LIABILITY FOR CLIMATE CHANGE: THE BENEFITS, THE COSTS, AND THE TRANSACTION COSTS

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As we learn that the danger of climate change is real and imminent, we need to develop social mechanisms to redistribute the uneven economic damages resulting from it, both nationally and internationally. The polluter-pays principle, which is widely applied in environmental policy, is an immediate way to do this. Liability for climate change has several advantages: it could generate knowledge about the size and probability of economic damages, and it would create institutions to minimize these costs, such as insurance.[1] However, the liability model faces severe obstacles, in both national and international law, as many of the other speakers in this Symposium have pointed out.[2] The duty of care and proof of causation are cornerstones of any system of liability. Both pose serious barriers to claims for compensation in this field. Depending on how these rules are implemented, claims for climate change-related damages could become crushingly expensive and cause high transaction costs, as the following example may show.

I calculated the potential liability in a climate damage suit for six randomly selected coal power plants in Pennsylvania. To establish their potential liability in 2012, I added their emissions from 1992—the year when they "knew that their behaviour (or omission to regulate their economies) would contribute to future damage"[3]—to 2006[4]

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[1] *See* Adam Whitmore, *Compulsory Environmental Liability Insurance as a Means of Dealing with Climate Change Risk*, 28 ENERGY POL'Y 739, 740 (2000) (observing that imposing liability on emitters through mandatory insurance would likely cause insurers to price the harm associated with climate change using the best available information).

[2] *See, e.g.*, David Hunter & James Salzman, *Negligence in the Air: The Duty of Care in Climate Change Litigation*, 155 U. PA. L. REV. 1741, 1745 (2007) ("[E]ven if a causal link can be established between the offending action and the harm, what is the proper measure of the car companies' liability in the face of multiple sources of greenhouse gases over an extended time period?").

[3] Richard S.J. Tol & Roda Verheyen, *State Responsibility and Compensation for Climate Change Damages—A Legal and Economic Assessment*, 32 ENERGY POL'Y 1109, 1118 (2004).

and extended the trend of the last fifteen years to 2012. I then weighted these emissions with a damage figure of $50 per ton of carbon based on a comparison of twenty-eight studies done by Richard Tol.[5] Tol shows that the range of figures in the literature is huge—from -$6.60 to $1667.[6] He also demonstrates, with a confidence level of 95%, that the distribution of damage will lie below $62 per ton.[7] Compared to the controversial Stern Report, which puts the social costs of carbon at $314 per ton,[8] the damage in this figure can be seen as a "conservative" estimate.

Table 1 demonstrates that the liability for climate-related damages would be "crushing" if total greenhouse gas (GHG) emissions since 1992 were accounted for in a climate damage suit. In three out of six randomly selected cases, the damage claim would exceed Exxon's liability—$2.5 billion—for the Valdez oil spill,[9] one of the greatest single damage awards in history. Further, if we estimate the cost of attorneys' fees and administration using the data of Tillinghast-Towers Perrin for the U.S. tort system as a whole, we see that transaction costs would add up to more than $2.4 billion after only six cases![10] The bot-

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[4] Data were estimated from U.S. Environmental Protection Agency statistics maintained from 1995 through 2005. *See* U.S. Envtl. Prot. Agency, Clean Air Markets—Data and Maps, http://cfpub.epa.gov/gdm/index.cfm?fuseaction=emissions.wizard.

[5] *See* Richard S.J. Tol, *The Marginal Damage Costs of Carbon Dioxide Emissions: An Assessment of the Uncertainties*, 33 ENERGY POL'Y 2064, 2073 (2005) (concluding that it "is unlikely that the marginal damage costs of carbon dioxide exceed $50/tC and are likely to be substantially smaller than that").

[6] *Id.* at 2068-69, tbl.2. This extreme variance is largely due to differences in considering nonmarket effects of climate change such as habitat loss and species extinction, and also the result of using varying discount rates.

[7] *Id.* at 2073. This figure uses a time discount rate of 3%, which is "close to what most western governments use for long term investments." *Id.*

[8] *See* NICHOLAS STERN, STERN REVIEW: THE ECONOMICS OF CLIMATE CHANGE, at xvi (2007) (reporting the "social cost" of carbon emissions to be approximately $85 per ton of CO_2, which translates to $314 per ton of carbon). A prepublication version of the *Stern Review* is available at http:// www.hmtreasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm.

[9] *In re* The Exxon Valdez, 472 F.3d 600, 602 (9th Cir. 2006). The original damage award was set at approximately $5 billion ($287 million in general damages and $ 4.8 billion in punitive damages). *See id.* at 604. On December 22, 2006, the Ninth Circuit cut this sum in half saying it was unconstitutionally high in light of *State Farm Mutual Automobile Insurance Co. v. Campbell*, 538 U.S. 408 (2003). *See In re* The Exxon Valdez, 472 F.3d at 623-24.

[10] *See* TILLINGHAST-TOWERS PERRIN, U.S. TORT COSTS: 2002 UPDATE 17, *available at* https://www.towersperrin.com/tp/getwebcachedoc?webc=TILL/USA/2003/200302/Tort_Costs_2002_Update_rev.pdf (reporting that of each insured dollar spent in the tort system, 19% pays plaintff's counsel, 21% is directed to administration, and 14% is spent on defense costs). There may or may not be some economy of scale associated

tom line is that liability for climate change would be extremely expensive not only in terms of insurance costs but also in terms of transaction costs. And it will be a singular occasion for unproductive rent-seeking activities by law firms. Exactly because the rules for accountability are so uncertain in this context, there is ample room for lobbying and arguing before the court.

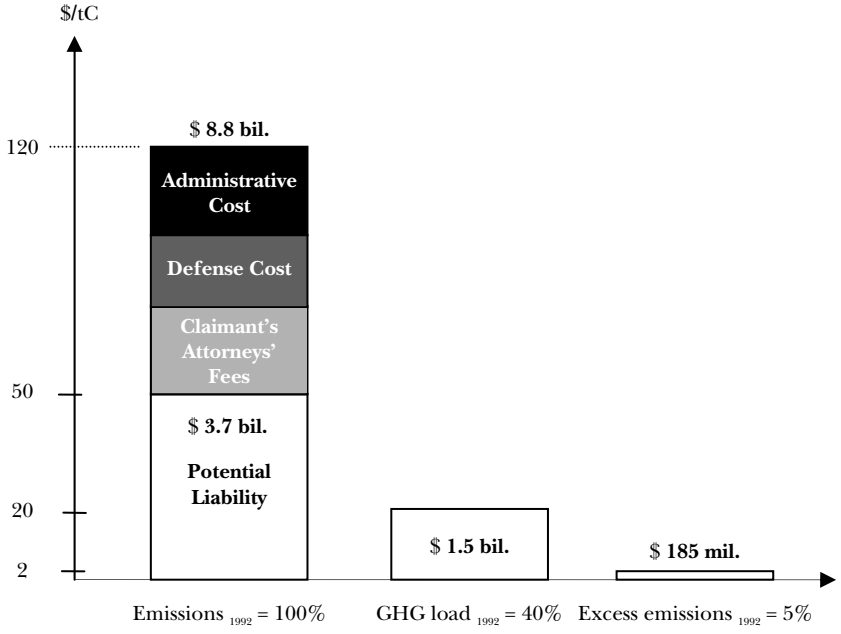
Table 1: Potential Liability and Transaction Costs of Climate Change Liability

Power Plant	Potential Liability	Claimants' Attorneys' Fees
Bruce Mansfield Shippingport, PA	$3700 million	$1496 million
Homer City Indiana, PA	$3700 million	$1499 million
Hatfields Ferry Greene, PA	$2500 million	$1021 million
Martins Creek Northampton, PA	$726 million	$294 million
Mitchell Power Station Courtney, PA	$426 million	$173 million
Montour Montour, PA	$34 million	$14 million

The sensitivity of potential liability to the implementation of liability rules is shown in Figure 1.

with large actions that reduces this number below the average figure for the U.S. tort system.

Figure 1: Sensitivity of Potential Liability to Accountability Rules: Total Liability for the Bruce Mansfield Plant



If, for example, we look at the potential liability of the Bruce Mansfield Power Plant in 2012 and consider its contribution to the concentration of GHGs in the atmosphere (GHG load) rather than its periodic GHG emissions (as in Table 1), only about 40% of its emissions in the period 1992-2012 would be additive to climate change, as the preexisting GHG load reduces the forcing of subsequent emissions.[11] Its liability must consequently be restricted to the plant's contribution to the GHG load, or about $1.5 billion. In considering the plant's duty of care, we could plausibly argue: why should the owner of Bruce Mansfield do more than average people in the developed world did in the same period to prevent dangerous interference with the climate? Taking the Kyoto Protocol as a benchmark establishing a duty of care, the plant would be required to reduce its emissions by about 5%. Hence, 95% of the plant's emissions would not be penalized under a tort system. The plant's expected liability would conse-

[11] *See* Myles Allen et al., *Scientific Challenges in the Attribution of Harm to Human Influence on Climate*, 155 U. PA. L. REV. 1353, 1358-59 (2007).

quently shrink to $185 million. We could continue along this line to bring liability to zero when any duty of care was denied. On the other hand, despite having raised the point of transaction costs, I did not give you the full picture. If we add the cost of the defense and tort system administration as a whole to any damage award the claimant might obtain, we could arrive at total costs for a single case of up to $8.8 billion. The sum of damage costs and transaction costs per ton of carbon could thus range from $2 to $120 per ton of carbon, depending on how the duty of care is established, what type of accountability rule applies, how damages are awarded, and the size and type of transaction costs involved.

Liability for climate change would heavily affect the U.S. economy. But it would also affect economies outside the United States depending on the way it is determined. If, for instance, Kirsten Engel's suggestion[12] to use approved allowances from the European Union to judicially force a tradable permit market on "laggards" within the United States—be they states or firms—is adopted, we can expect even less liquidity and higher carbon prices in the European Union. Another example is leakage. If the United States were to establish a crushingly expensive regime ascribing liability to individual polluters, there would be a serious incentive to relocate GHG-intensive industries to countries such as China and India, which have no or almost no restrictions on GHG emissions and no liability for climate-related damages. The bottom line is that we must consider and calculate the costs of a climate change liability in a global economic context.

My final point is that I have—painfully—learned that a "grand design" is probably not the best answer to the problem of international climate change. International negotiations have arrived at a patchwork of different regimes, at different levels, geared to different sets of technology, which only loosely tie into the goal of the U.N. Framework Convention on Climate Change to "prevent dangerous anthropogenic interference with the climate system."[13] What strikes me is how little we have looked into the interactions of policies within this "patchwork design" of international climate change policy (ICCP). Erik Bluemel provided an interesting example of the multiple con-

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[12] Kirsten H. Engel, *Harmonizing Regulatory and Ligitation Approaches to Climate Change Mitigation: Incorporating Tradable Emissions Offsets into Common Law Remedies*, 155 U. PA. L. REV. 1563, 1565-67 (2007).

[13] Framework Convention on Climate Change art. 2, May 9, 1992, 31 I.L.M. 849.

flicts that will arise in such a regime of ICCP with co-existing seller and buyer liability.[14] We need many more studies of this sort.

Another example of a potential flaw in "patchwork designs" is the standards used to set the targets of coexisting international cap-and-trade systems. If liability in, say, a nuisance regime in the United States increases whenever Annex B countries decide to decrease their tolerated level of GHG emissions, we will see even stiffer political resistance in the United States against any international regime of capping emissions than we already see without firms being held liable for climate damages at home. This argument extends to industrialized countries as a whole if international liability for climate change applies. There are many serious political and economic problems of this sort involved in an "entropic regime" of ICCP; thus there is plenty of room for future research in the law and economics of climate change policy.

[14] *See* Erik B. Bluemel, *Unraveling the Global Warming Regime Complex: Competitive Entropy in the Regulation of the Global Public Good*, 155 U. PA. L. REV. 1981, 2040 (2007) ("[I]n the context of a public good, it is expected that forum shopping and regime linkages will serve as conduits for noncompliance.").