKO)), warning that unlimited liability would interrupt the flow of oil to the United States and cause a shift in carriers from larger responsible firms to single-ship companies with few assets); Michael P. Donaldson, *The Oil Pollution Act of 1990: Reaction and Response*, 3 *Vill. Envtl. L. J.* 283, 314 (1992) (noting that, in his signing statement for the new federal law, President Bush expressed concern that major oil companies would be "replaced by smaller companies with limited assets and reduced ability to pay for the cleanup of oil spills"); William J. Cook, *An Easy Way out of This Mess*, *U.S. News & World Rep.*, June 25, 1990, at 14 (cautioning that "the only tankers serving the United States might be the clunkers of the world fleet, whose owners couldn't be tapped after an accident"); and David M. Bovet & Charles R. Corbett, *Proceedings, 1991 International Oil Spill Conference 696* (March 1991) (predicting potential shortages of oil in high-risk states). See also Henry Hansmann & Reinier Kraakman, *Toward Unlimited Shareholder Liability for Corporate Torts*, 100 *Yale L. J.* 1879 (1991); Allanna Sullivan, *Oil Firms, Shippers Seek to Circumvent Laws Setting No Liability Limits for Spills*, *Wall St. J.*, July 26, 1990, at B1; Charles Anderson, *Oil Pollution Act Fouls the Regulatory Waters*, *Wall St. J.*, February 20, 1992, at A14; H. P. Drewry Shipping Consultants Ltd., *Shipping Stat. & Econ.*, July & August 1990; and PennWell Publishing, *U.S. Oil Spill Law Cause for Tanker Owners' Worry*, *Int'l Petroleum Encyclopedia* 234 (1993).

³ Many economists and legal scholars have addressed problems arising out of the practice of using judgment-proof entities to externalize costs. See Lynn M. LoPucki, *The Death of Liability*, 106 *Yale L. J.* 1 (1996); Lucian Arye Bebchuk & Jesse M. Fried, *The Uneasy Case for the Priority of Secured Claims in Bankruptcy*, 105 *Yale L. J.* 857 (1996); James B. Rebitzer, *Job Safety and Contract Workers in the Petrochemical Industry*, 34 *Indus. Rel.* 40 (1995); Jay B. Barney, Frances L. Edwards, & Al H. Ringleb, *Organizational Responses to Legal Liability: Employee Exposure to Hazardous Materials, Vertical Integration, and Small Firm Production*, 35 *Acad. Mgmt. J.* 328 (1992). Al H. Ringleb & Steven N. Wiggins, *Liability and Large-Scale, Long-Term Hazards*, 98 *J. Pol. Econ.* 574 (1990); Hansmann & Kraakman, *supra* note 2; David W. Leebron, *Limited Liability, Tort Victims, and Creditors*, 91 *Colum. L. Rev.* 1565 (1991); T. Randolph Beard, *Bankruptcy and Care Choice*, 21 *Rand J. Econ.* 626 (1990); Steven Shavell, *The Judgment Proof Problem*, 6 *Int'l Rev. L. & Econ.* 45 (1986). In particular, LoPucki warns that judgment-proof strategies (or opportunities) may lead to the demise of the current U.S. system of assigning legal liability.

sanctions attach differentially across firms—thus, according to the claim, large firms that face higher sanctions will limit their liability by contracting out to small judgment-proof firms. However, organizational responses to legal liability admit a broader set of transactions than simply contracting out. For instance, contrary to the predictions of academics and industry observers, major oil companies have not systematically contracted out the shipping of their oil. In fact, these companies have moved in the opposite direction, now transporting more crude oil in U.S. waters (both as a percentage and in absolute terms) than they did before the heightened liability imposed in the wake of the Exxon *Valdez* accident.

To explain the response of the major oil companies to unlimited liability, this article develops a simple model of organizational decision making with respect to the use of judgment-proof firms. The model's more salient implications are explored in the context of the oil shipping industry. At its essence, the model highlights two countervailing effects that are realized when contracting out liability-generating activities to judgment-proof firms. On the one hand, major oil companies, for example, can externalize their liability for transporting oil by using nearly insolvent independent carriers (independents). Commentators have emphasized this "externalizing benefit" as the principal justification for contracting out to insolvent independent firms. However, the insolvency of these firms can generate more "liability costs" for the major oil companies, because judgment-proof firms have reduced incentives to exercise proper care. Even a small possibility of being held vicariously liable for the independents' negligence can quickly make the liability costs outweigh the externalizing benefits.

Recent empirical research has shed light on the issue of the organizational propensity to contract out risky activities to judgment-proof firms. In a widely cited article, which focused on latent risks in hazardous industries, Al Ringleb and Steven Wiggins observed that "the incentive to evade liability has led to roughly a 20 percent increase in the number of small corporations in the U.S. economy."⁴ The number of small firms increased, according to Ringleb and Wiggins, because larger firms closed their hazardous processes, choosing instead to contract them out. Jay Barney and his colleagues found evidence that "firms are more likely to adopt non-vertically integrated production systems" in response to increasing liability from employee on-the-job exposure to hazardous materials.⁵ Similarly, the assignment of employer liability in the petrochemical industry has encouraged major firms to contract out for safety training and supervision of some employees. James Rebitzer found this outsourcing to be a common practice, even though major petrochemical firms are often in a better position to train and supervise their employees.⁶

⁴ Ringleb & Wiggins, *supra* note 3, at 589.

⁵ Barney *et al.*, *supra* note 3, at 328.

⁶ Rebitzer, *supra* note 3.

These empirical studies, along with familiar anecdotal accounts, have been used to both inform and bolster the conventional perspective on contracting out. However, these accounts merely illustrate a special case of a more general and well-known phenomenon—that is, firms often initiate efficiency-based organizational adjustments following changes in relevant legal institutions.

A more complete framework for understanding how firms respond to increases in liability requires the incorporation of important institutional considerations, such as vicarious liability. Vicarious liability, that is, liability for a “related” agent’s actions, is explicitly incorporated in the analysis here to expand upon the existing theory. Separately, Alan Sykes and Lewis Kornhauser first analyzed vicarious liability using principal-agent models.⁷ In their models, principals were liable for the actions of their agents, who may be judgment proof.⁸ John Summers, and later Steven Shavell, extended the analysis of judgment-proof agents, focusing on optimal care levels under the regimes of strict liability and negligence.⁹ T. Randolph Beard and others provided a second-wave analysis of optimal care levels for judgment-proof actors.¹⁰ These articles, however, did not explore the organizational consequences of vicarious liability for transactions that can be procured through markets or within the firm. As Oliver Williamson observed, there are often meaningful organizational effects that stem from differences in contracts pursued within a firm and contracts negotiated between independent firms.¹¹ This article merges legal institutional analysis with incentive considerations to explain organizational responses to liability. Section II lays out the article’s theoretical orientation using a simple model. Section III describes the organization of the crude oil shipping industry and the relevant legal regime. Section IV provides empirical support for the model, followed by a discussion in Section V and a brief conclusion.

⁷ Alan O. Sykes, *An Efficiency Analysis of Vicarious Liability under the Law of Agency*, 91 *Yale L. J.* 168 (1981); Lewis A. Kornhauser, *An Economic Analysis of the Choice between Enterprise and Personal Liability for Accidents*, 70 *Cal. L. Rev.* 1345 (1982).

⁸ Sykes (*supra* note 7) used the principal-agent model to analyze the existing rationale of vicarious liability with the “control test” and “inherently dangerous activity” exceptions. Kornhauser focused on the level of care generated with and without vicarious liability and examined the implications in private and public enterprises.

⁹ John S. Summers, *The Case of the Disappearing Defendant: An Economic Analysis*, 132 *U. Pa. L. Rev.* 145 (1983); Shavell, *supra* note 3. See also David Sappington, *Limited Liability Contracts between Principal and Agent*, 29 *J. Econ. Theory* 1 (1983) (presenting general conditions in which limited liability of an agent will lead the principal to offer contracts that induce socially inefficient behavior).

¹⁰ Beard, *supra* note 3; Ben Craig & Stuart E. Thiel, *Large Risks and the Decision to Incorporate*, 42 *J. Econ. & Bus.* 185 (1990); Lisa Lipowski Posey, *Limited Liability and Incentives When Firms Can Inflict Damages Greater than Net Worth*, 13 *Int’l Rev. L. & Econ.* 325 (1993).

¹¹ Oliver E. Williamson, *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting* (1985).

II. MODEL

This section uses a simple numerical example to demonstrate the indeterminacy of increases in liability on a firm's decision to contract out risky activities.¹² Imagine a risk-neutral owner-managed firm (the firm, i) engaged in an accident-prone regulated activity. The firm may itself undertake this activity, including the associated regulatory compliance, or it may pay to have it done by a second risk-neutral owner-managed firm (the supplier, j). Assume that there are only two unobservable compliance levels (low compliance, c_1 , and high compliance, c_2) and two states of nature (no accident, θ_1 , and accident, θ_2). Let $c_1 = 2$ and $c_2 = 10$; the probability of an accident given low compliance is $p(\theta = \theta_2 | c_1) = .02$, and the probability of an accident given high compliance is $p(\theta = \theta_2 | c_2) = .01$. The value of the activity, $V(\theta)$, is 100 in the no-accident state of the world and zero in the event of an accident. In the event of an accident, the fully observable damage is $l = 1,000$, which is assumed to be less than the firm's capitalization. The initial wealth of the supplier is taken to be 500. Therefore, in the event of an accident, the supplier will not be able to pay the full damages—that is, the supplier is judgment proof. To focus on the more basic aspects of contracting out versus vertical integration, we look to the organizational form that maximizes the joint expected profits of the firms.¹³ Let $\pi_i(\hat{c})$ represent the joint expected profits when firm i undertakes the activity with compliance level \hat{c} , and define $\pi_j(\hat{c})$ similarly.

No Vicarious Liability. When the firm undertakes the activity, the joint expected profits given low compliance effort are equal to the expected value of the activity¹⁴ minus the costs of compliance minus the expected liability of the activity:

$$\pi_i(c_1) = 98 - 2 - (.02)1,000 = 76,$$

¹² A more formal and general presentation of theoretical claims advanced here can be found in Richard R. W. Brooks, *Liability and the Boundaries of the Firm* (Working paper, Inst. Pol'y Res., Northwestern Univ. 2001).

¹³ For simplicity, the model assumes equal costs of internal and external monitoring (normalized at zero). Differential monitoring costs may be a salient factor in the comparison of contracting out and vertical integration. However, extensive consideration of this factor is beyond the scope of this article. Additionally, I found no empirical basis to support a claim that oil companies are better able to monitor their own shipping operations or, alternatively, the operations of independents. Furthermore, for ease of explication, the model does not consider asset ownership implications in terms of optimal noncompliance investments, asset misappropriation, and misuse. See Brooks, *supra* note 12; Oliver D. Hart, *Firms, Contracts, and Financial Structure* (1995).

¹⁴ The expected value of the activity is 99 when high compliance is taken and 98 when low compliance is taken.

and similarly, the joint expected profits from high compliance effort are equal to

$$\pi_i(c_2) = 99 - 10 - (.01)1,000 = 79.$$

Thus, if the firm undertakes the activity, it has incentive to undertake high compliance effort, with expected profits of 79. When the supplier undertakes the activity, the joint expected profits given low compliance effort are equal to¹⁵

$$\pi_j(c_1) = 98 - 2 - \frac{1}{2}(.02)1,000 = 86,$$

and joint expected profits from high compliance effort are equal to

$$\pi_j(c_2) = 99 - 10 - \frac{1}{2}(.01)1,000 = 84.$$

Thus, if the supplier undertakes the activity, it has incentive to undertake low compliance effort, with expected profits of 86. The firm will contract out the activity to the supplier. That is, since expected profits under the supplier's management are greater than under the firm's management, a Pareto-superior allocation (relative to the contracting parties only) can be reached assuming that information asymmetry and transaction costs do not prevent negotiation.¹⁶

Vicarious Liability. Let q be the probability that the firm is held liable for the remainder of the unpaid damages by the supplier in the event of an accident.¹⁷ If the firm undertakes the activity, the joint expected profits are the same as calculated above: 76 with low compliance and 79 with high compliance. However, now when the supplier undertakes the activity, the joint expected profits given low compliance effort are equal to the expected value of the activity minus the costs of compliance minus the expected

¹⁵ The 1/2 in these equations represents the approximate share of damages that the supplier would pay. The exact share (which we can label α , where $\alpha = (\text{wealth} - \text{compliance})/\text{damages}$) is .498 or .490 depending on chosen care level.

¹⁶ Note that the allocation is not truly Pareto superior because the externality imposed by the judgment-proof supplier must be borne by the victims of the accident.

¹⁷ Defining the firm's liability as the remainder unpaid of damages makes the example a little easier to work out, but it should be noted that other forms of liability (such as joint and several liability) may introduce distortions that are not so easily worked out. A small supplier's incentive to take efficient compliance may be reduced if it believes that plaintiffs (under a regime of joint and several liability) will pursue claims against the deep-pocketed firm. (Alan O. Sykes, "Bad Faith" Refusal to Settle by Liability Insurers: Some Implications of the Judgment-Proof Problem, 23 J. Legal Stud. 77 (1994); James Boyd & Daniel E. Ingberman, The Search for Deep Pockets: Is "Extended Liability" Expensive Liability? 13 J. L. Econ. & Org. 232 (1997).) Of course, even the "remainder" definition of liability may encourage the supplier to spend less on compliance, thereby increasing the amount for which the firm is ultimately liable.

liability of the supplier minus the expected contribution of the firm given vicarious liability q :

$$\pi_j(c_1) = 98 - 2 - \frac{1}{2}(.02)1,000 - q(.02)500 = 86 - 10q,$$

and joint expected profits from high compliance effort are

$$\pi_j(c_2) = 99 - 10 - \frac{1}{2}(.01)1,000 - q(.01)500 = 84 - 5q.$$

Thus, as long as $q \geq 2/5$, the firm wants the supplier to undertake high compliance effort. If the firm could observe the supplier's effort, then it would be optimal for the firm to contract out the activity and pay the supplier on the basis of observed effort. However, because the supplier's effort is unobservable, the firm must design a payment scheme that sufficiently rewards the supplier (in expectation) so that it will undertake the desired compliance effort.¹⁸ In order to induce the supplier to undertake the high effort, the firm cannot pay a fixed wage and thereby insure the supplier, since the supplier would then certainly undertake the low effort. Thus, the firm has to reward or punish (or both reward and punish) the supplier on the basis of some outcome correlated with compliance level, presumably accident status. However, the firm's ability to punish the supplier is restricted by the supplier's limited wealth, which brings us to rewards. The key question becomes, Is the difference in expected profit sufficient for the firm to offer the supplier a high enough wage in the no-accident state so that the supplier will undertake the high effort level? In this example, the answer is no. The firm cannot profitably offer the supplier an expected wage that induces high compliance, which is not to suggest that vertical integration will necessarily be chosen.¹⁹ As long as $q \leq 7/10$, it remains optimal for the firm to contract out, despite the supplier's low compliance effort.²⁰ From this follows the corollary that raising q lowers the incentive to contract out. In other words, increasing the probability that firms are held liable for the negligence of their contractual partners reduces the incentive to contract with judgment-proof suppliers.

Finally, consider how an increase in the level of liability affects the decision

¹⁸ There are situations where there is no incentive misalignment between the firm and the supplier. For example, if the cost of low compliance was 5 instead of 2, or when $q < 2/5$.

¹⁹ Recall that the joint profit is 79 when the firm undertakes the activity with high compliance. Whereas, the joint profit is at most 82 when the supplier undertakes the activity with high compliance—that is, $84 - 5q$, where $q \geq 2/5$. Thus, even if the firm gave the supplier the full surplus of 3 in the no-accident state, the supplier would still have incentive to undertake low compliance based on the likelihood of the no-accident state.

²⁰ The joint profit when the firm undertakes the activity with high compliance is lower than the joint profits when the supplier undertakes the activity with low compliance if $q < 7/10$ —that is, $79 < 86 - 10q$ implies $q < 7/10$.

to contract out. Let l increase from 1,000 to 2,000.²¹ When the firm undertakes the activity, the joint expected profits given low compliance effort are equal to

$$\pi_i(c_1) = 98 - 2 - (.02)2,000 = 56,$$

and similarly, the joint expected profits from high compliance effort are equal to

$$\pi_i(c_2) = 99 - 10 - (.01)2,000 = 69.$$

Thus, if the firm undertakes the activity, it has incentive to undertake high compliance effort, with expected profits of 69. When the supplier undertakes the activity, the joint expected profits given low compliance effort are equal to

$$\pi_j(c_1) = 98 - 2 - \frac{1}{4}(.02)2,000 - q(.02)1,500 = 86 - 30q,$$

and joint expected profits from high compliance effort are

$$\pi_j(c_2) = 99 - 10 - \frac{1}{4}(.01)2,000 - q(.01)1,500 = 84 - 15q.$$

Now, as long as $q \geq 2/15$, the firm wants the supplier to undertake high compliance effort. But, as in the previous example, the firm cannot provide the supplier with sufficient incentive to undertake high compliance. Thus, it is optimal for the firm to contract out to the supplier only so long as $q \leq 17/30$ and to undertake the activity itself otherwise.²² So the critical level of vicarious liability that allows for optimal contracting out (that is, beyond which contracting out is not profitable) has decreased from $q = 7/10$ to $q = 17/30$ when the level of liability increased from 1,000 to 2,000. Thus, for any fixed strictly positive level of vicarious liability (that is, $\bar{q} > 0$), an increase in the magnitude of liability alone leads to less contracting out.

III. LIABILITY AND ORGANIZATION OF THE U.S. OIL SHIPPING INDUSTRY

A. Industry Structure

Domestic crude oil (crude) transportation in the United States is conducted mainly through pipelines and waterborne shipments (see Table 5). Waterborne shipping of crude may be organized through a variety of contractual arrange-

²¹ This magnitude of increase is much smaller than the change in the federal liability limits for oil spills, which increased 40 times, from \$250,000 to \$10,000,000 in 1990. Note also that $\alpha \approx 1/4$, since low compliance by the supplier implies $\alpha = (500 - 2)/2,000 = .249$ and high compliance implies $\alpha = (500 - 10)/2,000 = .245$.

²² The joint profit when the firm undertakes the activity with high compliance is lower than the joint profits when the supplier undertakes the activity with low compliance if $q < 17/30$ —that is, $69 < 86 - 30q$ implies $q < 17/30$.

ments and generally involves three parties—the owner of the commodity (that is, cargo owner or shipper), the owner of the vessel, and the operator of the vessel.²³ These parties are sometimes collected into a single vertically integrated organization, and at other times, the parties must negotiate external contracts. These contracts (known as charters) are arranged through spot markets and long-term contracts of various lengths.²⁴ For most of the industry's existence, long-term charters and vertically integrated operations were the primary organizational mode of crude shipping.²⁵ However, by the mid-1970s, spot charters became dominant in response to organized trading markets for petroleum and changes in contractual practices between oil producers and refiners.²⁶ Refiners increasingly sought delivery of oil from independent tanker operators. Vertically integrated shipments fell by large amounts in the 1970s and 1980s.²⁷ In 1990, industry observers predicted an acceleration of this trend away from vertical integration as a consequence of newly enacted federal oil pollution legislation.

Federal regulation of oil pollution had been in place for most of the last century.²⁸ The federal rules provided for restrained and predictable oil shipping control by, in part, restricting an individual state's ability to regulate oil pollution liability laws.²⁹ However, the public outrage following the Exxon *Valdez* oil spill pushed Congress and the president to enact the Oil Pollution Act of 1990 (OPA 90),³⁰ which significantly changed U.S. oil spill liability and compensation policies. In addition to increasing the federal liability for

²³ A broker sometimes plays an essential role in bringing these parties together.

²⁴ Charters may involve the leasing of a ship with or without a crew (bareboat charters) or the hiring of a ship for a particular trip (voyage charters) or a particular time (time charters). Many other possibilities are available. See Stephen C. Pirrong, *Contracting Practices in Bulk Shipping Markets: A Transaction Cost Explanation*, in *Case Studies in Contracting and Organization* (Scott E. Masten ed. 1996).

²⁵ Jerome Thomas Bentley, *The Effects of Standard Oil's Vertical Integration into Transportation on the Structure and Performance of the American Petroleum Industry, 1872–1884* (1979).

²⁶ Pirrong, *supra* note 24, explains that as oil producers (under the auspices of OPEC) abandoned traditional long-term supply contracts with refiners, the need for refiners to have vessels tied to them waned. Oil refiners thus relied less on long-term charters and their own fleet to transport crude.

²⁷ “[R]efiner-owned tonnage has declined from approximately 35 percent of the total in 1972 to 15 percent today [1993]. . . . Forward chartering also became less prevalent during this period.” Pirrong, *supra* note 24, at 158.

²⁸ The Oil Pollution Act of 1924 allowed liability for oil spills involving negligence. Strict liability for spills has been in place since the early 1970s through various statutes: the Federal Water Pollution Control Act of 1972 (FWPCA), 33 U.S.C. § 1251 *et seq.*; the Trans-Alaska Pipeline Authorization Act of 1973 (TAPAA), 43 U.S.C. §§ 1651–55; the Deepwater Port Act of 1974, 33 U.S.C. §§ 1501–24; and the Outer Continental Shelf Lands Act Amendments of 1972 (OCSLA), 33 U.S.C. §§ 1331–74.

²⁹ To promote U.S. merchant shipping, Congress passed the Limitation of Liability Act of 1851 (46 U.S.C. § 183), which limited the liability for spills to the postaccident value of the vessel including cargo.

³⁰ 33 U.S.C. §§ 2701–61.

TABLE 1
STATE LIABILITY LAWS FOR OIL SPILLS

State ^a	Cleanup and Claim Liability	Natural Resource Damage Liability	Cargo-Owner Liability? ^b	State COFR? ^c
Alabama	Unlimited	Unlimited	No	No
Alaska	Unlimited	Unlimited	Yes	Yes
California	Unlimited	Unlimited	Yes	Yes
Connecticut	1.5 times the cleanup cost	Unlimited	No	No
Delaware	\$30 million	Unlimited	No	Yes
Florida	\$1,200/grt for cleanup	Unlimited	Yes	No
Georgia	Unlimited	Unlimited	No	No
Hawaii	Unlimited	Unlimited	Yes	No
Louisiana	\$1,200/grt for cleanup	Unlimited	No	No
Maine	Unlimited	Unlimited	No	No
Maryland	Unlimited	Unlimited	Yes	Yes
Massachusetts	Unlimited	Unlimited	No	No
Mississippi	Unlimited	Unlimited	No	No
New Hampshire	Unlimited	Unlimited	No	Yes
New Jersey	\$150/grt	\$150/grt	Yes	No
New York	\$1,200/grt up to \$10 million	Unlimited	Yes	No
North Carolina	Unlimited	Unlimited	Yes	No
Oregon	Unlimited	Unlimited	Yes	Yes
Rhode Island	Unlimited	Unlimited	No	Yes
South Carolina	Unlimited	Unlimited	No	No
Texas	\$660/grt	\$10 million	No	No
Virginia	\$500/grt up to \$10 million	\$500/grt up to \$10 million	No	Yes
Washington	Unlimited	Unlimited	Yes	Yes

SOURCES.—Petroleum Industry Research Foundation; Culter Information Corp., Oil Spill Intelligence Report, September 16, 1994, at 1-2; and U.S. Coast Guard.

NOTE.—grt = gross registered ton.

^a With the exception of Massachusetts, South Carolina, and Virginia, this column represents coastal states that amended their oil spill laws between 1989 and 1991. The Texas statute was enacted in 1991. The Great Lakes states of Indiana, Illinois, Michigan, Minnesota, Ohio, and Pennsylvania also have oil spill statutes that do not specify any limitations on liability.

^b The statutes of California, Delaware, Hawaii, North Carolina, Texas, and Virginia have language that indicates liability for charterers. Maine allows liability for licensees.

^c Certificates of Financial Responsibility (COFRs) are issued to shipowners and operators who possess a minimum level of insurance or financial wealth relative to the risks their activities impose.

owners and operators of vessels that sustain spills, OPA 90 expressly allows states to enact and maintain their own oil spill liability and compensation laws; all 23 coastal states have done so, 20 of which place no limits on corporate liability (see Table 1).³¹ Concerned by the prospect of unlimited

³¹ U.S. Coast Guard and Senate Committee on Environmental and Public Works, Oil Pollution Liability and Compensation Act of 1989, Senate Rep. No. 94, 101st Cong., 1st Sess., at 2-3.

corporate liability, oil tanker companies and industry lobby groups envisioned grave consequences for domestic oil transportation and gasoline prices.³² Beyond the effects on markets, industry advocates predicted that these tough laws would also have negative consequences for the environment—paradoxically leading to more oil spills. Oil spills would become more likely as large responsible companies, fearing excessive liability, would refuse to operate tankers in U.S. waters.

Most of the large oil companies reorganized the governance of their oil shipping operations following OPA 90. Four common types of reorganizations took place. First, many companies moved their U.S. shipping operations into separate subsidiary corporations,³³ subsidiaries often bearing names notably unrelated to the parent corporation.³⁴ Second, several large-scale divestitures of shipping interests occurred.³⁵ Third, charter terms were adjusted to shift liability.³⁶ For instance, delivery basis contracts (that is, contracts in which the purchaser of the oil acquires ownership only after it has been

³² INTERTANKO and the International Group of P&I Clubs warned Congress that shipowners would leave the U.S. oil transportation market (H. P. Drewry Shipping Consultants Ltd., *Shipping Stat. & Econ.*, December 1991, at 6). The oil industry's public warnings closely resembled those made by the automobile industry in the late 1960s and early 1970; automobile industry representatives warned that passage of the 1970 Clean Air Act Amendments "could prevent the continued production of automobiles [and] do irreparable damage to the American economy." Robert V. Percival *et al.*, *Environmental Regulation: Law, Science, and Policy* 854 (1996).

³³ See generally Janet Plume, 1990 Law Transforms Oil Barge Industry: Companies Sell Off Units to Avoid Risk, *J. Com.*, August 19, 1991, at 1A; Janet Porter, IMO to Discuss Ways to Circumvent US Stance on Oil Compensation Fund, *J. Com.*, November 4, 1992, at 8B. Even major shipping companies, such as I. M. Skaugen AS, have heeded their lawyers' advice to legally separate their high-risk U.S. activities from the rest of the corporation. Janet Porter, Skaugen Plans to Spin Off US Subsidiary, *J. Com.*, August 13, 1991, at 8B.

³⁴ Exxon USA, which previously conducted its shipping through Exxon Shipping, now conducts its shipping activities through its wholly owned subsidiary Sea-River Inc. See *Directory of Corporate Affiliations, U.S. and International Public and Private Companies: Who Owns Whom (1981-97)*; Dun & Bradstreet, Inc., *America's Corporate Families, The Billion Dollar Directory (1981-97)*. Exxon cited OPA 90 as one reason for the change of name but maintained that the change was not an attempt to avoid legal liability (H. P. Drewry Shipping Consultants Ltd., *Shipping Stat. & Econ.*, April 1993, at 46). Texaco also removed the corporate namesake from its fleet of 31 tankers following the enactment of OPA 90 (H. P. Drewry Shipping Consultants Ltd., *Shipping Stat. & Econ.*, July 1990, at 6).

³⁵ For example, Ashland Oil Company (Ashland) sold its Great Lakes tanker operations in 1991 because of the changes in the law (see Plume, *supra* note 33). Marathon Oil also sold its Great Lakes Fleet and several other shipping interests in the early 1990s (*Directory of Corporate Affiliations, supra* note 34; Dun & Bradstreet, Inc., *supra* note 34). Amoco too withdrew from the tanker market business following the passage of the new oil spill regulations. Alan Abrams, A Cloud of Doubt Envelops Tanker Officials, *J. Com.*, June 20, 1994, at 8B.

³⁶ In April 1990, the International Group of P&I Clubs advised tanker owners that oil companies were attempting to adjust certain contractual terms in order to transfer liability to independent vessel owners (H. P. Drewry Shipping Consultants Ltd., *Shipping Stat. & Econ.*, May 1990, at 6).

delivered) have become less common.³⁷ Fourth, major oil companies adjusted their use of independent crude carriers.³⁸ The issue for these companies is whether the benefits of contracting out outweigh the costs.³⁹ Key factors in determining this trade-off are the magnitude of liability and the likelihood of being held vicariously liable, factors that require some institutional consideration.

B. *Legal and Economic Institutional Matters*

The presumed desirability of contracting out in this setting rests primarily on the notion that firms can partition the liability-generating activity from the corporate entity; that is, major oil companies can limit their legal liability and reputational harm by contracting out to independent judgment-proof shippers with limited wealth and reputations to risk. However, as demonstrated in the model, the presence of vicarious liability (legal or reputational) for the actions of independent operators may discourage firms from contracting out.

For several reasons, liability in this context is not as easily shifted as some commentators suggested. First, legislators from coastal states, aware of judgment-proofing strategies, engaged in patchwork attempts to fill statutory and common-law gaps in liability assignment. For example, the federal oil spill statute holds vessel owners and operators, but not cargo owners, liable

³⁷ Elf Aquitaine, a large French oil company, stopped selling oil on a delivery basis in response to the liability claims allowed under OPA 90. Sullivan, *supra* note 2.

³⁸ Some shipowners changed their operators in order to take advantage of a loophole in the phase-in schedule of the certificate of financial responsibility (COFR) requirement under OPA 90. The COFR phase-in schedule allows an operator with a COFR issued prior to OPA 90 to continue to operate under that COFR until it expires—up to 3 years. However, a change in the operator of a ship allowed the shipowner to file a new application under the old requirements for an additional 3 years. This strategy caught the U.S. Coast Guard by surprise. In a normal month, there were about 124 new applications filed. In October of 1994 there were 167 applications, in November there were 276, and in December there were 615. “The number of vessels involved was actually much greater than these figures reflect as an entire fleet could come under a single application.” Joel Glass, Shipowners Exploit Legal COFR Loophole, *Lloyd’s List I* (1995).

³⁹ Major firms may increase their tanker operations as a means of quality control. ARCO cited the benefits of owner control when it announced that it would carry all of its own oil. Petroleum Industry Research Foundation (PIRINC), *Transporting U.S. Oil Imports: The Impact of Oil Spill Legislation on the Tanker Market 65* (report prepared for the U.S. Dep’t Energy (under contract DE-FG01-91PE79095) to the U.S. Dep’t Energy’s Office of Domestic and International Energy Policy, June 1992). Chevron, too, felt that the best way to minimize the risk of liability from an oil spill was to manage its transportation itself rather than rely excessively on outside sources (interview with senior Chevron Shipping representative, August 1, 1997).

for spills.⁴⁰ States, such as Florida (see Table 1), responded to this gap by amending their laws to extend liability to cargo owners.⁴¹ Of course, a firm could carry the shipping transaction one step further, by actually selling the oil to a judgment-proof carrier and repurchasing it after delivery.⁴² This strategy too, however, is constrained by legislation.⁴³ Further, the costs associated with transferring ownership twice make this strategy less desirable. Additionally, there are common-law restraints on partitioning liability. The common law in the United States has generally held firms liable for the work-related negligence of their employees or agents under the doctrine of *respondeat superior*.⁴⁴ Although contracting firms are typically not liable for the negligence of independent contractors,⁴⁵ there are conditions under which liability will attach. For example, firms may be held vicariously liable if (1) the contract involves inherently dangerous activities, (2) the firm retains control over the activity, or (3) the contractor is incompetent. The “inherently

⁴⁰ Furthermore, at common law, the rule concerning common carriers is that the shipper (that is, owner) of the commodity is not liable for damages caused by the commodity while it is being transported. Exceptions to the rule applied when the shipper failed to use reasonable care in preparing the commodity for transportation or failed to inform the carrier of the potentially dangerous character of the commodity. See generally Restatement (Second) of Torts § 392 (1965); and specifically with respect to ocean transportation, see The Carriage of Goods by Sea Act of 1936 (COGSA), 46 U.S.C.A. § 1304 (2)(i), (m), (n), (o), and (p). At common law (and later under COGSA §§ 1300–1315), it was considered against public policy for the owner of the commodity to bear the liability for damage caused by the commodity during transport by the carrier. See Thomas J. Schoenbaum, *Admiralty and Maritime Law* (1994); and Grant Gilmore & Charles L. Black, Jr., *The Law of Admiralty* (2d ed. 1975).

⁴¹ “The owner of a pollutant transported as cargo on any vessel . . . is liable for all cleanup costs . . . not paid for by the owner or operator of the vessel.” West’s Florida Statutes Annotated § 376.12(10) (1997). The cargo owner, however, is not liable if the vessel owner or operator is in compliance with state financial security requirements.

⁴² Indeed, the *Wall Street Journal*, July 26, 1990, at B1, reported that U.S. refiners were being canvassed by at least one entrepreneur willing “to run the liability risk for them, [by] buying their oil and holding possession of it until it reaches their refineries,” for the nominal charge of 10 cents a barrel.

⁴³ For example, the court in *State of New York v. Montayne*, 199 A.D.2d 674, 604 N.Y.S.2d 978 (1993), held that under New York’s Navigation Law, McKinney’s Navigation Law § 181, a broker in an oil sale could be held strictly liable for cleanup of an oil spill by virtue of its contractual relationship with the shipper “and its responsibility for selecting the manner and means of delivery.” The defendant’s claim that liability cannot attach because it neither owned nor delivered the oil when the spill occurred was flatly rejected by the court, which stated “that liability under the statute does not depend on title.” The court continued, “We cannot accept [the defendant’s] argument since it creates *opportunities for avoidance* that would lead to an evisceration of the statute” (emphasis added). The court has demonstrated unrelenting commitment to the plain meaning of the statute, to the point of imposing “liability upon firefighters who allegedly damaged an above-ground petroleum storage tank *while fighting a fire*” (*Nicol v. Jenkins Fire Co.*, 192 A.D.2d 164, N.Y.S.2d 519) (emphasis added).

⁴⁴ See Restatement (Second) of Agency § 219 (1958).

⁴⁵ See Restatement (Second) of Torts §§ 409–29. This exception has been largely justified on the belief that the independent contractor is in a better position (than the employing firm) to minimize and spread the costs of work-related risks. Page Keeton *et al.*, *Tort and Accident Law* (1989).

dangerous activity” condition is unlikely to apply for oil shipping.⁴⁶ However, condition 2, relating to control, has been used to “pierce the corporate veil” for accidents involving oil spills.⁴⁷ Condition 3—liability based on the incompetence of the contractor—may also apply for grossly incompetent carriers (although firms wishing to retain their assets would presumably avoid such carriers). There is, however, an alternative incompetence claim that may apply in this setting. The Third Circuit briefly expanded the notion of incompetence to include financially undercapitalized contractors.⁴⁸ The court later reversed its financial undercapitalization ruling, arguing that the state was not prepared for such an expansion of liability.⁴⁹ However, if courts interpret the recent state legislative efforts to expand oil pollution liability as an indication of states’ intent to preclude the use of judgment-proof independents, then vicarious liability based on undercapitalization may again become an actionable claim. Finally, even if a firm can avoid legal liability, “market liability” provides another obstacle to the effective use of judgment-proof agents. A firm’s reputation may be placed in jeopardy if it is known to be the original or eventual owner of oil that spills in transit.⁵⁰ Reputations

⁴⁶ Attempts to hold firms liable for the negligence of independent contractors based on a theory of nondelegable duty given the hazardous nature of petroleum transportation have been unsuccessful (see, for example, *Jackson v. Standard Oil Co. of California*, 8 Wash. App. 83, 505 P.2d 139 (1972)). The case law generally finds that the transportation of petroleum products neither is an ultrahazardous activity nor poses unusually high risks when customary safety protocols are followed (see *Collins v. Liquid Transporters*, 262 S.W.2d 382 (1953)).

⁴⁷ The court in *Jackson* (505 P.2d at 139) held that the plaintiff established (*prima facie*) that Standard Oil controlled the training of the independent contractors and therefore could be held liable for their negligently tortious conduct. Support for this *prima facie* case against Standard Oil was based, in large part, on the fact that Standard Oil gave the independent contractor operating safety manuals. Following the *Valdez* spill, Exxon Corporation was deemed criminally liable for the conduct of its subsidiary (Exxon Shipping) on the basis of the theory that Exxon Corporation controlled Exxon Shipping. Although Exxon Shipping was a subsidiary of Exxon Corporation, the court made it clear that the control theory is also applicable to independent contractors. The government’s case against Exxon Corporation was also based on an enterprise theory of liability. That is, the transportation activities of Exxon Shipping and the exploration, extraction, refining, wholesale and retail activities of Exxon Corporation were all part of the same enterprise, and as such liability should accrue to the whole enterprise.

⁴⁸ See *Becker v. Interstate Properties*, 569 F.2d 1203 (3d Cir. 1977), cert. denied, 436 U.S. 906, 98 S. Ct. 2237, 56 L. Ed. 2d 404 (1978). The New Jersey Supreme Court in *Majestic Realty Associates, Inc. v. Toti Contracting Co.*, 30 N.J. 425, 153 A.2d 321 (1959), suggested that distributive justice may warrant inclusion of insufficiently capitalized contractors under the “incompetent contractor” exception to employer nonliability for third-party losses. Following the *Majestic* opinion, the Third Circuit, in *Becker v. Interstate Properties*, held that an employer of a judgment-proof independent contractor may be held liable for the tortious negligent conduct of the contractor on a theory of insufficient capitalization. The *Becker* court based its ruling on perceived doctrinal trends of the state in the light of the *Majestic* dictum.

⁴⁹ See *Robinson v. Jiffy Executive Limousine Co.*, 4 F.3d 237 (3d Cir. 1993).

⁵⁰ To illustrate the importance of reputation, note that Exxon has spent \$2 billion to “protect its corporate image” in the wake of its *Valdez* accident, according to the insurer Lloyd’s of London. This expenditure is the source of some controversy, since Exxon has sued Lloyd’s and other insurers to recover some of its costs. (See *Youell v. Exxon Corp.*, 74 F.3d 373 (2d Cir. 1996).) The insurers contend that Exxon did not have a legal duty to spend as much as

matter here. Large firms often overcomply with regulations, spending millions of dollars on self-promotional ventures to improve their image with consumers and regulators.⁵¹ Major firms are also keenly aware of their environmental standing among investors.⁵² Thus, those oil companies that continued to use independent operators put in place elaborate and costly systems of monitoring and inspecting the vessels used to transport their oil.⁵³ In summary, the U.S. petroleum transportation industry is overlaid with institutional constraints on transferring liability. There has always been a nontrivial chance that major oil companies would be held responsible for the negligence of their independent carriers, whether by law or the market. The expected costs of this responsibility increased significantly when OPA 90 allowed for unlimited liability. Given these costs, one ought not expect significant increases in contracting out to judgment-proof carriers, unless they offer advantages that go beyond externalizing liability.⁵⁴ There is, however, no strong evidence that indicates that independent operators possess any advantages over the major oil companies in this respect.

IV. EMPIRICAL EVIDENCE

To examine how major oil companies responded to the increases in oil spill liability, I present in this section data on U.S. domestic petroleum shipping around the passage of OPA 90.⁵⁵ The issue this analysis seeks to resolve

it did for cleanups, and “[v]oluntary cleanup is not covered under the insuring agreements at issue.” Culter Information Corp., Oil Spill Intelligence Report, September 16, 1994, at 1–2.

⁵¹ These strategies are particularly salient in highly regulated industries, since consistent violators of regulations experience greater regulatory oversight and receive larger fines than firms that are generally in compliance. In addition to implicit leniency for complying firms, government programs have been implemented to reward firms that avoid violations, such as the Occupational Safety and Health Administration’s Star Program (which limits inspections for firms that meet stated criteria for 4 consecutive years) and the Environmental Protection Agency’s (EPA’s) Environmental Leader Program (which rewards companies that are consistently in compliance with less rigorous enforcement and less red tape).

⁵² Companies named as high-level polluters in the EPA’s annual Toxic Release Inventory (TRI) experience a statistically significant decline in their stock price (J. T. Hamilton, Pollution as News: Media and Stock Market Reactions to the Toxic Release Inventory Data, 28 J. Envtl. Econ. & Mgmt. 98 (1995)). S. G. Badrinath and Paul J. Bolster have also identified a “market penalty” for violators of air pollution regulation by showing a significant fall in market value of the firms involved in EPA civil actions (S. G. Badrinath & Paul J. Bolster, The Role of Market Forces in EPA Enforcement Activity, 10 J. Reg. Econ. 165 (1996)).

⁵³ PIRINC, *supra* note 39, at ES-2.

⁵⁴ For example, a willingness to contract out to independent operators could, in theory, be motivated by the superior capabilities of these operators or scale economies of firms that specialize in shipping. However, any oil company can realize these scale economies by shipping for itself and other companies; in fact, prior to the passage of OPA 90, oil companies regularly transported oil for competing firms (see Plume, *supra* note 33), suggesting that fear of being held up by rivals did not prohibit such transactions.

⁵⁵ One would expect firms to respond promptly, if at all, to such radical changes in their exposure to liability. However, the analysis considers the time period from 1982 to 1996 to account for anticipatory and lagged responses to changes in the legal rules.

is whether major oil companies have increased their use of independent tanker operators following the stringent oil spill legislation of 1990. If contracting out has been a salient response to the heightened levels of liability, then the trend of the 1970s and 1980s toward the chartering of independent tanker operators should be reinforced or at least remain unchanged. Otherwise, if the trend of chartering independents stopped or reversed itself following the new laws, then we can conclude that widespread contracting out to externalize liability costs was not the predominant response.⁵⁶ Of course, an observed change in domestic crude shipping patterns might be explained by factors other than expanded liability for spills. Likely factors might include substitution among other modes of crude oil transportation (for example, pipelines and railways) or independent structural changes unique to U.S. crude shipping patterns. In order to account for these factors, the analysis first considers data on other modes of transporting of crude. Additionally, the analysis looks at data on the shipping patterns of noncrude petroleum products (petroleum products), such as gasoline and residual fuels. Contrasting crude oil shipping with the shipping of petroleum products (as opposed to coal, wheat, or other bulk commodities) focuses attention on the responses of firms affected by the recent oil spill laws.⁵⁷ Focusing on these firms permits identification of general changes in bulk petroleum shipping practices as opposed to responses uniquely related to crude. Since the expected liability for spills involving petroleum products also increased under OPA 90, we should observe that those markets respond in a fashion similar to that of the crude shipping market. Although similar, the response in the products market may be more muted and less immediate because the expected liability for spilled petroleum products remained lower than for spills involving crude.⁵⁸ Finally, the analysis presents data on crude domestic tanker movements for the major oil companies in the United Kingdom. Domestic shipping data from the United Kingdom provide a nice point of comparison, since the United Kingdom did

⁵⁶ This article maintains that such a response was unlikely because agency costs and vicarious liability for spills rendered it prohibitively costly. In particular, given the possibility of being held vicariously liable and the significant increases in the magnitude of fines for spills, the major oil companies should have been reluctant to entrust undercapitalized independent operators with the shipping of their oil. Therefore, we predict a change from the 1970s' and 1980s' pattern of U.S. crude oil shipping.

⁵⁷ Those firms involved in the shipping of crude are also largely involved in shipping petroleum products.

⁵⁸ Predicting the costs associated with an oil spill is a difficult task, involving hard-to-foresee considerations such as ocean currents, wind patterns, and location of the spill (Dagmar Schmidt Etkin, *The Financial Costs of Oil Spills* (1994)). Still, one may reasonably assume that the shipping of petroleum products generally involves less liability than the shipping of crude. Spills of lighter refined products, such as gasoline, will evaporate and naturally disperse much faster than crude, leaving considerably less to clean up. Other products, such as asphalt, pose a low probability of spills in great quantities or high cleanup costs. Thus, because of the lower levels of liability for natural resource damage and cleanup costs, one might expect that the recent oil spill laws would have an impact in the markets for shipping products that is less stark than in markets for shipping crude.

not experience the extreme regulatory upheaval and expansion of liability for oil shipping that the United States did in 1990.

A. *Data Description and Sources*

The U.S. domestic petroleum shipping data for the major oil companies were obtained from the Waterborne Commerce Statistics Center of the Army Corps of Engineers (Waterborne Commerce).⁵⁹ Waterborne Commerce maintains operator records by vessel type (tanker, barge, and so on), cargo type (crude petroleum, gasoline, residual fuels, and so on), and traffic type (coastwise, lakewise, internal, and so on). Aggregate-level data are readily available; however, firm-specific data are privileged and unavailable.⁶⁰ In order to obtain more detailed information without violating the confidentiality restrictions, Waterborne Commerce extracted data on a subgroup of firms. This subgroup, which is here labeled as the “majors,”⁶¹ consists roughly of the 20 largest oil companies operating in the United States around the time of the regulatory changes. The selection of the majors was based on various annual rankings, particularly total revenue.⁶² Although the primary basis for inclusion among the majors was total revenue,⁶³ some adjustments were made to keep the list consistent over the years. (See Appendix Table A1 for more

⁵⁹ Several independent selection criteria were used to generate the data. A multiple-selection criteria was employed to assure consistency of the data and mitigate against data-processing errors.

⁶⁰ The Navigation Data Center of U.S. Army Corps of Engineers is responsible for the federal water transportation statistical programs, which includes waterborne commerce statistics. The Waterborne Commerce Statistics Center, located in New Orleans, Louisiana, publishes data on vessel operators of record derived from ENG Forms 3925, 3925B, and 3925P. These forms must be “completed and filed by vessel operating companies each month for all voyages or vessel movements completed during the month.” (Navigation and Dredging Operations and Maintenance Guidance and Procedures, Pamphlet No. 1130-2-520, Department of the Army, U.S. Army Corps of Engineers, ch. 5, at 4 (1996).) Information on these forms includes vessel and operator data as well as the type and characteristics of principal commodity transported. Given the proprietary nature of this information, the U.S. Army Corps of Engineers will release operator data only at a level of aggregation sufficient to protect the individual identity of vessel operators and other relevant parties.

⁶¹ This usage is not to be confused with the majors used to refer to the then six largest petroleum interests (British Petroleum, Chevron, Exxon, Mobil, Royal Dutch/Shell, and Texaco). The majors of this article include those six firms as well as other large petroleum interests.

⁶² There were several sources for these rankings: Oil & Gas Journal, OGJ Report, Oil & Gas Journal Data Book (1984–97); Ward’s Business Directory, Companies Ranked by Sales within 4-Digit SIC, in Ward’s Business Directory of Public and Private Companies (1983–97); National Petroleum News, Market Facts, 89 Nat’l Petroleum News 18 (1997); American Petroleum Institute, Selected Oil/Energy Companies in the United States (1997).

⁶³ The majors consistently earned between 80 and 90 percent of the revenues of the industry. The share of revenues varies slightly over the years of the study depending on how the industry group was defined. The main sources for defining the relevant industry were reports produced by Oil & Gas Journal (*supra* note 62) and Ward’s Business Directory (*supra* note 62).

detail on the top revenue-generating oil firms for the years of the study.)⁶⁴ After determining a consistent set of the major oil companies, their shipping affiliates and subsidiaries were identified and included among the majors.⁶⁵

While Waterborne Commerce provided information on the operators of domestic petroleum shipping, the Maritime Administration (MARAD) and the U.S. Coast Guard provided data on the ownership of the U.S. tanker fleet legally able to engage in domestic crude oil transportation. Several other sources were supplemented with trade journals to determine the U.S. tanker fleet size and associated ownership information. The primary figures and owner information come from the MARAD's Office of Statistical and Economic Analysis. To fill in gaps of the MARAD data (as well as to confirm their accuracy) vessel inventory data were acquired from the U.S. Coast Guard.⁶⁶ A third source, Fairplay Information Systems's *World Shipping Year*

⁶⁴ For example, Sun Oil was ranked highly among the top 20 oil companies in terms of revenue for many years of the study. It is not included in the sample because in the late 1980s it was "broken up," changed the name of its domestic upstream component to Oryx Energy Company, and thereafter was not among the top revenue-generating firms. Tenneco was also excluded from the list because its assets were sold off to various companies (but not to companies included in the final list), and these assets were difficult to track. On the other hand, firms such as Gulf Oil and Getty Oil were included in the list even though they were acquired in 1984. They were included because their assets remained together, were easily traceable, and went to other oil companies that are consistently in the top 10 revenue-generating firms. The oil companies that were included in the final lists are Amerada Hess, Amoco, ARCO, Ashland Oil, BP USA, Chevron, Coastal, Conoco, Enron, Exxon, Getty, Gulf, Kerr-McGee, Marathon, Mobil, Occidental Petroleum, Phillips Petroleum, Shell/Royal Dutch, Texaco, and Unocal. The names of many of these firms have changed over the years of the study. Finally, the list of majors was expanded to include the American Tanker, Overseas Shipping Group, and Keystone so as to capture BP America's role in shipping. Since BP America has a foreign parent, it was restricted from directly engaging in U.S. domestic shipping under the Jones Act. Inclusion of these operators neither significantly nor qualitatively altered the reported results.

⁶⁵ The data on subsidiaries and affiliates were derived from Directory of Corporate Affiliations (*supra* note 34) and Dun & Bradstreet, Inc. (*supra* note 34). Those subsidiaries and affiliates that listed water transportation (Standard Industrial Classification 44) among their principal activities were added to the list of majors.

⁶⁶ Through various database files, the Coast Guard maintains records on all U.S.-flagged vessels and foreign-flagged vessels of 16,000 gross tons or greater to enter U.S. waters since 1984. The primary file utilized was the Vessel Identification Table (VIDT), which contains 414,930 observations, each representing a unique vessel entry. The relevant variables in this table are the vessel names, the flag of the vessel, the type of vessel (in 15 categories including tankers, tank barges, oil recovery, recreational, research vessels, tug boats, and fishing boats), and the use of the vessel (in 43 categories from crude carriers to prison barges). Importantly, the VIDT file also contains a unique vessel identification (vkey) variable for each observation. The vkey allows one to merge the vessel information table with a database of vessel owners (the Party Identification Table, PIDT), each with a unique party identification (pkey). The PIDT contains 209,828 unique vessel owners. The two files were first merged into a single database using the Vessel Responsible Parties Table (VRPT), which links the party and its role (for example, owner, operator, and so forth) using the pkeys from the PIDT files to particular vessels using the vkeys from the VIDT file. The next step was to limit the merged database by focusing only on vessel types capable of transporting petroleum (for example, tank barges, tankers, and other commercial vessels) and appropriate-use types (for example, crude carriers, combination carriers, and bulk oil and products carriers). This generated a trimmed-down database with 8,156 observations representing 4,809 unique company names. Most of these companies owned

Books (1988–97), was used as an additional check. The three sources were highly consistent, and the few minor inconsistencies were resolved straightforwardly.⁶⁷ The Association of Oil Pipelines provided the figures on the various modes of U.S. domestic crude oil transportation. Data on domestic crude oil shipping in the United Kingdom were obtained from Lloyd's of London Maritime Information Service (Lloyd's). Lloyd's maintains records on U.K. crude oil tanker movements for vessels of 10,000 deadweight tons (DWT) or greater from 1987 to the present. Finally, figures on tanker operating costs and freight rates were taken from the MARAD's Office of Costs and Rates.

B. Results

Table 2 presents a summary of the data on domestic waterborne movements of crude petroleum from 1982 to 1996. The total (in millions of tons) is shown—followed by the amount and percentage operated by the majors, which is shown in Figure 1. Looking at Figure 1, we note the sharp increase in the percentage carried by the majors beginning in 1990.⁶⁸ The majors also made large absolute increases in their U.S. operations, which can be seen in Table 2.⁶⁹ These results stand in clear opposition to the predictions of di-

very few vessels—for example, by restricting the sample to unique company names that own three or more vessels, we get 5,629 observations representing 557 different companies. The next step was to restrict the sample to tankers only (leaving 2,921 observations) and then taking only those tankers that are U.S. flagged (leaving 330 observations). Finally, by removing all U.S. government tankers (for example, U.S. Department of Transportation, U.S. Navy, and Department of Interior), we are left with a sample of 296 observations. This final database turned out to be slightly larger than the MARAD databases because it includes some historical information.

⁶⁷ In cases of inconsistencies related to the tonnage capacity reported, I used the first deadweight tonnage numbers provided by MARAD. There were limited cases of inconsistencies in the owner information. For example, one source may have listed a bank or financial institution as the owner, while another listed a major oil company or independent shipping company as the owner. There were only a few cases of one source listing a major oil company as the owner while another listed an independent shipper as the owner. Such conflicts existed largely because one source was slower than the other to recognize that the vessel had been transferred from one owner to another.

⁶⁸ As a check on the consistency of this data, the 20 largest operators in 1990 (in terms of tonnage) were first identified. Then using this list of operators, the amount shipped by these 20 in 1989 and 1990 were compared. This comparison allows one to observe how the largest operators in 1990 behaved prior to the change in OPA 90. If the majors significantly increased their operations in response to OPA 90, then we might expect that the 1990 large operators (as a group) should have moved considerably less crude in 1989. Results of the comparison confirm this expectation: the 1990 large operators moved 76 percent of the domestic tanker and tank barges crude in 1990; the previous year, this same set of operators moved only 38 percent. Additional checks, using varying lists of the top 20 oil companies (according to revenue), produced similar findings.

⁶⁹ As would be expected, Table 2 also indicates that the overall level of domestic water transportation of crude has fallen due, in part, to the liability-driven increase in the price of shipping. This increase manifested itself mainly through higher insurance premia and increased capital requirements to build safer double-hulled vessels. Section V elaborates on this point.

TABLE 2
U.S. DOMESTIC CRUDE PETROLEUM WATERBORNE SHIPMENTS

Year	Total Shipments	Amount by Majors	Percentage by Majors
1982	178.4	48.7	27.3
1983	187.0	52.0	27.8
1984	180.8	50.5	27.9
1985	194.6	55.1	28.3
1986	196.2	53.4	27.2
1987	203.1	58.7	28.9
1988	199.2	55.5	27.9
1989	181.8	52.4	28.8
1990	176.2	109.5	62.2
1991	171.2	110.3	64.4
1992	162.8	109.1	67.0
1993	147.5	99.4	67.4
1994	144.1	97.1	67.4
1995	133.2	88.7	66.6
1996	128.1	85.5	66.7

NOTE.—Amounts are in millions of tons (tonnage figures are short tons—that is, 2,000 pounds).

vestiture by the major oil companies. Namely, instead of witnessing more contracting out to smaller less-capitalized operators to avoid liability, we see that the majors significantly increased their U.S. domestic vertically integrated crude shipping operations following OPA 90. The Petroleum Industry Research Foundation (PIRINC) presented a similar observation in a 1992 report on the impact of OPA 90 on U.S. oil imports.⁷⁰ This report employed quantitative data on fleet composition, trades, and vessel movements (largely supplied by Lloyd's Maritime System) and more qualitative interviews with oil companies, shipowners, charterers, insurance companies, and others. The report concluded, "Corporate restructuring to limit the assets at risk continues, but the early signs of a flight to quality provides a stark contrast to the fears of many OPA critics who forecast that U.S. oil imports would be carried in inferior ships, by uncaring owners, for unscrupulous charterers. *The exact opposite is occurring.*"⁷¹

In addition, data on the bulk shipping of certain noncrude petroleum products are considered in order to focus attention on the responses of operators

⁷⁰ PIRINC, *supra* note 39.

⁷¹ *Id.* at ES-2 (emphasis added). "Most of the large oil companies have recommitted themselves to the U.S. trades, and focus their efforts on control of the tonnage they use, either by ownership or by extensive inspection programs for chartered vessels and establishment of much closer links with independent shipowners." *Id.* While the PIRINC report reached the same conclusions as this article, the data are quite distinct. The PIRINC data are based on profiles of vessels calling on U.S. ports from 1989 to 1991. That is, these data reflect the number of vessels calling on U.S. ports—not cargo volume. Identifying the increases in cargo volume moved by the majors is one distinct advantage of the results in this article.

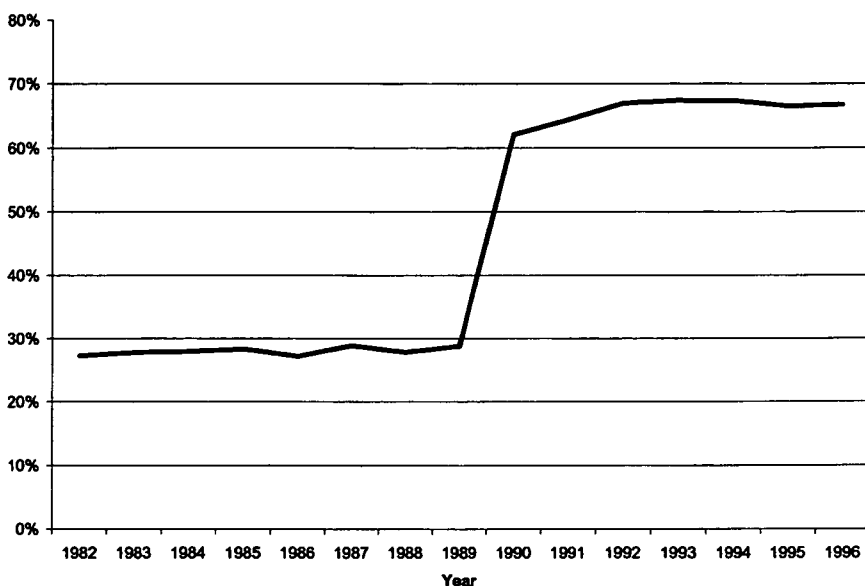


FIGURE 1.—Percentage of total tonnage for U.S. domestic waterborne crude petroleum shipped by selected major oil companies, 1982–96.

affected by the recent oil spill laws. Figure 2 shows the percentage of domestic waterborne shipments on all vessels by the majors for gasoline, residual fuels, asphalt, and distillate fuel oil. As with the changes in crude shipments shown in Figure 1, one can clearly observe that the majors moved significantly more gasoline and distillate fuel oil shipments following the passage of OPA 90. There were also significant changes in asphalt and residual fuels (residuals) shipments by the majors.⁷²

⁷² Comparing the mean quantities and percentages operated by the majors pre- and post-OPA 90 (using two-sample *t*-tests both with pooled and unequal variances), we observe significant differences in means at the .01 level for all commodities except asphalt, which is significant at the .05 level. These results are consistent with a model that predicts stronger responses as the expected accident costs associated with the commodity rise. The expected accident costs of shipping crude are likely to be greater than the expected accident costs of shipping gasoline, residual fuels, asphalt, and distillate fuel oils (see note 59 *infra*). Gasoline, being a “nonpersistent oil,” will evaporate to a great extent following a spill. This evaporation implies lower cleanup costs and less natural resource damages than with similar crude oil spills. Residuals and asphalt are “persistent oils” like crude; however, the expected accident costs associated with these commodities are generally lower because they are transported mainly by tank barges. Tank barges impose a lower accident risk than tankers because they (1) typically travel at half the speed of tankers, (2) are smaller than tankers with many segregated compartments to limit the release of oil during a hull rupture, and (3) make better use of hydrostatic balancing to minimize cargo loss during a hull rupture (PIRINC, *supra* note 39). It is therefore not surprising to see the strongest and most immediate response with respect to crude and more muted though still significant responses with respect to residual fuels and asphalt.

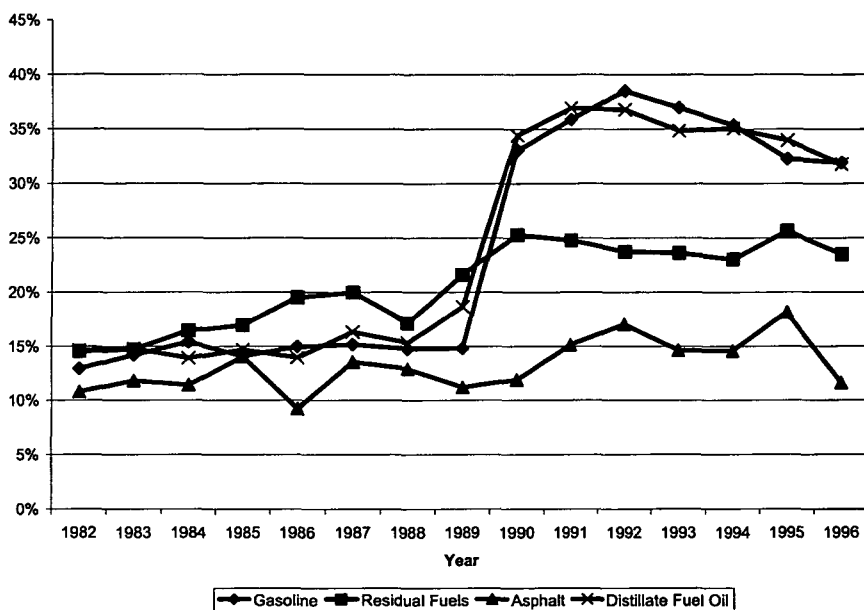


FIGURE 2.—Percentage of total tonnage for U.S. domestic waterbound petroleum products shipped by selected major oil companies, 1982–96.

In addition to the volume of crude moved by the majors, data on tanker ownership tend to confirm the notion that the majors took an increasingly larger share of the tanker market following OPA 90. While independent operators' ownership of worldwide tanker supply continued to increase post-OPA 90,⁷³ in the United States it was the majors who increased ownership of tanker supply. Table 3 reports the deadweight capacity of all U.S. registered oceangoing privately owned merchant tankers of 1,000 gross tons or greater. As the table indicates, from 1990 to 1996, the major's share of the tanker deadweight capacity increased from 30 to 42 percent, reflecting a 40 percent increase in capacity share.⁷⁴ There was practically no change in the percentage of tonnage owned by the majors from 1989 to 1991, which

⁷³ In 1992, 58 percent of the world tanker supply was owned by independent operators, who by 1997 owned 76 percent of the world tanker fleet. In 1977, the majors owned 20 percent of the world tanker supply—this figure fell to 13 percent in 1989, 11 percent in 1992, and 9 percent in 1997. (See INTERTANKO, Fact Sheet (1997); and PIRINC, *supra* note 39.)

⁷⁴ It is important to note that overall reductions in domestic crude traffic (particularly from Alaska) have led to a general decrease in capacity over these years, for both the majors and independents. However, the independents' capacity has been following at a substantially faster rate, leaving an ever larger share to the majors. As one might predict, the major's percentage change in deadweight capacity did not respond as quickly as the tonnage shipped.

TABLE 3
 MAJOR OIL COMPANIES' SHARE OF PRIVATELY
 OWNED U.S. FLAGGED TANKERS

Year ^a	DWT Capacity of U.S. Fleet	Major's Share of Fleet (%)
1988	13,467	31
1989 ^b	12,899	31
1990	12,828	30
1991 ^c	12,526	31
1992	11,333	32
1993	10,099	34
1994 ^d	9,261	38
1995	8,172	41
1996	8,026	42

NOTE.—Amounts are measured in terms of deadweight tonnage (DWT) capacity of U.S. privately owned fleet.

^a Annual figures are based on MARAD reports dated January 1 of the following year unless otherwise indicated.

^b Estimate is based on January 1989 and July 1990 reports.

^c Based on April 1991 report.

^d Based on July 1994 report.

matches PIRINC's findings.⁷⁵ However, by 1993, significant changes are observable. The lag in terms of capacity share of the majors is not surprising given the costs associated with adding and removing vessels from a fleet. It was the independent carriers' reduction in their U.S. fleet capacity that led to the increase in the major's share. This result is consistent with the notion that many small judgment-proof companies left the market following OPA 90.

Changes in the Alaskan domestic trade are undoubtedly responsible for a large portion of the increase in crude oil shipments operated by the majors. Waterborne Commerce maintains a public domain database showing state-to-state waterborne shipments by commodity. Table 4 shows the percentage of crude oil that is transported by water from Alaska and selected other states to all other states in the U.S. from 1988 to 1996.⁷⁶ Crude oil shipments originating in Alaska consistently account for approximately 65 percent of the total domestic movements, which may be a slightly inflated figure.⁷⁷

⁷⁵ Using Lloyd's port-of-call data, PIRINC found no significant change (in terms of ownership) between 1989 and 1991 for the fleets of the most reputable independent operators and the major oil companies. (PIRINC, *supra* note 39, at 63.)

⁷⁶ In deriving the total domestic movement of crude for Table 4, we removed the figures from a state to a trans-shipment area (inclusion of these figures does not significantly alter any of the results presented here).

⁷⁷ The total domestic shipping figures used in these calculations do not exactly match figures reported elsewhere because of coding conventions undertaken by Waterborne Commerce to protect the confidentiality of individual companies. For example, if one vessel-operating company has 80 percent or more of the tonnage for a particular state of origin to a particular state of destination, then that commodity is reclassified to "other." Also, if only two vessel-operating companies ship a commodity between two states, then that commodity is reclassified as

TABLE 4
 ORIGIN AND DESTINATION OF U.S. DOMESTIC WATERBORNE CRUDE OIL COMMERCE

Origin	Destination	1988	1989	1990	1991	1992	1993	1994	1995	1996
Alaska	Alaska	3	3	3	3	2	2	1	0	0
Alaska	California	41	43	41	43	40	41	42	39	37
Alaska	Hawaii	3	2	2	3	3	3	3	2	2
Alaska	Washington	19	17	19	20	22	21	21	22	21
Louisiana	All states	17	14	15	14	15	14	13	12	13
California	All states	7	12	11	10	10	11	11	9	9
Texas	All states	4	4	4	4	3	4	3	3	4
Other states	All states	5	5	4	4	4	5	5	12	14

NOTE.—All values are percentages.

Changes in Gulf and Atlantic coasts trade, which represents a nontrivial share of total domestic crude shipping, also account for part of the increased activity by the majors. Around the time of the regulatory change, the Organization for Economic Cooperation and Development reported in its marine transportation journal that “[w]ith refining interests on the U.S. Gulf and Atlantic coasts, the new U.S. legislation [OPA 90] (which contains the threatening prospect of ‘unlimited liability’ for shipowners in the event of a spill) [strongly impacts] companies like Chevron.”⁷⁸

V. DISCUSSION

This article claims that the major oil companies increased their vertically integrated U.S. crude shipping as a consequence of heightened expected costs for the spills by independent operators. However, the observed change in crude shipping might have alternative explanations. For instance, the change in domestic crude shipping may be due to a change in domestic crude transportation generally. Table 5 shows the amount and percentage of crude oil transported domestically by various modes (that is, pipeline, water, motor, and railroads) from 1980 to 1996. Pipelines and water are the principal modes of transportation. The volume of domestic crude moved by water has dropped off over the years, but no significant change occurred around the passage of OPA 90. In particular, from 1989 to 1992, the percentage and absolute amount of domestic crude petroleum movement by water stayed remarkably steady at around 47 percent and 300 billion ton-miles.⁷⁹ The volume of crude moved

“other.” About 5 percent of the total crude commerce is regularly reclassified because its route would reveal the vessel-operating company. The effect of this reclassification is to artificially add greater weight to the Alaska percentages.

⁷⁸ See Marine Transport, Organization for Economic Co-operation and Development 81 (1990). In 1990, Chevron was among the first major U.S. oil companies to respond to OPA 90 by ordering new double-hulled tankers to expand its domestic carrying capacity.

⁷⁹ Ton-miles are calculated by multiplying the number of tons of the commodity by the number of miles traveled.

TABLE 5
U.S. CRUDE OIL SHIPMENTS BY MODE OF TRANSPORTATION

YEAR	TOTAL	PIPELINES		WATER		MOTOR		RAILROADS	
		Ton-Miles	%	Ton-Miles	%	Ton-Miles	%	Ton-Miles	%
1980	753.0	362.6	48.2	387.4	51.4	2.5	.3	.5	.1
1981	740.7	333.1	45.0	404.9	54.6	2.2	.3	.5	.1
1982	770.2	335.1	43.5	432.7	56.2	2.0	.2	.4	.1
1983	806.1	332.4	41.2	471.2	58.5	2.0	.2	.5	.1
1984	748.4	333.0	44.5	412.6	55.1	2.2	.3	.6	.1
1985	786.2	334.4	42.5	449.2	57.2	1.8	.2	.8	.1
1986	751.3	335.2	44.6	413.6	55.1	1.7	.2	.8	.1
1987	767.3	341.5	44.5	423.3	55.2	1.6	.2	.9	.1
1988	739.9	350.7	47.4	386.8	52.3	1.6	.2	.8	.1
1989	653.0	338.7	51.9	312.2	47.8	1.6	.2	.5	.1
1990	628.2	334.8	53.3	291.2	46.4	1.5	.2	.7	.1
1991	651.3	336.1	51.6	312.8	48.0	1.6	.3	.8	.1
1992	647.1	343.3	53.0	301.3	46.6	1.7	.3	.8	.1
1993	586.9	328.7	56.0	255.5	43.5	1.8	.3	.9	.2
1994	581.8	322.6	55.5	256.7	44.1	1.7	.3	.8	.1
1995	586.0	335.9	57.3	247.7	42.3	1.7	.3	.8	.1
1996	543.2	338.3	62.3	202.4	37.3	1.7	.3	.8	.1

SOURCE.—Association of Oil Pipelines.

NOTE.—Amounts are in billions of ton-miles, the tonnage of crude times the distance traveled. Other than pipelines, the distance is derived from the shortest route that can be safely navigated.

by pipelines also remained practically unchanged during the years of the study. Crude oil pipeline shipping prices, which are regulated, also remained relatively constant.⁸⁰ These figures for domestic crude petroleum movements around the enactment of OPA 90 suggest that substitution involving pipelines, railroads, or motor did not account for the increase in domestic water transportation of crude petroleum by the majors.⁸¹

Alternatively, it might be argued that the observed shipping patterns are nonetheless unrelated to the expanded level of liability following OPA 90. One might test this argument by conducting a comparative analysis using a jurisdiction that did not experience significant regulatory changes for petroleum transportation. While a perfectly controlled experiment is not possible, a rough comparative assessment is offered by considering the U.K. data from Lloyd's. The United Kingdom serves as a reasonable control because its

⁸⁰ There was movement toward more competitive pricing during the early years of the study, when the Federal Energy Regulatory Commission attempted to deregulate oil pipelines—attempts that proved to be largely successful by the late 1980s. See Emerson H. Tiller, *Controlling Policy by Controlling Process: Judicial Influence on Regulatory Decision Making*, 14 *J. L. Econ. & Org.* 114 (1998).

⁸¹ While Table 5 shows an overall decline in domestic transportation of crude by all modes, U.S. consumption of petroleum has increased over the years of this study (see Table 6). Taken together, these observations imply that direct imports made up for the decline in domestic transportation of petroleum in the 1990s.

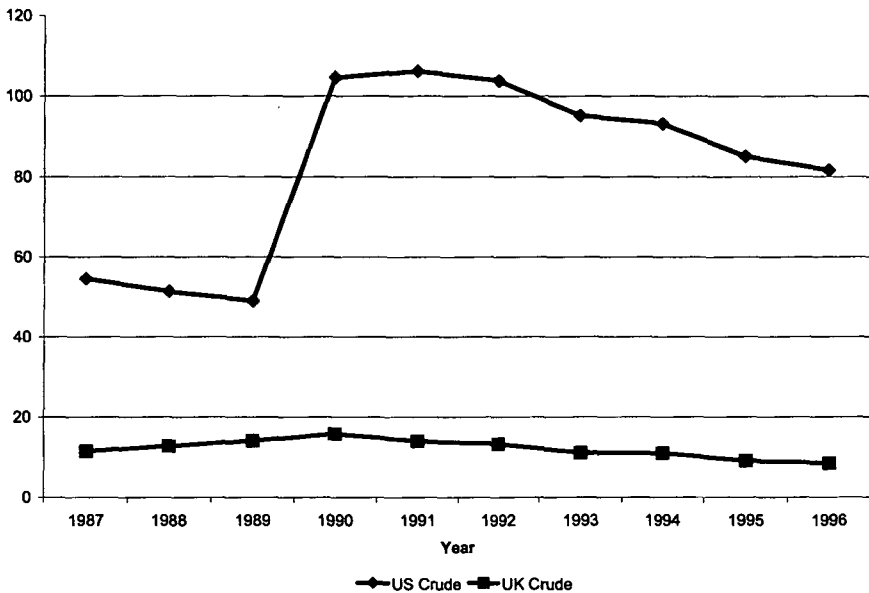


FIGURE 3.—U.K. and U.S. domestic waterbound crude petroleum shipped by selected major oil companies, 1987–96 (total tonnage, in millions of tons, shipped on self-propelled tankers).

liability regime for oil transportation was a close match to that of the United States prior to OPA 90, and it did not undergo a regulatory shock in or around 1990. Also, the United Kingdom is among the largest consumers and transporters of crude in Europe. Figure 3 presents a comparison of U.K. and U.S. domestic tanker movements of crude petroleum by the majors from 1987 to 1996. The figure dramatically illustrates the magnitude of change in crude shipping in the United States compared to the United Kingdom. While there was an increase in the amount of U.K. domestic crude that the majors transported from 1989 to 1990, the change is quite small compared to what was experienced in the United States in 1990. Going from 1989 to 1990, the majors increased their U.K. domestic crude shipping by 12 percent, an increase that corrected itself by 1991.⁸² On the other hand, the majors increased their U.S. domestic crude shipping on tankers by 114 percent from 1989 to 1990—with the following years remaining far above pre-1990 levels.⁸³

Finally, one might speculate that the majors' choice to further vertically integrate into domestic crude shipping was not a choice at all. That is, the majors may have been forced to increase their operations either because

⁸² Again, using a two-sample *t*-test to compare pre- and post-OPA 90 mean values, we observe no significant differences in the U.K. means.

⁸³ The pre- and post-OPA means statistically differ at the .01 level for the U.S. means.

independent operators left the U.S. market or because these operators charged prohibitively high rates. It was widely reported that many independents would leave the U.S. trade because they did not want to face the risk of unlimited liability, while others, who were willing to continue their U.S. operations, feared they could not meet the new financial responsibility requirements following OPA 90. However, as discussed below, independents did not leave the U.S. market, and they were able to satisfy the financial responsibility requirements.

Commercial oil shippers have long been required to demonstrate financial responsibility commensurate with the environmental liability their operations generated.⁸⁴ Generally, a tanker was required to demonstrate financial responsibility of \$150 per gross registered ton (grt) or at least \$250,000; with the enactment of OPA 90, the amount increased to \$1,200/grt or \$10,000,000.⁸⁵ Certificates of financial responsibility (COFRs) are issued to operators with sufficiently large net worth or pollution liability insurance. For most operators, the principal source of demonstrating financial responsibility is the Protection and Indemnification Clubs (P&I Clubs).⁸⁶ The P&I Clubs are nonprofit associations of shipowners and operators who pool their resources to indemnify each other.⁸⁷ When the International P&I Clubs threatened to not insure vessels operating on American routes, industry observers were concerned that most independent vessel owners and operators would choose not to or be unable to operate in U.S. waters.⁸⁸

Following the passage of OPA 90, a few tanker companies ceased U.S. operations, and many others announced that they would boycott the U.S.

⁸⁴ Prior to OPA 90, liability was determined through various laws, such as the Federal Water Pollution Control Act (FWPCA), 33 U.S.C. § 1321, and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. § 9601.

⁸⁵ The Oil Pollution Act of 1990 requires that a responsible party establish and maintain evidence of wealth or insurance sufficient to meet the maximum amount of liability that the party might face. See OPA 90, § 1004(c)(2), 33 U.S.C.A. § 2704(c)(2). Many states also have their own financial responsibility requirements (see Table 1).

⁸⁶ The P&I Clubs provide insurance guarantees for approximately 97 percent of tank vessel owners. U.S. Department of Transportation (U.S. Coast Guard), Regulatory Impact Analysis: Financial Responsibility for Water Pollution (Vessels), 66 (Staff Rep. No. CGD 91-005, June 1994).

⁸⁷ Individual members of P&I Clubs pay the association premia based on their reputation, vessel type, vessel age, area of operation, and other factors. Members may also purchase additional oil spill insurance. The P&I Clubs then insure their risks with large insurance entities, such as Lloyd's of London.

⁸⁸ These threats are well documented in the shipping trade press; see, for example, H. P. Drewry Shipping Consultants Ltd., *Shipping Stat. & Econ.*, July 1990, at 6, and December 1991, at 6; *Journal of Commerce Special Report on International Marine Insurance*, September 1992, at 4; and *Lloyd's List*, July 1, 1994, at 1, and July 22, 1994, at 1. See also U.S. House of Representatives Hearing on Vessel Certificates of Financial Responsibility, July 21, 1994 (Serial No. 103-123).

market.⁸⁹ However, the vast majority of tanker companies remained in the U.S. market.⁹⁰ As previously mentioned, a U.S. Department of Energy commissioned report found that the profile of vessels serving the U.S. between 1989 and 1991 was virtually unchanged. The report also found no evidence to indicate that reputable independent tanker owners left the U.S. market following OPA 90: "A comparison of the activities of 25 of the best known independent companies shows virtually no change in their U.S. trading habits."⁹¹

The independents' threats to boycott the U.S. market did not materialize for three principal reasons. First, the U.S. trade route—the largest world market—would have been a very costly route to abandon. Second, although the new oil spill laws required financial responsibility commensurate with the heightened level of liability following OPA 90, the pre-1990 financial responsibility provisions remained in place until 1994.⁹² Third, short-run overall costs of the independent tanker companies increased only marginally following OPA 90. Table 6 illustrates this fact generally: the difference between the wellhead price of crude and the refiner acquisition costs (which may be used as a proxy for crude shipping costs) did increase from 1989 to 1990. However, by 1992, costs returned to the level of the early 1980s. Specifically, there was a capital costs increase resulting from OPA 90's requirement that oil vessels be double hulled by 2010.⁹³ Operating costs also increased modestly because of the enhanced monitoring of vessels and improved safety standards.⁹⁴ Daily operating costs, not including insurance costs, increased by 4 percent from 1989 to 1990 and stayed at that level in 1991.⁹⁵ Insurance costs, which had been between 10 and 14 percent of total

⁸⁹ Foreign-owned oil companies (such as Dutch-owned Shell, French-owned Elf Aquitaine, and Belgian-owned Petrofina) and several independent tanker companies (such as World-Wide Shipping with its fleet of 70) announced that they would no longer call on U.S. ports (H. P. Drewry Shipping Consultants Ltd., *Shipping Stat. & Econ.*, July 1990, at 6, and August 1990 at 6).

⁹⁰ Even many of those tanker companies that left initially returned after short absences. See Office of Oil and Gas (U.S. Department of Energy), *The U.S. Petroleum Industry: Past as Prologue, 1970–1992* (1993); and U.S. Department of Transportation (U.S. Coast Guard), *supra* note 86, at 67. Despite suggestive announcement to the contrary, both Elf Aquitaine and Shell, for example, continued to actively charter ships to U.S. ports (PIRINC, *supra* note 39, at 65).

⁹¹ U.S. Department of Transportation (U.S. Coast Guard), *supra* note 86, at 63.

⁹² The U.S. Coast Guard and concerned commentators debated the implementation of the new COFRs for many years. See *Vessel Certificates of Financial Responsibility Hearings before the Subcommittee on Coast Guard and Navigation, U.S. House of Representative*, July 21, 1994.

⁹³ The double-hulled requirement sped up the rate of retiring older vessels and raised the cost of constructing replacements since double hulls increase vessel-building costs by 15–20 percent (PIRINC, *supra* note 39).

⁹⁴ Following OPA 90, the majors began thorough monitoring of chartered vessels, demanding increased operational standards and stringent inspection programs. *Id.*

⁹⁵ This estimate is based on tanker expenses per voyage day, which are active sea days plus port days. Figures were provided by the Office of Costs and Rates, Maritime Administration.

TABLE 6
U.S. CRUDE OIL CONSUMPTION, PRICES, AND SPILLS

Year	Daily Consumption	Wellhead Price (\$)	Refiner Acquisition Costs (\$)	Refiner Acquisition Costs minus Wellhead		Number of Spills	Volume of Spills
				Price (\$)	Price (\$)		
1980	17,056	21.59	24.23	2.64	1,346	3,335	
1981	16,058	31.77	34.33	2.56	1,137	5,369	
1982	15,296	28.52	31.32	2.80	862	3,366	
1983	15,231	26.19	28.87	2.68	781	1,954	
1984	15,726	25.88	28.53	2.65	737	7,148	
1985	15,726	24.09	26.66	2.57	549	4,416	
1986	16,281	12.51	14.82	2.31	712	2,675	
1987	16,665	15.40	17.76	2.36	571	2,098	
1988	17,283	12.58	14.74	2.16	708	4,016	
1989	17,325	15.86	17.87	2.01	704	12,047	
1990	16,988	20.03	22.59	2.56	706	5,969	
1991	16,714	16.54	19.33	2.79	648	334	
1992	17,033	15.99	18.63	2.64	515	267	
1993	17,237	14.25	16.67	2.42	486	767	
1994	17,718	13.19	15.67	2.48	565	1,025	
1995	17,725	14.62	17.33	2.71	501	1,227	
1996	18,309	18.46	20.77	2.31	435	1,382	

SOURCES.—U.S. Department of Energy; American Petroleum Institute, Basic Petroleum Data Book (July 1998); and U.S. Coast Guard.

NOTE.—Consumption is measured in thousands of barrels per day. Prices are in U.S. dollars per 42-gallon barrel. The number and volume (in thousands of gallons) of spills are for tanker ships and tanker barges only.

operating costs, rose by 18 percent in 1990.⁹⁶ In 1991, the P&I clubs imposed a small pollution surcharge for oil tankers that operated in U.S. waters.⁹⁷

The evidence indicates that independent tanker companies remained in the U.S. market following OPA 90. Furthermore, the rates charged by these independents appeared largely unaffected by the financial responsibility and liability aspects of OPA 90.⁹⁸ Worldwide tanker time charter rates for vessels of various sizes are presented in Table 7, which shows that 1-year time charter rates increased significantly during 1990 and 1991. These increases can be principally attributed to the events leading up to and including the Gulf War

⁹⁶ It is difficult to discern how much of this increase was driven by OPA 90 since the weaker pre-1990 COFR requirements remained in place.

⁹⁷ In 1991, the surcharge was 32 cents per grt per voyage. The surcharge was 41 cents in 1992, 23 cents in 1993, and 29 percent in 1994. U.S. Department of Transportation (U.S. Coast Guard), *supra* note 86; H. P. Drewry Shipping Consultants Ltd., *Shipping Stat. & Econ.*, March 1991, and December 1991, at 6.

⁹⁸ The primary influence of OPA 90 on tanker rates has operated through its double-hull requirement, forcing capital costs to increase substantially.

TABLE 7
 AVERAGE ANNUAL WORLDWIDE TANKER FREIGHT RATES
 FOR 1-YEAR TIME CHARTERS

Year	Products (30,000)	Aframax (80,000)	Suezmax (140,000)	VLCC (250,000)
1980	15,907	11,863	12,577	10,649
1981	9,927	9,401	10,171	8,421
1982	8,008	5,997	6,350	5,630
1983	6,347	5,609	6,538	5,729
1984	5,701	6,235	7,925	6,252
1985	4,513	3,630	6,830	8,172
1986	7,161	7,691	6,958	11,281
1987	8,292	9,968	9,521	9,702
1988	8,985	11,792	12,100	12,717
1989	10,518	14,777	14,931	15,265
1990	11,318	18,346	16,808	19,446
1991	12,548	18,578	17,432	21,238
1992	10,433	13,652	13,756	15,463
1993	10,158	13,000	12,567	15,202
1994	11,292	14,292	12,646	13,010
1995	11,575	16,842	18,908	14,708
1996	12,230	17,164	21,072	17,229

SOURCE.—Clarkson Research Studies (spring 1999).

NOTE.—Amounts are in U.S. dollars per day.

crisis.⁹⁹ By 1992, the rates returned to pre-1990 levels. North American tanker rates showed some fluctuation in 1989 and 1990 because of record low temperatures followed by unexpectedly warm weather.¹⁰⁰ In early 1990, spot rates for the routes from the east coast of Mexico and the West Indies to the U.S. eastern seaboard increased owing to Gulf War demands.¹⁰¹ However, overall spot rates declined in 1991 by 50 percent—reaching a 10-year low—owing to surplus tonnage.¹⁰² Time charters for the U.S. trade, particularly for double-hulled vessels, earned premia as high as 20 percent for a brief period in 1991. However, by 1992, surplus tonnage pushed 1-year time charters for VLCC 30 percent below the 1991 average levels.¹⁰³

Given that independent tanker companies continued to operate in the U.S. market and that there were no sustained increases in their rates, the obvious question is, Why did the majors not expand their use of these companies

⁹⁹ H. P. Drewry Shipping Consultants Ltd., *Shipping Stat. & Econ.*, August 1990–April 1991. Time charter rates increased as oil companies attempted to secure future tonnage to avoid a supply disruption in an unstable market and as insurers imposed a war risk premium.

¹⁰⁰ H. P. Drewry Shipping Consultants Ltd., *Shipping Stat. & Econ.*, January–March 1990. The U.S. invasion of Panama also caused some fluctuation in North American tanker rates (H. P. Drewry Shipping Consultants Ltd., *Shipping Stat. & Econ.*, January 1990).

¹⁰¹ H. P. Drewry Shipping Consultants Ltd., *Shipping Stat. & Econ.*, January & February 1991.

¹⁰² *Id.*

¹⁰³ *Id.*; H. P. Drewry Shipping Consultants Ltd., *Shipping Stat. & Econ.*, March 1992.

and compensate them for their increased risks and costs? After all, charterers commonly agree to pay the additional insurance costs for operating in the U.S. trade.¹⁰⁴ The majors could have compensated the independent tanker companies for the higher insurance premia without significantly affecting their own costs. For instance, if the independents passed along the full pollution surcharge to refiners, it would have increased the refiners' acquisition costs by only 1.38–2.2 percent between 1991 and 1994. So the question remains, Why did the majors not contract out more of their petroleum shipping following OPA 90? The answer this research offers is that the benefits of externalizing liability by contracting out risky activities to judgment-proof firms were outweighed by the expected costs induced by the distortions in care levels produced by these firms.

VI. CONCLUSION

The conventional view of organizational responses to increases in liability is that firms will contract out risky activities to judgment-proof entities. This problem, "the judgment-proof problem," has received considerable attention as a highly salient issue in the context of expanding U.S. legal liability. Some scholars maintain that this problem (if unaddressed) will inevitably lead to the collapse of the U.S. system of civil liability. Others call for extreme and immediate responses, such as direct government regulation, allowing for criminal sanctions and mandating insurance for risky activities.¹⁰⁵ This article challenges the uniformity of the conventional view of contracting out risky activities. While contracting out to judgment-proof suppliers is sometimes a best response to increases in liability, firms are often better off vertically integrating because those suppliers are judgment proof not only to third-party claimants but also to the firm itself. Vertical integration may occur even where there has been no expansion of vicarious liability. The analysis shows that the optimal organizational response to increases in legal liability is in-

¹⁰⁴ PIRINC, *supra* note 39, at 93.

¹⁰⁵ However, these proposed solutions bring their own problems and do not necessarily correct the judgment-proof problem. Direct government regulation or monitoring for criminal behavior are costly options with mixed track records. Mandating full insurance may also fail for a variety of reasons: (1) insurance companies typically place limits on the amount and scope of recovery; (2) given a system of limited shareholder liability, public corporations have insufficient incentive to acquire full insurance (Hansmann & Kraakman, *supra* note 32); (3) since many firms do not purchase full insurance, "bad-faith" or strategic interactions between the insured and the insurer may lead to nonoptimal litigation or settlement of tort claims and increased externalization of liability for judgment-proof firms (Sykes, *supra* note 17); (4) even the possibility of good-faith disputes between the insurer and the insured may provide an incentive for underinsurance (see Youell v. Exxon Corp., *supra* note 50, concerning Exxon's claim against its insurer Lloyd's of London); (5) even if there was full insurance, issues of moral hazard would arise, as they generally do under full insurance (Shavell, *supra* note 3); (6) finally, insurance or COFR may fail because some states that allow for unlimited liability require only a COFR satisfying the federal law, which does not provide for unlimited liability for most spills (see Table 1).

determinate given institutional constraints, legal and otherwise, on shifting liability. Thus, close attention must be given to institutional details in order to predict and understand likely organizational responses to changing liability.

The empirical section of the article examined the U.S. domestic crude oil shipping industry before and after the stringent regulatory oversight and heightened liability of the late 1980s and early 1990s. Industry observers predicted that the major oil companies would contract out to judgment-proof independent operators in order to limit their liability exposure. In addition to the costly market consequences, observers foresaw detrimental environmental outcomes as undercapitalized and careless vessel operators took charge of domestic oil shipping. However, careful empirical examination of the institutional parameters and the incentive issues reveals another conclusion. Contrary to popular expectations, major oil companies have increased their shipping operations, and the number of oil spills has been reduced significantly since 1990 (see Table 6). The liability-shifting benefits of contracting out were overcome by the dramatic increase in the magnitude of liability in the presence of vicarious liability for oil spills. Either heightened vicarious liability or increases in the magnitude of liability can render contracting out undesirable. Unfortunately for this analysis, both were ratcheted up following the Exxon *Valdez* oil spill. Clearly, both played a role in the outcome, but it is not possible to directly attribute the impact of each. Efforts of attribution are necessarily relegated to future research.

APPENDIX

TABLE A1
TOP REVENUE-GENERATING OIL COMPANIES FROM 1983 TO 1996

1983	1984	1985	1986	1987	1988	1989
Exxon	Exxon	Exxon	Exxon	Exxon	Exxon	Exxon
Mobil	Mobil	Mobil	Mobil	Mobil	Mobil	Mobil
Texaco	Texaco	Texaco	Texaco	Texaco	Texaco	Texaco
Chevron ^a	Chevron	Chevron	Chevron	Chevron	Chevron	Chevron
Amoco ^b	Amoco	Amoco	Amoco	Amoco	Amoco	Amoco
Gulf	.....	.....	.....	.....	.....	.....
Shell	Shell	Shell	Shell	Shell	Shell	Shell
ARCO	ARCO	ARCO	ARCO	ARCO	ARCO	ARCO
Conoco ^d	Conoco	Conoco	Conoco	Conoco	Conoco	Conoco
Occidental	Occidental	Occidental	Occidental	Occidental	Occidental	Occidental
Phillips	Phillips	Phillips	Phillips	Phillips	Phillips	Phillips
Sun	Sun	Sun	Sun	Sun ^e	.....	.....
Unocal	Unocal	Unocal	Unocal	Unocal	Unocal	Unocal
Tenneco	Tenneco	Tenneco	Tenneco	Tenneco ^f	.....	.....
BP USA ^g	BP USA	BP USA	BP USA	BP USA	BP USA	BP USA
Getty ^h	.....	.....	.....	.....	.....	.....
Marathon ⁱ	Marathon	Marathon	Marathon	Marathon	Marathon	Marathon
Amerada	Amerada	Amerada	Amerada	Amerada	Amerada	Amerada
Ashland	Ashland	Ashland	Ashland	Ashland	Ashland	Ashland
Coastal	Coastal	Coastal	Coastal	Coastal	Coastal	Coastal
Enron ^j	Enron	Enron	Enron	Enron	Enron	Enron
Kerr-McGee	Kerr-McGee	Kerr-McGee	Kerr-McGee	Kerr-McGee	Kerr-McGee	Kerr-McGee
1990	1991	1992	1993	1994	1995	1996
Exxon	Exxon	Exxon	Exxon	Exxon	Exxon	Exxon
Mobil	Mobil	Mobil	Mobil	Mobil	Mobil	Mobil
Texaco	Texaco	Texaco	Texaco	Texaco	Texaco	Texaco
Chevron	Chevron	Chevron	Chevron	Chevron	Chevron	Chevron
Amoco	Amoco	Amoco	Amoco	Amoco	Amoco	Amoco
Shell	Shell	Shell	Shell	Shell	Shell	Shell
ARCO	ARCO	ARCO	ARCO	ARCO	ARCO	ARCO
Conoco	Conoco	Conoco	Conoco	Conoco	Conoco	Conoco
Occidental	Occidental	Occidental	Occidental	Occidental	Occidental	Occidental
Phillips	Phillips	Phillips	Phillips	Phillips	Phillips	Phillips
.....
Unocal	Unocal	Unocal	Unocal	Unocal	Unocal	Unocal
.....
BP USA	BP USA	BP USA	BP USA	BP USA	BP USA	BP USA
.....
Marathon	Marathon	Marathon	Marathon	Marathon	Marathon	Marathon
Amerada	Amerada	Amerada	Amerada	Amerada	Amerada	Amerada
Ashland	Ashland	Ashland	Ashland	Ashland	Ashland	Ashland
Coastal	Coastal	Coastal	Coastal	Coastal	Coastal	Coastal
Enron	Enron	Enron	Enron	Enron	Enron	Enron
Kerr-McGee	Kerr-McGee	Kerr-McGee	Kerr-McGee	Kerr-McGee	Kerr-McGee	Kerr-McGee

SOURCES.—Oil & Gas Journal (1984–97); and National Petroleum News (1997).

^a Formerly Standard Oil of California.

^b Formerly Standard Oil of Indiana.

^c Acquired by Chevron in 1984.

^d Later acquired by Du Pont.

^e Spun off and renamed Oryx in 1988. Never consistently returned to top 20.

^f Sold off U.S. operations to private companies in 1988. Assets are difficult to track.

^g Formerly Standard Oil of Ohio.

^h Acquired by Texaco in 1984.

ⁱ Later acquired by USX.

^j Formerly Internorth.

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