Executive Summary

An Analysis of the Preventive Effect of Environmental Liability
Environmental Liability, Location, and Emissions Substitution:
Evidence from the Toxic Release Inventory

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This paper examines the relationship between the imposition of strict liability for environmental damages, and emissions of toxic chemicals into the environment. In contrast to the fault-based regime it replaces, a policy of strict liability does not distinguish between damages due to negligence and those due to emissions during careful operation. Adopting a strict liability policy toward the environment can thus alter firms’ incentives with respect to their emissions strategies, as they seek to minimize their combined liability exposure and the costs of proper waste disposal.

One particular concern is that firms will substitute emissions into one environmental medium for emissions into some other medium that they perceive to carry greater risk of damage and/or detection. The consequences would be two-fold. First, damages might increase faster than penalties, if indeed those damages go undetected or cannot be attributed to the responsible party. Second, firms would be diverting productive resources toward avoidance behavior, without necessarily reducing total emissions cost-effectively.

Under the American federalist system, there could also be a third consequence wherever adjacent states do not all impose the same type of environmental liability. It could be that regulators in a strict liability state will be more tolerant of emissions that cross into a neighboring, negligence-based state, so as to discourage the migration of economic activity toward a nearby liability regime that some firms might find more attractive, while plants in the strict liability state may take less care to limit toxic emissions if they perceive that their actions satisfy the adjacent negligence state’s standard of due care.
These consequences are presumably socially undesirable and unintended outcomes of adopting strict liability for environmental damages. If they occur, this would weaken somewhat the case for strict liability-based environmental policies. In the United States, these are the federal Superfund and individual states’ “mini-Superfund” programs. The primary environmental case for strict liability is that that firms will reduce their toxic releases when they are faced with environmental cleanup costs or are forced to compensate third parties for damages.

We look for evidence supporting the hypotheses about unintended consequences, by testing whether the imposition of strict liability has altered the relationship between emissions into four primary environmental media (air; water; on-site land storage; off-site land disposal), or affected overall emissions levels. Our prior expectation is that emissions to air and water are more closely related to each other than to either of the other two types of emissions, and vice versa, though we examine all possible cross-media relationships for evidence of substitution activity.

The federal Superfund program, in which strict liability is imposed for environmental damages, pre-dates by nearly a decade the annual reporting by manufacturing plants of the toxic emissions that comprise our data, from the Toxics Release Inventory (TRI). The scope of the federal program is limited to a small minority of highly contaminated and/or risky sites, which has left many hazardous waste sites under the control of individual states. Many states have adopted strict liability since TRI was initiated, allowing us to test the effects of strict liability on toxic emissions, relative to a negligence-based policy. As of 1995, 40 of 50 states had instituted strict liability provisions; the remainder continued to rely on negligence-based liability.
Our analysis is relevant to the European Union, which is considering mandating the adoption by member countries of strict liability for environmental damages. Our data facilitate the analysis of how strict liability adoption affects emissions behaviors, and of possible border effects where liability regimes differ between traditional, fault-based liability and strict liability. We use annual, state-level emissions data, aggregated from individual firm reports. Thus, our data correspond in important ways to the case of the European Union, with its independent member countries and a unified federal framework. While the underlying U.S. federal statute imposes strict liability throughout our sample, the necessarily limited scope of the federal Superfund program gives the state liability policies wide latitude to affect firm incentives.

We find that strict liability has little obvious effect on annual emissions levels. They have exhibited a fairly steady downward trend since reporting began and, for the full set of reported emissions, we find no evidence that this trend has been affected by state adoptions of strict liability. When we limit our attention to seventeen, highly toxic chemicals that were the focus of a voluntary federal program (called “33/50”) to speed reductions, we find that strict liability may exert slight pressure to reduce emissions, but primarily for emissions to air. The statistical evidence for this is suggestive but is not strongly significant. We find a similar but weaker pattern for releases to on-site storage, but no evidence of any additional effect on off-site storage releases or emissions to water.

To test for emissions substitution effects, we work with annual changes in emissions. Although we find evidence that firms substitute between on-site storage and off-site disposal of hazardous materials, this relationship is not affected by the state’s environmental liability policy. We find no evidence that air and water emissions are
substitutes, under either liability regime. Instead, we find some evidence, stronger than for the on- vs. off-site substituting, that air and water emissions are *complements*, exhibiting similar tendencies to rise or fall in response to given stimuli. As with the other types of emissions, this relationship does not appear to be affected by the state’s liability policy. This evidence for cross-media relationships holds only for the seventeen toxic chemicals identified in the 33/50 program of voluntary reductions.

Finally, we find some evidence that strict-liability states bordering fault-based states may experience somewhat higher levels of releases to air than do other strict-liability states, although regional patterns in liability adoption could also account for this effect. It is possible that the slight effects of state-to-state differences in liability policy that we do find have been diminished by the prior imposition of the federal strict liability policy. Although policy differences exist in the United States, they do not appear to motivate emissions substitutions effects as unintended consequences of strict liability adoptions.

To conclude, the adoption of strict liability in preference to a negligence-based system as practiced in the United States does not appear to have induced widespread, unforeseen changes in the way firms handle their toxic pollutant emissions. We find that emissions to water and to air complement each other and, to with somewhat less confidence, that releases to land in on-site facilities are substitutes for transport to off-site facilities. Neither of these relationships appears to have been affected by states’ environmental liability policies.