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Variability in Punitive Damages: Empirically Assessing Exxon Shipping Co. v. Baker

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by

Theodore Eisenberg, Michael Heise, and Martin T. Wells*

Exxon Shipping Co. v. Baker acknowledged that empirical studies undercut criticism of punitive damages. Paradoxically, the Court simultaneously expressed concern about jury predictability based on a high and variable punitive–compensatory ratio published in an article by the present authors. The Court reduced the $2.5 billion Exxon Valdez punitive award to $500 million and stated: "the constitutional outer limit may well be 1:1."[1] Our empirical findings do not support the unpredictability concern or widely applying the limiting ratio. The high and variable ratio is an artifact of not accounting for the key variable that explains punitive awards – the compensatory award. (JEL: K 00, K 13, K 32, K 41)

1 Introduction

Punitive damages are one of the flashpoints of United States (U.S.) tort law and a source of tension in international civil justice relations (Gotanda [2007], Quarta [2008]). In addition to the substantive policy debate about whether punitive damages should exist, debate exists about the quantitative pattern of punitive awards. After decades of misinformation about the U.S. legal system fostered by groups such as the American Tort Reform Association (American Tort Reform Association (ATRA) [2009]),[2] it is now generally accepted that the mass of punitive damages

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[1] *Exxon Shipping Co. v. Baker,* 128 S.Ct., p. 2634, n. 28 (2008).

[2] ATRA [2009] states, "Reform is urgently needed to restore balance, fairness, and predictability to punitive damages law. The civil justice system should not be a 'litigation lottery' characterized by excessiveness and arbitrariness." ATRA cites none of the best-available information on patterns of punitive damages awards.

awards have been reasonably sober, modest in size, and without significant increases over time.

For example, no credible debate exists about whether, in the mass of cases, a strong association exists between punitive and compensatory awards (e.g., EISENBERG AND WELLS [2006]). To our knowledge, no persuasive analysis of actual cases supports the absence of a relation between punitive and compensatory damages (e.g., VIDMAR et al. [2006]). It was claimed in HERSCH AND VISCUSI [2004] that no significant relation exists between punitive and compensatory awards in very large cases, but that claim is incorrect (EISENBERG AND WELLS [2006]). It was also claimed in HERSCH AND VISCUSI [2009] that jury punitive damages behavior is unpredictable. The claim seems based on Exxon-funded experiments that never reconciled their findings with real-world punitive damages data (EISENBERG, RACHLINSKI, AND WELLS [2002]). SUNSTEIN AND SHIH [2004] have incorrectly claimed no significant association between punitive and compensatory awards in sexual harassment cases (SHARKEY [2006]).

Roughly speaking, U.S. juries and judges have let "the punishment fit the crime." Greater harm, as measured by the level of compensatory damages, has been accompanied by increased awards of punitive damages. The relation between punitive and compensatory damages has been strikingly consistent across many data sets (VIDMAR et al. [2006], HYMAN et al. [2007, p. 25], KARPOFF AND LOTT JR. [1999, p. 543], MOLLER, PACE, AND CARROLL [1999, p. 300, n. 52], SCHLANGER [2003, p. 1605 and n. 136], SHARKEY [2006]). In *Exxon Shipping Co. v. Baker* (128 S.Ct. 2605, 2624 (2008)) the Supreme Court observed that recent studies undercut the most audible criticism of punitive damages and that discretion to award punitive damages has not produced a mass of runaway awards. Although the Supreme Court has now recognized that much of the criticism of punitive damages awards has been misplaced, the Court has nevertheless regarded the punitive–compensatory relation as sufficiently important to expand the constitutional doctrine of substantive due process to restrict punitive damages (CALABRESI [2008]).

The Court's potentially most important quantitative ruling with respect to punitive damages came not as a matter of constitutional doctrine, but in the exercise of the Court's authority over federal maritime law. The Court's ruling grew out of the massive oil spill from the Exxon Valdez oil tanker in 1989. In *Exxon Shipping Co. v. Baker* (henceforth *Exxon Shipping*), the same case in which the Court recognized the general sobriety of punitive awards, the Court expressed concern about what it perceived to be a high mean and standard deviation in the punitive–compensatory ratio. Although *Exxon Shipping* was a maritime case, its pronouncements have implications for a wider range of punitive damages cases,[3] and the Court stated in

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[3] Compare, e.g., *Jurinko v. Medical Protective Co.*, 305 Fed. Appx. 13, 27 n. 15 (3d Cir. 2008); *Gragg v. International Management Group (UK), Inc.* 2009 WL 1140490, at *4 (N.D.N.Y. 4/24/2009); *Hayduk v. City of Johnstown*, 580 F.Supp.2d 429, 483 n. 46 (W.D. Pa. 2008); *Lithia Motors, Inc. v. Yovan*, 204 P.3d 120, 128 (Or. App. 2009), with *Mendez-Matos v. Municipality of Guaynabo*, 557 F.3d 36, 54

footnote that "the constitutional outer limit may well be 1:1" (*Exxon Shipping Co. v. Baker,* 128 S.Ct., p. 2634, n. 28 (2008)).

Some of the present authors were among those who wrote the article reporting the mean and standard deviation of the punitive–compensatory ratio relied on in *Exxon Shipping* to refer to a possible 1:1 constitutional limit on the ratio. Since the Court relied on our research results to announce potentially important new doctrine, it is appropriate for us to comment on the Court's interpretation of that research. The main limitation in the Court's analysis was not accounting for the variability of the punitive–compensatory ratio as a function of the level of the compensatory award. Basing doctrine on a single mean and standard deviation is not statistically supportable because, as the Court has recognized, the means and standard deviations for low compensatory award cases are, and should be, noticeably higher than these statistics for high compensatory award cases. Basing doctrine on the combined mean and standard deviation ignores the expected and desirable heterogeneity across low and high award cases.

Section 2 of this article reviews the facts of the *Exxon Shipping* case and describes the Court's reliance on our data to support its concern about punitive awards. Section 3 presents our statistical analysis suggesting that the data do not support broad application of the Court's 1:1 limit. Such a limit might have been reasonable on the facts of *Exxon Shipping* but would not be a statistically supportable constitutional or prudential principle. Section 4 concludes.

2   The Exxon Shipping Case and the Court's Concern about Varying Punitive Awards

2.1   Facts and Rulings Relating to the Punitive Damages Award

In 1989, the supertanker Exxon Valdez ran aground on a reef off the Alaskan coast, fracturing its hull and spilling millions of gallons of oil into Prince William Sound. Exxon Shipping Co., owner of the supertanker, and its corporate parent, Exxon Mobil Corp. (collectively, Exxon), settled state and federal claims for environmental damage, with payments exceeding $1 billion. A separate action was brought for economic losses to individuals who depended on Prince William Sound for their livelihoods (*Exxon Shipping Co. v. Baker,* 128 S.Ct., p. 2611 (2008)).[4]

On the night of the spill, Joseph Hazelwood captained the 900 foot-long tanker loaded with over a million barrels of crude oil. While employed by Exxon, Captain Hazelwood had completed a four-week alcohol treatment program but failed to complete a prescribed follow-up program and stopped attending Alcoholics Anonymous. Plaintiffs presented evidence that after treatment Hazelwood "drank in bars,

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n. 14 (1st Cir. 2009); *Line v. Ventura*, 2009 WL 1425993, at *11 (Ala. 5/22/2009); *American Family Mutual Ins. Co. v. Miell*, 569 F.Supp.2d 841, 859 (N.D. Iowa 2008).

[4] The description of the facts in *Exxon Shipping* is taken largely from the Supreme Court's opinion in the case.

parking lots, apartments, airports, airplanes, restaurants, hotels, at various ports, and aboard Exxon tankers" (p. 2612, quoting district court). With respect the Exxon's knowledge of Hazelwood's drinking behavior, contested testimony indicated that Hazelwood drank with Exxon officials and that Exxon managers knew of his relapse. Witnesses testified that on the night of the spill, "Hazelwood downed at least five double vodkas in the waterfront bars of Valdez, an intake of about 15 ounces of 80-proof alcohol, enough 'that a non-alcoholic would have passed out' " (p. 2612, quoting Court of Appeals).

On that night, about two hours after sailing, the ship, under Hazelwood's active control, made a standard maneuver out of the shipping lane to avoid icy conditions. The turn required a turn back to the shipping lane to avoid an underwater reef. The Supreme Court's opinion described the critical events that followed:

"Two minutes before the required turn, however, Hazelwood left the bridge and went down to his cabin in order, he said, to do paperwork. This decision was inexplicable. There was expert testimony that, even if their presence is not strictly necessary, captains simply do not quit the bridge during maneuvers like this, and no paperwork could have justified it. And in fact the evidence was that Hazelwood's presence was required, both because there should have been two officers on the bridge at all times and his departure left only one, and because he was the only person on the entire ship licensed to navigate this part of Prince William Sound. To make matters worse, before going below Hazelwood put the tanker on autopilot, speeding it up, making the turn trickier, and any mistake harder to correct." (p. 2612)

Those left on the bridge inexplicably failed to make the required turn back into the shipping lane and the ship hit the reef, tearing the hull open, and leading to 11 million gallons of oil leaking into Prince William Sound.[5] After Hazelwood returned to the bridge, he tried but failed to rock the ship off the reef, a maneuver which could have increased the spill.

Evidence suggested that the effects of Hazelwood's pre-voyage drinking had not worn off by the time the ship ran aground. The Supreme Court's opinion states:

"The Coast Guard's nearly immediate response included a blood test of Hazelwood (the validity of which Exxon disputes) showing a blood-alcohol level of .061 eleven hours after the spill. [...] Experts testified that to have this much alcohol in his bloodstream so long after the accident, Hazelwood at the time of the spill must have had a blood-alcohol level of around .241, [...] three times the legal limit for driving in most States." (p. 2613)

After the spill, Exxon spent around $2.1 billion in cleanup efforts. The U.S. charged Exxon with criminal violations of federal laws and Exxon pleaded guilty to violating the Clean Water Act, the Refuse Act, and the Migratory Bird Treaty Act and agreed to pay a $150 million fine, later reduced to $25 million plus restitution of $100 million. A civil action by the U.S. and the State of Alaska for environmental

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[5] It has been reported that, "If the Exxon Valdez spill had happened on the East Coast, it would have extended from Massachusetts to North Carolina" (WARREN [2009]).

harms ended with a consent decree for Exxon to pay at least $900 million toward restoring natural resources, and Exxon paid another $303 million in voluntary settlements with fishermen, property owners, and other private parties. As measured by the amounts paid, the harm found to have been caused by Exxon likely exceeded $3 billion.

The remaining civil cases were consolidated into the case that wound up before the Supreme Court and included as plaintiffs commercial fishermen, Native Alaskans, and landowners. At Exxon's request, the district court certified a mandatory class of all plaintiffs seeking punitive damages, consisting of over 32,000 plaintiffs. Exxon stipulated to its negligence and to liability for compensatory damages. Phase I of the trial considered Exxon and Hazelwood's potential for punitive damages. This phase included instructions concerning corporate liability for acts of employees.

Phase II of the trial determined the compensatory damages for commercial fishermen and Native Alaskans, and Phase III determined the amount of punitive damages. Phase IV, which was to set compensation for other plaintiffs, was obviated by settlement (pp. 2613f.).

In Phase II the jury awarded $287 million in compensatory damages to the commercial fishermen. The district court included damages to other interests in arriving at a compensatory damages figure of about $500 million, which the Supreme Court accepted.[6] Most of the Native Alaskan class had settled their compensatory claims for $20 million, and those who opted out of that settlement ultimately settled for a total of around $2.6 million. In Phase III, the jury heard about Exxon's management's behavior relevant to the spill. The court instructed the jurors that punitive damages were designed not to provide compensatory relief but to punish and deter. The court instructed the jury to consider the reprehensibility of Exxon's conduct, its financial condition, the magnitude of the harm, and any mitigating facts. The jury awarded $5 billion against Exxon (p. 2614), a result that, along with the spill itself, generated much commentary.[7]

On appeals below the Supreme Court level, the Court of Appeals for the Ninth Circuit upheld the Phase I jury instruction on corporate liability for acts of managerial agents.[8] With respect to the amount of the punitive damages award, the Ninth Circuit remanded twice for adjustments in light of the Supreme Court's due process cases.[9] The Ninth Circuit eventually reduced the punitive award to $2.5 billion, the amount reviewed in the Supreme Court.

Two of the issues reviewed by the Supreme Court are not of immediate interest for purposes of this article. The Supreme Court granted review to consider whether maritime law allows corporate liability for punitive damages for the acts of manage-

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[6] See In re the Exxon Valdez, 236 F. Supp. 2d 1043, 1063 (D. Alaska 2002); 128 S.Ct., p. 2634 (accepting the District Court's calculation of compensatory damages).

[7] See STOLL [1995, pp. 19ff.], BARDWICK [2000], CARTWRIGHT [1991], GALLAGHER [1990], GOLDBERG [1994], MILLARD [1993], PANOFF [1998, pp. 723f.], QUAM [1992], STAGER [1995], TOLBERT [1990], DEPARTMENT OF COMMERCE [1991].

[8] In re Exxon Valdez, 270 F.3d, at 1236.

[9] 270 F.3d, at 1246f., 472 F.3d 600, 601, 625 (2006), 490 F.3d 1066, 1068 (2007).

rial agents and whether the Clean Water Act[10] precludes punitive damages awards in maritime spill cases (*Exxon Shipping Co. v. Baker,* 128 S.Ct., p. 492 (2008)). That is, we are not concerned here with whether Exxon should have been held liable for any punitive damages, as the jury determined in Phase I.

Our focus is on the third question that the Court agreed to review, the amount of punitive damages given the amount of the compensatory award, because this is the quantitative relation that the Court has stated has constitutional due process limitations. Technically, that issue was not before the Court as a matter of constitutional law. The Court agreed to review, "whether the punitive damages awarded against Exxon in this case were excessive as a matter of maritime common law" (*Exxon Shipping Co. v. Baker,* 128 S.Ct., p. 2615 (2008)). The maritime law context of the Court's ruling means that Exxon Shipping Co. is not formally a holding about constitutional due process limits on punitive damages.

Nevertheless, the case's application of a limit on punitive damages has implications beyond the maritime law context. As noted above, the Court stated that the constitutional outer limit may well be the 1:1 ratio it applied in *Exxon Shipping* (p. 2634, n. 28). And the concerns that led the Court to reduce the punitive award from the $2.5 billion approved by the Ninth Circuit to $500 million are based on our data that could as easily be applied in a constitutional context. Lower courts have applied *Exxon Shipping* in constitutional settings beyond the case's maritime context.[11]

2.2   *The Data the Court Relied on in Exxon Shipping*

In reducing the punitive damages award, the Court relied on empirical data about the relation between punitive and compensatory damages. We therefore first describe the data and the relevant empirical research relied on.

Exxon Shipping relied in part on an article by some of the present authors. The article, "Juries, Judges, and Punitive Damages: Empirical Analyses Using the Civil Justice Survey of State Courts 1992, 1996, and 2001 Data," was published in 2006 in the *Journal of Empirical Legal Studies (JELS)* (EISENBERG et al. [2006]).[12] That article analyzed three major data sets in what is sometimes referred to as the "Civil Justice Survey of State Courts." The Civil Justice Survey is a project of the National Center for State Courts (NCSC) and the Bureau of Justice Statistics (BJS) and includes data gathered directly from state court clerks' offices on tort, contract, and property cases disposed of by trial in fiscal year 1991–1992, and then calendar years 1996 and 2001.[13] The three separate data sets cover state courts of general jurisdiction in a random sample of 46 of the 75 most populous counties in

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[10] 86 Stat. 816, 33 U.S.C. § 1251 et seq. (2000 ed. and Supp. V).

[11] See note 4 supra.

[12] The description of the data used here is based on the description in that article.

[13] The 2005 *Civil Justice Survey* data included 156 counties (BUREAU OF JUSTICE STATISTICS [2008]). The 2005 data become available after the decision in *Exxon Shipping*, were not included in the Court's analysis, and therefore are not analyzed here.

the United States. The 2001 data included 46 counties; the 1991–1992 and 1996 data included 45. One county included in the 1991–1992 and 1996 study, Norfolk, MA, fell out of the nation's 75 most populous in the 2000 Census and was replaced by Mecklenburg County, NC, and El Paso County, TX. Two Maryland counties declined to participate in the 1991–1992 study, and were replaced with Fairfax County for all three iterations of the Civil Justice Survey.

The 75 counties sampled include approximately 33% of the 1990 U.S. population; the actual 45 counties contributing data account for approximately 20% of the population.[14] The initial dataset (1991–1992) includes only jury trials. The two subsequent data sets, 1996 and 2001, include jury and bench trials, thereby allowing direct comparisons between judge and jury trials. The three data sets include all completed trials in all three years in most of the counties. Sampling in the 1992 and 1996 data sets is described in earlier publications. Sampling was used in three counties in the 2001 data set, Cook County, Illinois, and Philadelphia County and Bergen County, New Jersey.

These data are the most representative sample of state court trials in the United States. With direct access to state court clerks' offices, as well as approximately 100 trained coders recording data, the information gathered does not rely on litigants or third parties to report. Self-reports, common in many commercial verdict reporters, typically overrepresent cases with large awards. (EISENBERG et al. [1997, p. 641, n. 53], MERRITT AND BARRY [1999], MOLLER, PACE, AND CARROLL [1999, p. 335]). The quality of the data made it appropriate for the Court to rely on them in assessing punitive damages awards and should encourage BJS and the NCSC to continue this important work.

2.3   The Court's Concern in Exxon Shipping

Before expressing concern about the pattern of punitive damages awards, the Court initially noted that the criticism of punitive damages awards has been undercut by empirical studies.

"American punitive damages have been the target of audible criticism in recent decades [...] but the most recent studies tend to undercut much of it [...] [D]iscretion to award punitive damages has not mass-produced runaway awards [...] by most accounts the median ratio of punitive to compensatory awards has remained less than 1:1." (*Exxon Shipping Co. v. Baker,* 128 S.Ct., p. 2624 (2008))

The Court further noted that periodic claims of punitive damages awards increasing over time are not supported by the data.

"Nor do the data substantiate a marked increase in the percentage of cases with punitive awards over the past several decades." (p. 2624)

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[14] For summaries of the data and methodology, see BUREAU OF JUSTICE STATISTICS [2004], [1996], and [1995].

The Court concluded that the figures "show an overall restraint" (p. 2624). In reaching the conclusion that criticism of punitive damages has exaggerated reality, the Court relied in part on our statistical analysis of the BJS 1992, 1996, and 2001 data sets (p. 2624, nn. 13–14).

But the Court relied on our data for a finding somewhat at odds with the above conclusions about the reality of punitive damages awards. Based on the descriptive statistics reported in Table 1 of our *JELS* article, reproduced in part as Table 1 below, the Court noted that the mean ratio of punitive to compensatory damages in the 438 jury trials studied was 2.90 and the standard deviation was 13.81 (p. 2625 and n. 14).

Relying on the mean and standard deviation from our descriptive statistics, the Court hypothesized that, despite the overall sober pattern of awards, there was a problem of unpredictability. The Court stated its concern in the opinion's text:

"The real problem, it seems, is the stark unpredictability of punitive awards. Courts of law are concerned with fairness as consistency, and evidence that the median ratio of punitive to compensatory awards falls within a reasonable zone, or that punitive awards are infrequent, fails to tell us whether the spread between high and low individual awards is acceptable. The available data suggest it is not. A recent comprehensive study of punitive damages awarded by juries in state civil trials found a median ratio of punitive to compensatory awards of just 0.62:1, but a mean ratio of 2.90:1 and a standard deviation of 13.81." (p. 2625)

The main question we address in this article is whether the Court's reliance on our descriptive statistics in the *JELS* article supports widespread application of a 1:1 ratio.

Briefly, the Court relied on our summary statistics about the mean and standard deviation of the punitive–compensatory ratio without considering the larger statistical picture. As the article on which the Court relied showed, the most important statistical influence on the size of the punitive award is the size of the compensatory award. The summary statistics do not account for the size of the compensatory award because they were merely summary statistics, intended to inform the reader about the overall nature of the data. We therefore believe that further discussion of the data the Court relied on is warranted.

3 A More Detailed Analysis of the Mean and Standard Deviation Relied on in Exxon Shipping

We begin by reporting information included in Table 1 of the *JELS* article that the Supreme Court relied on. In describing our summary statistics for jury trials, the Court accurately described the mean and standard deviation numbers from our article. But a more complete reading of the article should have generated hesitancy in concluding, based on those numbers, that our data supported a pattern of unpredictability in the amount of punitive damages awards. Further insight into the data was available from two sources in the article: (1) the figures showing the relation

Table 1
Characteristics of Damages Awards (using the BJS data relied on in *Exxon Shipping*)

	Jury	Bench	Combined
Number of trials with plaintiff win	9,040	2,570	11,610
Number of trials with punitive damages	438	101	539
Percent of trials with punitive damages	4.85	3.93	4.64
Punitive award mean	3,016,991	461,118	2,557,262
Punitive award median	63,115	45,901	56,401
Punitive award trimmed mean (excludes highest 1%)	967,714	58,631	735,832
Punitive award trimmed median	58,631	45,732	54,134
Punitive–compensatory ratio if compensatory > 0			
mean ratio	2.90	1.60	2.66
median ratio	0.62	0.66	0.62
standard deviation of ratio	13.81	4.54	12.66

Note: Summary statistics for 539 tried cases with punitive damages awards from 46 of the nation's most populous counties. The trials terminated in 1991–1992, 1996, and 2001.
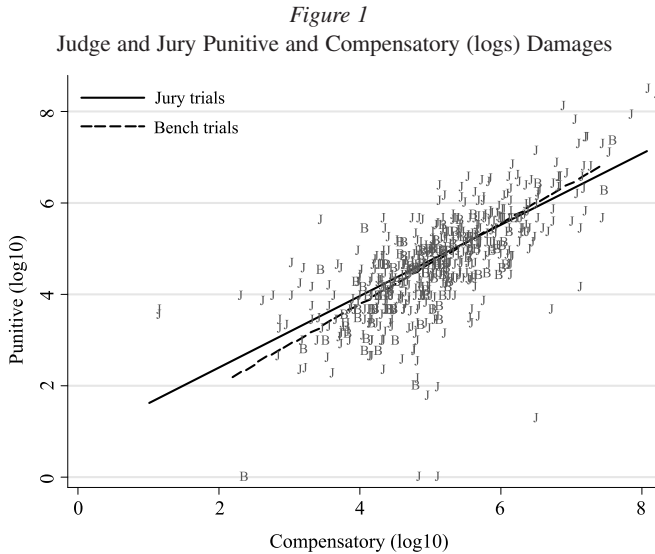*Sources:* BUREAU OF JUSTICE STATISTICS [2004], [1996], [1995], EISENBERG et al. [2006].

between punitive and compensatory awards, and (2) the regression analyses reported in the article that modeled the punitive award as a function of the compensatory award. Insight was also available from the Court's own qualitative statements about the relation between punitive and compensatory damages.

3.1   A More Complete Description of our Report on the Relation between Punitive and Compensatory Awards

Figures 1 and 2 from the *JELS* article, reproduced here, each showed aspects of the relation between the punitive and compensatory award. Figure 1 shows a scatterplot of punitive and compensatory awards, with points labeled "J" corresponding to jury trials and points labeled "B" corresponding to bench or judge trials. Figure 2 shows the same data subdivided by year and mode of trial.

The figures visually suggest a highly explicable pattern between punitive and compensatory awards. As the compensatory award increases, so does the punitive award and it does so in a linear fashion in log-transformed dollars. Moreover, the figures show that the pattern is similar for both judges and juries. If lay juries generated awards that were too unpredictable, the figures suggest that the juries were no more unpredictable than professional judges. One's eye provides the essential linear relation between punitive and compensatory awards. And more formal regression

Judge and Jury Punitive and Compensatory (logs) Damages

Note: Trials indicated by "J" are jury trials; trials indicated by "B" are bench trials. Lines are the best-fitting linear regression lines for jury and bench trials.
Sources: BUREAU OF JUSTICE STATISTICS [2004], [1996], [1995], EISENBERG et al. [2006].

analysis confirms the visual story. Table 4 from the *JELS* article, reproduced here as Table 2, reports the regression results for the relation between the punitive and compensatory award.

As Table 2 shows and the figures visually confirm, the relation between punitive and compensatory awards is highly statistically significant. Including or excluding a dummy variable for whether the trial was a judge or trial makes little difference across the three models reported.

Furthermore, it is not merely the case that a highly statistically significant relation between punitive and compensatory awards exists. The relation is socially substantial as well. The amount of the variance in the punitive award explained by the compensatory award is noteworthy. In this sense, the models fit the data well. The R^2s for the models in the penultimate row of Table 2 indicate that above 50% of the variance in punitive awards is explained by the models. Although R^2 can be misused as a measure of model strength, in simple models in which claims of unpredictability about data abound, R^2 can provide some insight on that question. In the simplest one-explanatory-variable model (model (1)) in Table 2, R^2 is simply the square of the linear correlation coefficient, a measure of linear association that ranges from -1 to $+1$. In model (1), therefore, the correlation coefficient is the squared root of 0.577, or 0.76. If one restricts the sample to the 438 jury trials,

Figure 2
Punitive and Compensatory Awards (logs) by Trial Mode and Year
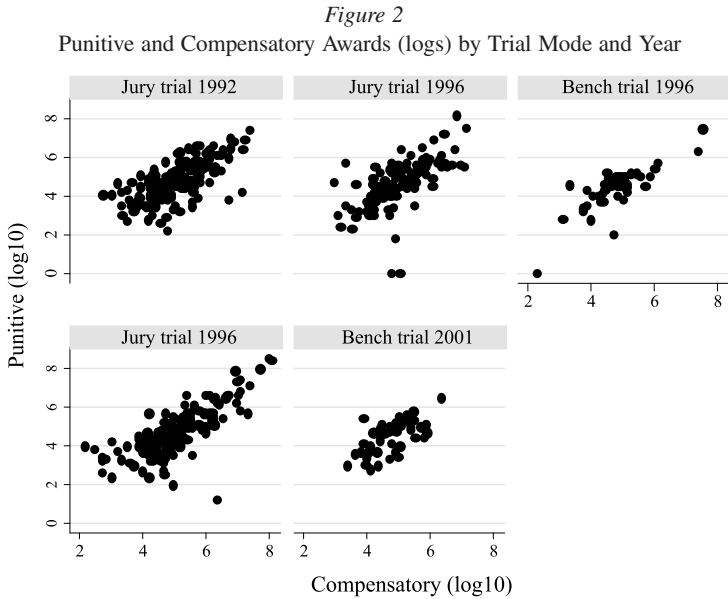
Sources: BUREAU OF JUSTICE STATISTICS [2004], [1996], [1995], EISENBERG et al. [2006].

Table 2
Regression Models of Punitive Damages (log) Levels (using the BJS data relied on in *Exxon Shipping*)

	(1)	(2)	(3)
Compensatory damages (log)	0.835**	0.835**	0.843**
	(0.040)	(0.038)	(0.046)
Jury trial dummy (1 = jury trial)	–	−0.029	0.009
	–	(0.026)	(0.145)
Jury trial × compensatory damages (log)	–	–	−0.008
	–	–	(0.029)
Constant	0.593**	0.639**	0.599**
	(0.197)	(0.199)	(0.236)
Model significance	< 0.001	< 0.001	< 0.001
R^2	0.577	0.578	0.578
N	539	539	539

Notes: ** $p < 0.01$. Robust standard errors in parentheses. Regression models for 539 tried cases with punitive damages awards from 46 of the nation's most populous counties. The trials terminated in 1991–1992, 1996, and 2001.
Sources: BUREAU OF JUSTICE STATISTICS [2004], [1996], [1995], EISENBERG et al. [2006].

the correlation coefficient is 0.69.[15] Correlation coefficients can themselves be mis-used but when the scatterplots show a strong linear association, as is the case here, misuse of the correlation coefficient is not a material concern. The high correlation coefficients are not consistent with the claim that the past pattern of punitive awards has been highly unpredictable. In social science research, R^2s across studies are not directly comparable, but explaining 50% of the variance can be quite impressive.[16] A study of 169 criminal justice articles reporting R^2 found an average of 0.389 (standard deviation of 0.220), and a median of 0.365. About one quarter of the art-icles had an R^2 of less than 0.20, and over 70% had an R^2 of under 0.50 (WEISBURD AND PIQUERO [2008]). On the civil justice side, models of compensatory damages do not regularly achieve the level of explanatory power that the models in Table 2 achieve (EISENBERG et al. [1997, p. 650 and n. 64]).

Figures 1 and 2 from the *JELS* article have a second feature relevant to the Court's concern about unpredictability. Not only do they show regularity in the punitive-compensatory relation, they show substantially more variation in that relation for low compensatory awards. The scatterplots in the figures show that for compensatory awards less than \$10,000 (4 on the *x*-axis in the log 10 units used), there is little pattern to the punitive–compensatory relation. The imagined best-fitting line for the low awards appears to be nearly horizontal, with a near-zero slope. This is confirmed by a regression model of the 54 jury trials with compensatory awards of less than \$10,000. The coefficient for the compensatory damages variable is small (0.093) and statistically insignificant ($p = 0.545$). It is also confirmed by a study that fit a more complex, non-linear line to a larger data set of compensatory and punitive awards. In that larger model, the best-fitting regression line was a cubic line, with no significant slope at the low end of compensatory awards (EISENBERG, HANS, AND WELLS [2008]). So the graphs and regression models in the *JELS* article that the Supreme Court relied on both provided information that might have tempered the Court's concern about unpredictability based on that article.

Since the Court in *Exxon Shipping* relied on our summary statistics of the ratio of punitive and compensatory damages, we present here a figure showing the relation between the punitive–compensatory ratio that concerned the Court and the level of the compensatory award. Figure 3 shows a kernel-weighted, smoothed local polynomial regression of the punitive–compensatory ratio on the compensatory award (see RUPPERT, WAND, AND CARROLL [2003]). The shaded portion of the figure shows the 95% confidence band for the regression line.

Figure 3 shows, now in the ratio units that concerned the Court, what the *JELS* article figures suggested. The punitive–compensatory ratio/compensatory award relation has a substantial slope and wide variability at the low end of compensatory

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[15] The correlation coefficient for jury trials does not vary materially if one limits the sample to cases with compensatory awards exceeding \$10,000 (correlation coeffi-cient $= 0.680$).

[16] "Values of .02, .13, and .26 have been proposed as potentially useful estimates of small, medium, and large effect sizes for the population R^2" (COHEN et al. [2003, p. 93]).

Figure 3

Local Polynomial Regression of the Punitive–Compensatory Ratio
on the Compensatory Award
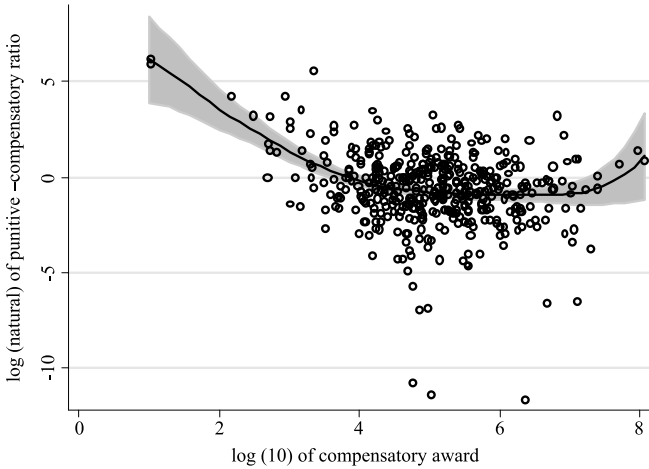
awards. The slope levels off in the region of compensatory awards of about $10,000 ("4" on the log 10 scale used for Figure 3's *x*-axis) and the confidence band narrows in that region. From $10,000 to about $1 million in compensatory awards, the ratio is stable. Above about $1 million the data thin out. Note also that the punitive–compensatory ratio stabilizes around 1 ("0" on the log scale used for the figure's *y*-axis) or slightly lower as the compensatory award reaches $10,000. So the figure in the ratio units confirms the results of the figures in the *JELS* article.

3.2   Why do our Conclusions Differ from the Court's?

Our revisiting of the figures and regression results from the *JELS* article relied on by the Court raises the question of how the mean and standard deviation relied on by the Court can be consistent with a portrait of punitive damages so different from the portrait the Court in *Exxon Shipping* relied on to support the 1:1 punitive–compensatory ratio it imposed. One answer is that the Court did not appear to believe it was relying on a different portrait of punitive damages. The Court seemed to agree with the *JELS* article's conclusion that the punitive damages system was not out of control, as suggested by the Court's system-wide statements quoted above. But the Court's simultaneous reliance on the data to label a segment of punitive awards as unpredictable seems internally contradictory. How can the same data support a system sufficiently sober to lead the Court to chastise those claiming a system out of control *and* a system warranting the Court's intervention based on its conclusion about unpredictability?

Although we are not privy to the Justices' thought process, and therefore cannot fully resolve the opinion's seeming internal contradiction, we believe we can provide some statistical insight into why the mean and standard deviation relied on by the Court do not support its concern about unpredictability. The short answer is that the detailed analysis in the *JELS* article more fully accounted for the relation between punitive and compensatory damages than did the summary statistics in Table 1 that the Court relied on, while seemingly ignoring the rest of the *JELS* article that related to this issue. The key additional factor explored throughout the article was the importance of the level of the compensatory award. To show the importance of the compensatory award level in assessing the mean and standard deviation relied on by the Court, Table 3 presents relevant summary statistics for jury cases with punitive and compensatory damages, but now stratified by the level of compensatory awards in the *JELS* article data.

Table 3 suggests that all of the high mean and standard deviation that concerned the Court comes from cases with compensatory awards of less than $10,000. For cases with compensatory awards of less than $1,000, the table's fourth column shows that the punitive–compensatory ratio standard deviation was 175.44; for cases with compensatory awards from $1,000 to $9,999, the standard deviation was 39.37. But the standard deviation dramatically decreased for cases with compensatory awards of $10,000 or more and did not exceed 3.58 for any group of these compensatory awards. For cases with larger awards the mean ratio and its standard deviation were quite stable.

From a statistical perspective one can explore the relation between the standard deviation across large and small compensatory awards by defining a dummy variable

Table 3

Stratifying the Punitive–Compensatory Ratio in Jury Trials by the Size of the Compensatory Award (using the BJS data relied on in *Exxon Shipping*)

Compensatory award range	Median punitive–compensatory ratio	Mean punitive–compensatory ratio	Punitive–compensatory ratio standard deviation	Number of cases in award range
$0 to 999	24.69	101.47	175.44	11
$1k to 9,999	1.00	9.64	39.37	43
$10k to 99,999	0.56	1.68	3.58	162
$100k to 999,999	0.55	1.62	3.32	151
$1m to 9,999,999	0.42	1.46	3.71	57
$10m to < $100m	0.57	1.12	1.31	13
$100m or more	2.41	2.41	–	1

Notes: k = $1,000; m = $1 million. All amounts are in dollars inflation adjusted to 2001.
Sources: BUREAU OF JUSTICE STATISTICS [2004], [1996], [1995].

Figure 4
Distributions of Punitive–Compensatory Ratio
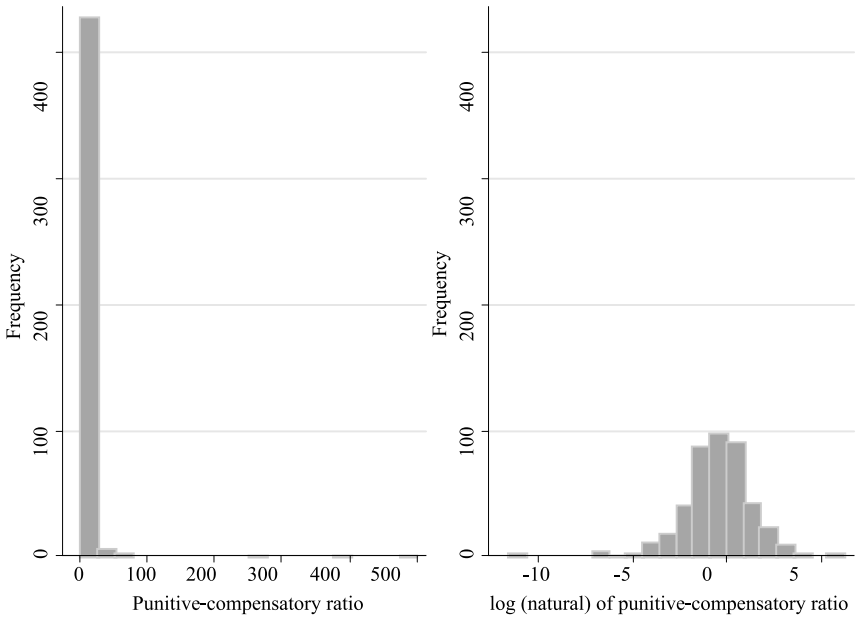
Note: The figure shows the distribution of the punitive–compensatory ratio for 438 jury trials with punitive and compensatory damages. The left portion of the figure shows the ratio in untransformed units. The right portion of the figure shows the log of the ratio.
Sources: BUREAU OF JUSTICE STATISTICS [2004], [1996], [1995].

equal to one if the compensatory award is less than $10,000 and equal to zero if the compensatory award is greater than or equal to $10,000. One can then test the hypothesis that the standard deviations for the two groups are the same. Before conducting such a test, however, it is helpful to inspect the data using Figure 4.

Figure 4 shows a histogram of the punitive–compensatory ratio in untransformed units and in units in which the ratio has been transformed to logarithms (natural). The left portion of the figure shows the distribution of the ratio in untransformed units. The right portion of the figure shows the distribution of the log (natural) of the ratio. The figure shows that the untransformed ratio does not come close to satisfying assumptions about normality that underlie many statistical tests. Further exploration of the untransformed distribution, excluding cases in the extreme right tail, also suggest extreme skewness in the distribution. In contrast, the transformed distribution, while not perfect, has a reasonably satisfactory appearance and reasonable statistical attributes.

We conduct statistical tests using both the untransformed and the transformed ratios and using robust tests of variance. Table 4 reports these results. The two

Table 4

Tests of the Hypotheses that Mean and Standard Deviation for Cases with Compensatory
Awards Less than $10,000 Equal those for Cases with Compensatory Awards of $10,000
or More (using the BJS data relied on in *Exxon Shipping*)

Compensatory award range	Log of punitive–compensatory ratio		Punitive–compensatory ratio (untransformed)	
	Mean	Std. deviation	Mean	Std. deviation
$0 to 9,999	0.88	2.10	28.35	91.81
$10,000 or more	−0.76*	1.90†	1.61*	3.44*

Notes: N for $0 to 9,999 $= 54$; N for $10,000 or more $= 384$. All amounts are in dollars in-
flation adjusted to 2001. † difference between low and high compensatory awards is signifi-
cant at $p < 0.10$; * significant at $p < 0.001$.
Sources: BUREAU OF JUSTICE STATISTICS [2004], [1996], [1995].

right-most columns assess the mean and standard deviation in the untransfomed
units used in the descriptive statistics in Table 1 of our *JELS* article and relied on
in *Exxon Shipping.* Those columns show that both the mean and standard deviation
of the punitive–compensatory ratio strikingly and statistically significantly differ
for low award and high award cases. Lumping the two groups of cases together
to make policy or doctrine based on a single mean or a single standard deviation
is therefore statistically questionable. In the untransformed units, one can firmly
reject the hypotheses of equal mean ratios and of equal standard deviations. Yet the
Court's use of a single mean and single standard deviation in *Exxon Shipping* did not
distinguish between low compensatory award and high compensatory award cases.

  Table 4 further suggests that, using log-transformed units (the first two numerical
columns), making policy or doctrine based on grouping high and low compensatory
cases together is questionable. The mean ratios in transformed units statistically
significantly differ at $p < 0.001$. The difference in variances in transformed units is
marginally statistically significantly different ($p < 0.10$), suggesting caution in com-
bining their standard deviations. In the transformed units, all ratios of 3.55 (34.81 in
untransformed units) or greater are in the low award cases, only 5% of high award
cases have a ratio of 1.90 or greater (6.69 in untransformed units), and only 4% of 384
high award cases have a ratio 3.0 or greater (20 in untransformed units). This pattern
is not suggestive of a systematic pathology in need of constitutional correction.

*3.3 The Court Ignored its Own Insight Regarding Low Compensatory Cases and
Placed a Near-Impossible Burden on Establishing the System's Consistency*

The Court's failure to distinguish between low and high compensatory award cases
is surprising in light of its prior discussion of the topic. The Court has repeat-
edly recognized that the size of the compensatory award can materially affect the
punitive–compensatory ratio. In *Exxon Shipping* itself, the Court relied on its first

case to strike down a punitive damages award on constitutional grounds, *BMW of North America, Inc. v. Gore* (517 U.S., p. 559 (1996)). The Court stated, "[L]ow awards of compensatory damages may properly support a higher ratio [...] if, for example, a particularly egregious act has resulted in only a small amount of economic damages" (*Exxon Shipping Co. v. Baker,* 128 S.Ct., p. 2622 (2008), quoting *BMW of North America, Inc. v. Gore,* 517 U.S., p. 582 (1996)). In *Exxon Shipping*, the Court reiterated the same thought: "heavier punitive awards have been thought to be justifiable when [...] the value of injury and the corresponding compensatory award are small" (p. 2622).

When the Court focused on our data about the punitive–compensatory ratio, it overlooked its own position with respect to low compensatory award cases. As shown above, the Court suggested in both *BMW* and *Exxon Shipping* that low compensatory cases "may properly support a higher [punitive–compensatory] ratio." If that is so, then focusing on a single mean or standard deviation to evaluate the punitive–compensatory ratio is not statistically supportable. One must take into account the size of the compensatory award.

Yet the Court did not investigate whether the mean and standard deviation of concern were the product of precisely the factors it had approved as supporting high ratios. Had the Court examined the graphs in our article, reproduced as Figures 1 and 2 above, it might have avoided questionable reliance on the summary statistics in Table 1 that do not differentiate between low compensatory award cases and other cases. In this sense, the Court's methodology led it astray in the same way that others have been led astray by failing to first graph data.

The Court's overlooking of evidence supporting its own sound intuition about high ratios in low compensatory award cases may have inadvertently led it to place an unrealistic burden on establishing the consistency of punitive damages awards. To its credit, the Court seemed to sincerely want evidence on which to base punitive damages doctrine. It believed it had evidence of an inconsistent pattern of awards based on our report of the mean and standard deviation in jury trials. In light of this evidence, to help justify its claim of unpredictability, the Court stated, "We are aware of no scholarly work pointing to consistency across punitive awards in cases involving similar claims and circumstances" (p. 2626).

That statement is only defensible if the Court relied on the high mean and standard deviation to trump the evidence of consistency across the BJS data and many other studies. With those studies in effect discarded via the Court's use of the descriptive statistics, little evidence was left. Had the studies been given fuller consideration or perhaps been better understood, the Court could not have helped but be aware of "scholarly work pointing to consistency." The Court's own constitutional punitive damages doctrine recognizes the compensatory award as the key quantitative factor about a case. The compensatory award, standing alone, is a circumstance so important that its relation to the punitive award can require a constitutional limitation. Scholarly work for more than a decade, with data spanning over 30 years, decidedly does point to consistency across punitive awards in cases involving that similar circumstance (Vidmar et al. [2006]).

And scholarly work further shows that the compensatory award is *the* key circumstance among the claims and circumstances. Work that explores the punitive–compensatory relation using several sets of variables, including case categories, plaintiff and defendant status, and locale demonstrate that the compensatory award is virtually all that matters (EISENBERG et al. [1997, pp. 647f.]). Juries are consistently tailoring the punishment to the harm. To the extent reasonably feasible given the scarcity of punitive awards and the difficulty of obtaining full information about each case, scholarly work points to startling consistency in the punitive award pattern.

Had the Court not gone statistically astray, it seems more in keeping with the pattern of scholarly work for the Court to have demanded at least some statistical evidence of inconsistency. The Court might have more justifiably stated, "We are aware of no credible scholarly work pointing to inconsistency across punitive awards in cases involving similar claims and circumstances." The Court likely believed no further evidence was necessary to supplement the high mean and standard deviation based on our article. If that is the evidence of inconsistency the Court had in mind, we believe we have shown that the doctrinal conclusions based on it are not statistically defensible.

3.4 Application of the Analysis to Exxon Shipping

The above analysis suggests that inconsistency between the Court's chastisement of those who have criticized punitive damages as being out of control and the Court's simultaneous assertion that punitive damages have been unpredictable can be explained by insufficient attention to the data and the available analysis of it. But the fact remains that the Court applied its unpredictability concern to reduce the punitive award in *Exxon Shipping* from $2.5 billion to $500 million in order to achieve a 1:1 ratio between punitive and compensatory damages. Both an irony and an underlying consistency attend the Court's use of the *JELS* article data to reduce the award.

The irony is that the Court used the asserted unpredictability of punitive–compensatory ratios, which is shown above to be attributable to low compensatory award cases, to strike an award in a case with a very high compensatory award. The variance in the punitive–compensatory ratio in cases with compensatory awards of less than $10,000 was used to strike an award in a $500 million compensatory case. Yet no evidence exists that high compensatory award cases exhibit the variability of low award cases that concerned the Court.

Nevertheless, Table 3 above suggests that the Court's result in *Exxon Shipping* in fact may have marginally promoted consistency in the award of punitive damages. Table 3 suggests that the mean punitive–compensatory ratio is a decreasing function of the size of the compensatory award size. This is consistent with a lower multiple being needed to punish or deter as the compensatory award increases (EISENBERG, HANS, AND WELLS [2008]). This pattern begins with the lowest compensatory award cases, those less with awards of less than $1,000, and applies to all groups

of compensatory award cases except the largest category (compensatory award of $100 million or more) in which there was only one case. For cases with compensatory awards of $10,000 or more, the mean punitive–compensatory ratio consistently decreases as the compensatory award increases, and never exceeds one. By reducing the punitive–compensatory ratio in *Exxon Shipping* from five to one, the Court thus brought the ratio much closer to the mean ratio in large cases.

Whether the Court should have done so on the facts of the case may largely be a function of a factor the Court did not discuss in *Exxon Shipping*, the wealth of the defendant. The defendant's wealth is widely entitled to consideration in setting punitive damages[17] and evidence about the defendants' financial condition was presented to the jury in Phase III of the trial (*Exxon Shipping Co. v. Baker,* 128 S.Ct., p. 2614 (2008)). The Court expressed no disapproval of that aspect of the case but the Court has not provided definitive guidance on what role wealth may play in punitive award calculations.[18] The absence of discussion of wealth in *Exxon Shipping* is a bit curious in light of the Court's express discussion of other factors that might support an increased punitive–compensatory ratio (p. 2633). And Exxon's financial condition would have seemed to merit some discussion. Exxon Corporation posted profits in excess of $6 billion (excluding Valdez spill expenses) for 1990 (HOLUSHA [1991]). The financial drain on Exxon of the punitive damages approved by the Supreme Court was thus little more than the effect of normal fluctuation in the price of oil. Given that financial information was presented to the jury, the Court may have viewed that factor as having already been accounted for in its calculus concerning the punitive award but, as noted, no express guidance was provided (HYLTON [2009]).

4   Conclusion

Although *Exxon Shipping* suggests a 1:1 ratio as a possible constitutional limit, the opinion does not embrace that ratio, seemingly based on some sense of the median ratio, as a limit for all cases. Using the median ratio as a limit for all cases would dramatically shift the distribution of the punitive–compensatory ratio by effectively eliminating the top half of the distribution. The Court apparently does not endorse such a profound shift because the opinion does not rule out accounting for key covariates such as the size of the compensatory award and the degree of misbehavior. The Court's opinions have been careful to leave open room

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[17] E.g., *Southern Union Co. v. Irvin*, 563 F.3d 788, 793 (9th Cir. 2009) (Reinhardt, J., concurring); MARKEL [2009, p. 332 n. 318]; Florida Standard Jury Instructions (Civil), § 2.d.2; New York Pattern Jury Instructions-Civil 2008, § 2:278; A.L.R. [1991]. States may allow punitive damages without defendant wealth evidence. *Vance v. 46 and 2, Inc.*, 920 A.2d 202 (Pa. Super. 2007).

[18] *Pacific Mutual Life Ins.e Co. v. Haslip*, 499 U.S., 1, 22 (1991) (Alabama's standard for reviewing punitive damages, which included the defendant's financial status, was "a sufficiently definite and meaningful constraint on the discretion of Alabama factfinders").

for substantial punitive–compensatory ratios when circumstances warrant them. In *Exxon Shipping*, the Court stated that a ratio in the 1:1 range should be the norm "in cases with no earmarks of exceptional blameworthiness within the punishable spectrum" (*Exxon Shipping Co. v. Baker,* 128 S.Ct., p. 2633 (2008)). The Court distinguished between cases like *Exxon Shipping*, "without intentional or malicious conduct, and without behavior driven primarily by desire for gain," (p. 2633), from more egregious cases. Presumably, based on its qualitative statements, the Court also considers higher punitive–compensatory ratios supportable in cases, unlike *Exxon Shipping*, with low compensatory awards. And the Court's dismissal of *Williams v. Philip Morris USA Inc.*[19] left in place a punitive award of $79.5 million that far exceeded the compensatory award in the case.[20]

On its facts, the Court's reduction of the punitive award in *Exxon Shipping* does little to reshape the landscape of punitive–compensatory ratios. A 1:1 ratio in such a large case is in keeping with the historic pattern of punitive awards. The Court's recognition that other factors could lead to increased ratios and its express endorsement of higher ratios in low compensatory award cases may mean that the case represents little in the way of actual change in punitive damages doctrine. Although portions of the opinion seemingly tug in contradictory directions, that tension can be reconciled by accepting *Exxon Shipping* as being tied to very high compensatory award cases, honoring the language endorsing departures from 1:1 ratios, and cabining the concern about unpredictability through improved statistical analysis.

The danger is that the Court's statements will be unthinkingly applied to compensatory award cases notably smaller than *Exxon Shipping* and contribute to an inability to tailor punitive awards to the facts and circumstances of particular cases.

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[19] 129 S.Ct. 1436 (2009) (dismissing writ of certiorari as improvidently granted).

[20] *Williams v. Philip Morris Inc.*, 176 P.3d 1255 (Or. 2008) (sustaining punitive award of $79.5 million in case with compensatory award of $800,000).

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