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In Praise of Ex Ante Regulation

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In Praise of Ex Ante Regulation

Brian Galle*

Timing is an important consideration in regulatory design. Corrective taxes are usually imposed before or contemporaneously with the harmful activity they are aimed at preventing, while tort awards are assessed ex post, in its aftermath. Patents and research grants both can encourage innovation, but patents pay off only after the invention is marketed. In a world of perfect information, fully rational actors, and complete credit or insurance markets, timing would not matter. In the real world though, the failure of one or more of these assumptions can change dramatically the impact of a regulatory option. For example, prior commentators have largely favored ex post incentives on the ground that government has much better information after the regulated activity is complete.

This Article argues that the consensus in favor of ex post regulation overlooks some important considerations. Ex post regulation does provide useful additional information when regulated parties are heterogeneous, but also carries significant and sometimes prohibitive social cost, especially when limited-liability firms produce externalities. Further, drawing on results from mathematical simulations, I show that the costs of heterogeneity can be sharply reduced with even modest up-front information. I apply these insights to a series of examples, including the obesity crisis, the regulation of systemic risk in the banking sector, and state fiscal failures.

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* Professor of Law, Georgetown University Law Center. I am grateful for helpful feedback from and conversations with Yariv Brauner, Victor Fleischer, Gerrit De Geest, Daniel Hemel, Aziz Huq, Louis Kaplow, Kyle Logue, Pat McCoy, Frank Partnoy, Katie Pratt, Dan Schwarcz, Natalya Shnitser, Steven Sugarman, and audiences during presentations at Boston College, University of Connecticut, University of Florida, and Harvard Law Schools, and the Annual Meeting of the National Tax Association.

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I. INTRODUCTION

The plaintiffs' daughter was four years old when they brought her in to the local medical clinic. Clinic staff gave the girl a sedative to keep her calm while they examined her, but they miscalculated the dose, and she later died.¹ Tort liability, or the specter of it, is supposed to discourage these kinds of preventable tragedies.² The clinic's owner, fearing a potential crippling award to bereaved families, should have trained his staff more carefully. As it happens, the owner instead had carefully scooped all the assets out of the firm. When the girl's parents won a \$34.6 million award against him, the limited-liability protection the firm provided ensured that he paid none of it.³

The problem of judgment-proof defendants is a familiar one to tort scholars, who have often grappled with its intricacies,⁴ but the lesson I want to take from this sad episode (and many others like it) extends beyond the details of tort doctrine. Consider that there were a number of other ways the state of Texas could have tried to ensure that clinical staff understood how to dose for small children. For example, it could have imposed greater training, certification, and continuing-education requirements on the relevant care providers. Which was the better choice: tort reform or regulatory action?

Users of e-cigarettes, many manufactured under low standards in China, are likely to face similar problems of judgment-proof

1. Maura Dolan, *Huge Jury Awards Seldom Live Up to Their Billing*, L.A. TIMES (Nov. 26, 1996), http://articles.latimes.com/print/1996-11-26/news/mn-3027_1_jury-award [<http://perma.cc/ZN4Y-EJPK>].

2. RICHARD A. POSNER, *ECONOMIC ANALYSIS OF LAW* §6.6 (8th ed. 2011).

3. Dolan, *supra* note 1.

4. *E.g.*, Steven G. Gilles, *The Judgment-Proof Society*, 63 WASH. & LEE L. REV. 603, 671-699 (2006); Kyle Logue, *Solving the Judgment-Proof Problem*, 72 TEX. L. REV. 1375, 1390-94 (1994); Lynn M. LoPucki, *The Death of Liability*, 106 YALE L.J. 1, 54-88 (1996).

defendants should the devices prove less safe than some now think.⁵ Should government demand that manufacturers and retailers carry liability insurance sufficient to cover any tort award? Should we simply impose a tax on the devices in an amount equal to what we project the average per-device tort award would be—a tax that, since it is collected up-front, will be paid before manufacturer firms can declare bankruptcy? Or try something else, like the conspicuous and disturbing labels Australia requires on tobacco products sold down under?⁶ Which of these would most efficiently minimize the harms to the American public?

Governing in the twenty-first century, in short, is a problem of incentive design. Regulators often know what they want, but not how best to achieve it. There is general consensus, for example, that society would like to avoid banking-sector meltdowns and promote life-saving drugs; to minimize the risk of catastrophic climate change and encourage contributions to charity; to fight obesity and encourage investment in infrastructure.⁷ It might surprise some readers to learn that for many scholars there is also a good degree of consensus on the best general approach to all these problems. That approach, in a word, is price. Many scholars believe government should do its best to make sure that the price market actors face in making their decisions accurately reflects all the society-wide costs and benefits of those decisions. That accomplished, government should then step back and let the market work.⁸

It is never that simple, of course. Even if regulators decide to use “price instruments” to shape policy, they still face a difficult set of subsidiary choices.⁹ The fight against obesity is a good example. How should we shift consumers from fatty and sugary foods to those higher in nutrients? Many commentators favor a “fat tax” or taxes on sugary

5. See H. Michael O'Brien, *E-Cigarette Class Actions Could Be On Fire Someday*, LAW360 (May 13, 2015), <http://www.law360.com/articles/654780/e-cigarette-class-actions-could-be-on-fire-someday> [<http://perma.cc/9U4W-UEK5>] (analyzing prospects for legal liability for e-cigarette makers).

6. AUSTRALIAN COMPETITION AND CONSUMER COMMISSION, *Tobacco Health Warnings*, PRODUCT SAFETY AUSTRALIA <http://www.productsafety.gov.au/content/index.phtml/tag/tobaccohealthwarning> (last visited Oct. 5, 2015) [<http://perma.cc/L8RW-B2J4>].

7. Good overviews on these topics include BRETT FRISCHMANN, *INFRASTRUCTURE* 10–23 (2013); SIMON JOHNSON & JAMES KWAK, 13 *BANKERS* 153–88 (2010); NATIONAL ACADEMY OF SCIENCES & THE ROYAL SOCIETY, *CLIMATE CHANGE: EVIDENCE AND CAUSES* 19, 23 (2014).

8. Gloria E. Helfand et al., *The Theory of Pollution Policy*, in 1 *HANDBOOK OF ENVIRONMENTAL ECONOMICS* 249, 251, 287 (Karl-Göran Mäler & Jeffrey R. Vincent eds., 2003); Ian W.H. Parry & Wallace E. Oates, *Policy Analysis in the Presence of Distorting Taxes*, 19 *J. POL'Y ANALYSIS & MGMT.* 603, 608–10 (2000).

9. Brian Galle, *Tax, Command . . . or Nudge?: Evaluating the New Regulation*, 92 *TEX. L. REV.* 837, 848–56 (2014).

beverages.¹⁰ Others have weighed in on behalf of subsidies for exercise and healthy food alternatives.¹¹

Another choice that regulators must make, as the tort examples show us, is whether to offer their incentives now or later.¹² Instead of a fat tax, for example, government could authorize broad tort liability against the food industry, or maybe even retailers.¹³ Commentators have long recognized that, in many respects, tort liability resembles a tax, except that a tax is paid while the conduct is happening, while the tort award instead is computed and assessed long after.¹⁴ Following the standard jargon, I will call incentives that take effect before or during the regulated conduct *ex ante* incentives, and those that kick in only after the conduct has happened *ex post*.

While under some idealized conditions *ex ante* and *ex post* regulations are effectively indistinguishable from each other, in the real world the choice between them is critical. Policy makers in the 1990s fought fiercely over whether tobacco makers should face higher taxes or unlimited tort liability, a debate that perhaps will return again as society gets serious about obesity regulation.¹⁵ Similarly, banking scholars now disagree on whether bank regulation is best accomplished through up-front charges for banks that might be “too big to fail,” or instead through penalties assessed after the fact against banks that in fact fail.¹⁶ Governments struggling to plan for future fiscal crises must

10. Jeff Strnad, *Conceptualizing the “Fat Tax”: The Role of Food Taxes in Developed Economies*, 78 S. CAL. L. REV. 1221, 1294–1322 (2005); Stephen D. Sugarman & Nirit Sandman, *Fighting Childhood Obesity Through Performance-Based Regulation of the Food Industry*, 56 DUKE L.J. 1403, 1429–90 (2007). *But see* Katherine Pratt, *A Constructive Critique of Public Health Arguments for Antiobesity Soda Taxes and Food Taxes*, 87 TUL. L. REV. 73, 114–39 (2012).

11. E. Katherine Battle & Kelly D. Brownell, *Confronting a Rising Tide of Eating Disorders and Obesity: Treatment vs. Prevention and Policy*, 21 ADDICTIVE BEHAVIORS 755, 762 (1996); Sugarman & Sandman, *supra* note 10, at 1489.

12. *See generally* Donald Wittman, *Prior Regulation vs. Post Liability: The Choice Between Input and Output Monitoring*, 6 J. LEGAL STUD. 193 (1977) (analyzing tradeoffs in regulating *ex ante* and punishing *ex post*).

13. M. Gregg Bloche, *Obesity and the Struggle Within Ourselves*, 93 GEO. L.J. 1335, 1356 (2005); Paul A. Diller, *Combating Obesity with a Right to Nutrition*, 101 GEO. L.J. 969, 1004–11 (2012).

14. Jon D. Hanson & Kyle D. Logue, *The Cost of Cigarettes: The Economic Case for Ex Post Incentive-Based Regulation*, 107 YALE L.J. 1163, 1268–80 (1998); Louis Kaplow & Steven Shavell, *Property Rules Versus Liability Rules: An Economic Analysis*, 109 HARV. L. REV. 713, 778–79 (1996).

15. *See generally* Robert L. Rabin, *The Third Wave of Tobacco Tort Litigation*, in REGULATING TOBACCO, 176–206 (Robert L. Rabin & Stephen D. Sugarman eds., 2001) (describing circumstances surrounding tobacco tort litigation in the 1990s).

16. Iman Anabtawi & Steven L. Schwarcz, *Regulating Ex Post: How Law Can Address the Inevitability of Financial Failure*, 92 TEX. L. REV. 75, 128–31 (2013); Adam J. Levitin, *In Defense of Bailouts*, 99 GEO. L.J. 435, 438–41 (2011). Banking scholars have used the *ex ante/ex post* distinction in a few different senses. The version I have in mind here is the debate between policies

decide whether to install self-regulation that will take effect in the present, or after the crisis hits. And IP scholars have debated recently whether the best incentive for innovators is a government grant or tax credit for research and design—which usually pays off at the time of the research—or instead a patent, whose value arrives years after the basic research period.¹⁷

In earlier work I have tried to identify some of the most important tradeoffs among different kinds of policy options, and to set out some generalizations about which tools make the most sense for which kinds of policy challenges.¹⁸ For example, I argue that penalties are often superior to rewards, with the possible exception of policies whose goal it is to encourage charity or production of other socially beneficial new enterprises. In other instances, prices may not be the best choice, and regulators could do better with “nudges” (such as the Australian tobacco labels) or other kinds of novel governance.

That earlier work set aside the *ex ante* / *ex post* question.¹⁹ I want to consider it in more depth here.

My goal is to argue against the developing consensus favoring *ex post* incentives.²⁰ For example, Victor Fleischer questions whether

that shape bank incentives in advance of crisis, such as limits or taxes on bank size, see JOHNSON & KWAK, *supra* note 7, at 153–88, and those that kick in after crisis, such as Levitin’s proposed “haircuts” for bailed-out banks, Levitin, *supra*, at 508–10. Muhammad Rashid et al., *Critical Evaluation of Solutions to the Too-Big-to-Fail Problem*, 18 J. AM. ACAD. BUS. 114, 115–23 (2012) provides a good overview of the proposals.

17. Daniel J. Hemel & Lisa Larrimore Ouellette, *Beyond the Patents-Prizes Debate*, 92 TEX. L. REV. 303, 308 (2013).

18. Brian Galle, *The Tragedy of the Carrots: Economics and Politics in the Choice of Price Instruments*, 64 STAN. L. REV. 797, 813–40 (2012); Galle, *supra* note 9, at 859–83.

19. Galle, *supra* note 9, at 852–53.

20. Victor Fleischer, *Curb Your Enthusiasm for Pigovian Taxes*, 68 VAND. L. REV. (forthcoming 2015) (manuscript at 20–21) (on file with author); Hanson & Logue, *supra* note 14, at 1268–80; Steven Shavell, *Corrective Taxation Versus Liability as a Solution to the Problem of Harmful Externalities*, 54 J. L. & ECON. S249, S251 (2011); Strnad, *supra* note 10, at 1321; Wittman, *supra* note 12, at 200.

Although most analysis has favored *ex post* regulation, a handful of authors have argued recently in favor of some forms of *ex ante* incentives. Kip Viscusi and Richard Zeckhauser argue for taxes in place of some tort liability for oil companies. W. Kip Viscusi & Richard Zeckhauser, *Detering and Compensating Oil-Spill Catastrophes: The Need for Strict Two-Tier Liability*, 64 VAND. L. REV. 1717, 1721–22 (2011). Tim Edgar advocates a tax on big banks, rather than threats that the government will refuse to bail the bank out when disaster strikes. Tim Edgar, *Corrective Taxation, Leverage, and Compensation in a Bloated Financial Sector*, 33 VA. TAX. REV. 393, 414–22 (2014). Vincent Buccola tackles some problems of using bankruptcy proceedings for sovereign debts. Vincent S.J. Buccola, *An Ex Ante Approach to Excessive State Debt*, 64 DUKE L.J. 235, 269–80 (2014). None of these efforts offer a generalized analysis of when we should prefer *ex ante* to *ex post* regulation, as I do here.

The *ex ante/ex post* question also appears in the literature on legal transitions. Barbara H. Fried, *Ex Ante/Ex Post*, 13 J. CONTEMP. L. ISSUES 123, 124–37 (2003). There, the question is whether government should compensate individuals harmed by legal change, or whether instead

standard tools of ex ante regulation, such as the tax system, can be flexible enough to accommodate the complex needs of modern regulation, and he argues instead for either more-traditional regulation or for ex post options like tort liability.²¹

The consensus begins with the problem of uncertainty. For example, Fleischer points out that it is hard to have an effective fat tax when we do not know in advance which people will actually be prone to obesity.²² Echoing earlier work by Jon Hanson and Kyle Logue, among others, he argues that this makes a strong case for preferring ex post solutions, such as tort liability, over the ex ante tax alternative.

As Fleischer suggests, favoring ex post regulation often will rule some regulatory options off the table.²³ For instance, corrective taxes and fees usually are imposed before or while behavior is occurring. Fleischer's analysis is also a challenge for those, like me, who favor "nudges," as those tools are usually effective only at the exact moment of decision, not afterwards.²⁴

These papers have made major, but incomplete, contributions to incentive design. The problems they point to are real, but may arise in fewer situations than the authors suggest. I differ, too, on the best solution to the problem of uncertainty.

First, I will show through math and statistical simulations that the problem of ex ante uncertainty is smaller than others have appreciated. Others have seemed to suggest that government should try to match the price a bad actor faces exactly to the harm that actor causes.²⁵ But I demonstrate that such precision is unnecessary, and usually not even optimal. Government can obtain most of the gains of precise matching simply by dividing the population up into two or three categories with a decent degree of accuracy. This finding builds on and modifies a classic result from Louis Kaplow & Steven Shavell.²⁶ While implementing even two or three categories may be unachievable ex ante

these persons should be deemed to have accepted their risks ex ante. *Id.* While this debate can inform regulatory policy, it does not speak directly to the choice between ex ante and ex post regulatory instruments.

21. Fleischer, *supra* note 20, at 18–33.

22. *Id.* at 30–31.

23. *Id.*

24. Galle, *supra* note 9, at 858–59.

25. Fleischer, *supra* note 20, at 20–21; Strnad, *supra* note 10, at 1321.

26. Specifically, Kaplow & Shavell argue that when marginal damage is uncertain, the government should set the cost of a price instrument at the expected average marginal damage. Kaplow & Shavell, *supra* note 14, at 725. But this prescription seems to assume government may use only a single price at a time. I show below, in Part III, that the Kaplow & Shavell result can be extended to multiple prices, and that this modification is superior to use of a single average price.

in some situations, it is far easier than the perfection others seem to demand.

Further, I argue that the informational gains, if any, from regulating *ex post* must be traded off against a host of other costs that waiting carries. As our tragic overdose example illustrates, actors who are indifferent to future incentives will not optimally invest to reduce harms or create benefits. I will argue that this kind of “myopia,” or short-sightedness, is troublingly common, especially in the case of corporations protected by limited liability, and that efforts to reduce it are themselves socially costly. Similarly, I explore the various transaction costs that society must incur in translating the threat or promise of future incentives backwards in time. My point is not that *ex ante* regulation is always more efficient than *ex post*, but rather that the case is more nuanced, and depends more on empirical facts that are currently unknown, than others have recognized.

Finally, I apply these lessons to a set of important policy debates. I consider whether governments should use tax systems to regulate, and also focus on the more specific example of “fat” taxes. Other examples include the problem of systemically important banks, and the failure of governments from the national to the local level to prepare adequately for recessions or other future misfortunes. Along the way I address other related problems. For instance, my analysis offers a new rationale for some limits on insider trading.

Part II of the Article summarizes the state of the literature, beginning with the general theory of regulation through price, and moving on in Part II.B. to the *ex ante* / *ex post* debate. Part III argues that informational costs of *ex ante* action are smaller than the prior literature seems to assume. Part IV analyzes the problem of myopia, while Part V looks at the other social costs of delayed incentives. Part VI considers both issues in the special context of limited-liability firms, where I respond primarily to proposals to overcome liability protection using mandatory insurance. Part VII applies these arguments to a set of real-world examples.

II. BACKGROUND

This Part summarizes the basic economic theory of regulation, with an emphasis on contemporary thinking on the problem of the “choice of instruments” for regulators. Part II.A. is the general

background.²⁷ Readers familiar with that literature can safely skip to Part II.B., which focuses more closely on the *ex ante* / *ex post* question.

A. *The Externality Problem and Its Solutions*

Modern economic theories of government regulation begin with the premise that markets sometimes fail.²⁸ Externalities are a classic example.²⁹ An externality, simply put, is a harm (“negative externality”) or benefit (“positive externality”) that affects someone other than the actor making an economic decision.³⁰

In general, the goal of regulation is neither to eliminate negative nor to produce boundless quantities of positive externalities, but rather to achieve what might be called the optimal level of externality.³¹ Eliminating even the worst pollutants is costly. Should government bankrupt coal producers, or is there a way to balance clean air against the costs of achieving it? On the positive externality side, everyone might agree that charity is beneficial. But should government spend millions to clothe or educate one more child?

Economists typically answer these kind of balancing questions using marginal analysis.³² Under this approach, the policy maker asks herself, “on the margin—that is, for the very next unit of good or bad produced—what is the harm or benefit of that one unit for *everyone in society*?” We might therefore call this the “marginal social damage,” (MSD) in the case of a negative externality, and “marginal social benefit” (MSB) for a positive one. The policy maker then compares this harm or benefit against the marginal costs to the producer. If the producer’s private marginal cost is greater than the marginal social damage, it does not pay, on net, to prevent the damage; counting the producer’s losses, society would lose by forcing the producer to avoid the externality.³³

To see this graphically, consider Figure One.

27. Section II.A. follows closely, often word-for-word, from my earlier coverage of this same topic. Galle, *supra* note 9, at 843–49.

28. JONATHAN GRUBER, PUBLIC FINANCE AND PUBLIC POLICY 3 (3d ed. 2011).

29. *Id.* at 4.

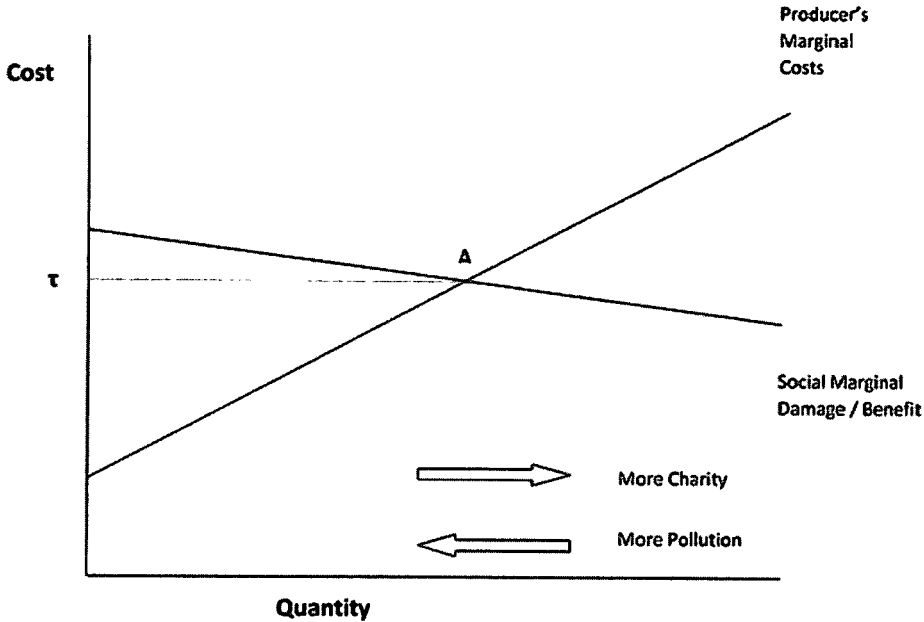
30. *Id.* at 122–23.

31. *Id.* at 137–39; Helfand, *supra* note 8, at 253.

32. GRUBER, *supra* note 28, at 119.

33. Note, importantly, that for simplicity we are assuming here that we should count the costs and benefits for the producer and everyone else equally. That’s a controversial proposition, but I’ll leave it aside here for ease of exposition.

Figure 1: Optimal Externality Production



In Figure One, the upward-sloping line represents the marginal cost curve for the externality producer: as we trace the line rightwards, each additional unit of pollution reduction (say, one ton less of carbon) or charitable output (say, another bed in a homeless shelter) is costlier to achieve.³⁴ The downward-sloping line is the marginal social benefit curve: each unit is slightly less beneficial than the last.³⁵ At point A the two lines intersect. This is the optimal point.³⁶ Anywhere to the right of A, the costs of charity or pollution reduction outweigh the benefits. To the left, there are unused cost-effective improvements remaining on the table.

Policy makers must also decide when to implement their regulatory scheme. One option is what others usually call *ex ante* regulation: the government decides its enforcement approach, and the

34. This reflects the likelihood that firms will undertake the cheapest efforts first, and then have to work harder and harder to achieve further milestones. For instance, at some point, adding more beds means constructing a new building.

35. Again, diminishing marginal utility is a standard assumption here. We probably house the neediest persons first, and at some point we're offering shelter space to Bill Gates.

36. I'm simplifying here for the sake of exposition. A more rigorous approach to setting the optimal quantity would also account for other factors that might affect the efficiency of the regulation. For example, if the regulation imposes costs, and the expectation of those costs changes behaviors other than the production of the externality, such as by distorting consumer choices among products, the ideal regulation might balance disruption of these expectations against pollution control. Helmuth Cremer et al., *Externalities and Optimal Taxation*, 70 J. PUB. ECON. 343, 346–47 (1998).

externality producer feels the weight of the government's influence before or during the time the externality is produced.³⁷ Ex post regulation, then, is regulation in which the government's decision and the resulting impact both arrive after the regulated conduct has already occurred.³⁸ Consider the difference between a tobacco tax and a tort suit against cigarette manufacturers. Both may ultimately be paid out of the coffers of tobacco companies, but one is incurred before anyone smokes, while the other is calculated long after.³⁹ To take another example, zoning laws restrict development before it results in unwanted burdens on neighbors, while nuisance suits impose liability after the damage has begun.

Of course, a major goal of the ex post regime is to prevent the punished harms from occurring.⁴⁰ With perfect government information, perfectly rational actors, and complete liquidity, ex post is equivalent to ex ante.⁴¹ A rational forward-looking person takes care to avoid injuring others in order to avoid paying tort liability or serving jail time later. In the case of a manufacturer or retailer that expects subsequent liability, the present discounted value of the expected future liability becomes part of the costs of production.⁴²

The choice between ex ante and ex post may foreclose some regulatory options, however. Obviously, giving someone new information is not a useful regulation strategy after they've already made their decision—no one is calling for mortgage lenders to disclose the real annual costs of loans within six months *after* the mortgage agreement is signed. Similarly, many “nudges” rely on the government's ability to structure the cognitive setting for an individual's decision, such as putting bananas close to the register or making retirement

37. Hanson & Logue, *supra* note 14, at 1268.

38. *Id.* at 1273. It is possible that some rules may fall in between the two. For example, for a typical ex ante rule, the government must decide the price or quantity limit to impose before the regulated action takes place. In a typical ex post rule, the regulated party does not pay any penalty until well after they have engaged in the regulated activity. What about a regulation that imposed an up-front price for engaging in an activity, but allowed the regulated party to defer payment for a long period? I think this would be a hybrid, neither purely ex ante nor purely ex post. As we'll see, there are distinctive policy arguments that follow from each of those two choices, and the hybrid rule could be subject to some of the policy arguments that I call ex ante (those that apply to the informational limits of choosing the government's path in advance) and others that I call ex post (those that apply to the possibility of myopic or judgment-proof defendants).

39. *Id.*

40. Christine Jolls, *On Law Enforcement with Boundedly Rational Actors*, in *THE LAW AND ECONOMICS OF IRRATIONAL BEHAVIOR* 268, 272 (Francesco Parisi & Vernon L. Smith eds., 2005).

41. *Id.*; see Sugarman & Sandman, *supra* note 10, at 1418.

42. Hanson & Logue, *supra* note 14, at 1273.

savings the default option.⁴³ By definition, these tools are no longer useful once the decision is made.

B. Uncertainty and the Case for Ex Post Regulation

If ex ante and ex post regulation are usually equivalent, how should regulators go about choosing between them? As we will see, the assumptions that equivalence requires—full information, rational actors, and liquidity—can fail. Prior commentators have tended to emphasize the possibility that government will lack full information over the other considerations. On that basis, they have argued that ex post regulations will often be preferable to ex ante solutions. For instance, in their epic 1998 treatment of tobacco regulation, Jon Hanson and Kyle Logue argue for tort liability over cigarette taxes.⁴⁴ More recently, Victor Fleischer has urged that we “curb our enthusiasm” for Pigouvian taxes, which he describes as instruments that the government must generally impose ex ante.⁴⁵

As these authors have shown, information is important in regulating externalities when the marginal benefit varies significantly across externality producers. When policy makers cannot perfectly identify the marginal benefit from regulating a given producer, social welfare is lower even when government correctly identifies the *total* marginal benefit across all producers.⁴⁶

It's worth developing this point in a bit more detail. Remember from Part II.A. that the government's goal is for externality levels to

43. RICHARD H. THALER & CASS R. SUNSTEIN, *NUDGE* 17–39 (rev. & expanded ed. 2009). One might argue that nearly any quantity regulation is essentially ex ante; it is not meaningful to impose a limit on the amount of mercury a factory emits after it has emitted it. That might be right, but it raises surprisingly difficult questions about the definitions of the ex ante/ex post and price/quantity categories. One could impose a mercury limit ex ante, but penalties for exceeding it might only be imposed in administrative proceedings years later. Perhaps the best response here is to observe that the categories are intended to be analytically simplifying, not absolute. There are policies that have more of the classic features of a pure ex ante rule, and those that have less. Regulations that fall in the middle, such as the mercury limit, might present a mix of features. For instance, the hypothetical mercury limit probably is the worst of both worlds. As we will see, like a pure ex ante rule, it is set in advance, when the government has less information, but like an archetypical ex post rule its enforceability depends on the liquidity of the defendant, diminishing its deterrent effect.

44. Hanson & Logue, *supra* note 14, at 1273–78.

45. Fleischer, *supra* note 21, at 20–21.

46. *Id.* at 24–29; Hanson & Logue, *supra* note 14, at 1268–70; Shavell, *supra* note 20, at S256; Strnad, *supra* note 10, at 1244; *see also* Wittman, *supra* note 12, at 200 (pointing out that uniform ex ante punishments may be inefficient when externality producers vary in their propensity to cause harm); *cf.* Steven Shavell, *Strict Liability vs. Negligence*, 9 J. LEGAL STUD. 1, 5 (1980) (noting that if consumers perceive only average, rather than firm-specific, risk, then firms have no incentive to reduce harms).

match exactly the point at which producers' marginal costs and the social marginal benefits of regulation intersect. As we also saw, when producers vary in their marginal cost schedules, price instruments cause the (rational) lower-cost producers to change their behavior more than high-cost producers, which helps to ensure that society achieves its goals at the lowest overall cost.

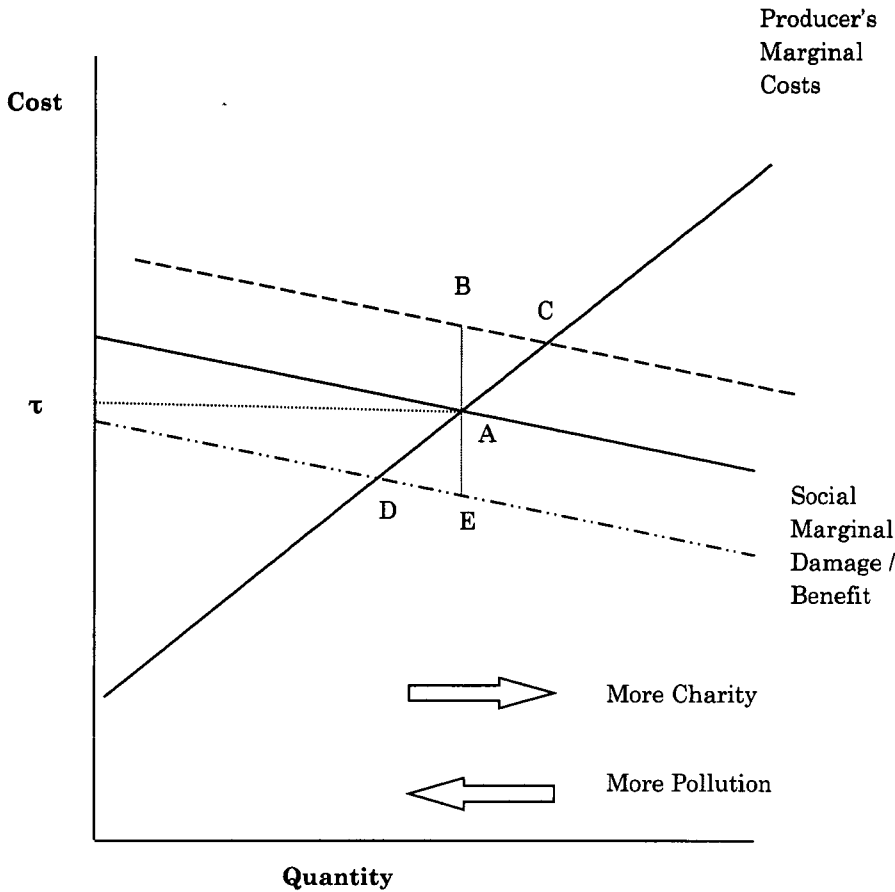
What happens, though, when producers vary in the amount of harm or benefit they create, but the government sets only one price?⁴⁷ Let's say that the price reflects the average of the benefit schedules of all the producers, and suppose that the resulting equilibrium price, *tau*, is \$100. Now let's take producers in Lake Wobegon, where everyone is above average.⁴⁸ These producers could create \$110 worth of externality correction for a cost of \$100; their marginal social damage curve is reflected by the top, dashed, line in Figure 2 below. Alternatively, imagine that we have some producers in Pawnee, where everyone is below average,⁴⁹ represented by the dash-dot line in Figure 2. Pawnee producers could create only \$90 worth of correction for a cost of \$100.

47. For a parallel and more rigorous mathematical exposition, see Kaplow & Shavell, *supra* note 14, at 775–79, and Alf Erling Risa, *Preference Revelation in Strict Liability Product Safety Markets*, 14 INT'L REV. L. & ECON. 41, 49–52 (1994). My analysis assumes away the possibility that enforcement and measurement costs could vary with marginal social damage; including that would complicate the analysis but leave the end results largely similar. See generally A. Mitchell Polinsky & Daniel L. Rubinfeld, *The Welfare Implications of Costly Litigation for the Level of Liability*, 17 J. LEGAL STUD. 151, 151–61 (1988); A. Mitchell Polinsky & Steven Shavell, *Enforcement Costs and the Optimal Magnitude and Probability of Fines*, 35 J.L. & ECON. 133, 133–39 (1992).

48. *National Geographic: In Search of Lake Wobegon*, GARRISONKEILLOR.COM (Dec. 2000), <http://www.garrisonkeillor.com/national-geographic-in-search-of-lake-wobegon/> [http://perma.cc/4ZFB-GG5E].

49. See, *City of Pawnee Photos*, PAWNEE INDIANA, <http://www.pawneeindiana.com/about/town-slogans.shtml#> (last visited Aug. 30, 2015) [http://perma.cc/2JD2-RNT6] (click “Next” to view photo “12/12,” a slogan for Pawnee that reads: “First in Friendship, Fourth in Obesity”); see also *Parks & Recreation: Time Capsule* (NBC television broadcast Feb. 11, 2011).

Figure 2



It appears from Figure 2 as though the government has missed an opportunity with our Wobegon producers. The optimal price for them, at point C, was greater than one hundred: If government had set a higher price, it could have achieved additional efficiencies.⁵⁰ This missed opportunity is measured by the triangle ABC. What about our below-average friends in Pawnee? The government should have set a lower price for them, the value of *tau* that corresponds to Point D. This would have avoided wasteful over-correction, as measured by triangle ADE in Figure 2.

50. To know exactly the value of *tau* at point C, we would also need to know the marginal cost curve of the Wobegon producers.

Some geometry can give us a sense of the social waste, or “deadweight loss,” involved in setting prices too high or too low for any given producer.⁵¹ As with any deadweight loss triangle, the marginal social loss will increase roughly in proportion to the square of the vertical distance each producer is from the equilibrium point.⁵²

As Kaplow and Shavell illustrate, this basic fact implies that when marginal social benefit varies across producers, and the government must choose one and only one price, the best the government can do is to minimize the area of all the deadweight loss triangles.⁵³ It should, in other words, identify the overall equilibrium price that minimizes the sum of the squared vertical distance to all the individual equilibrium points. Equivalently, the government could attempt to minimize the variance of the equilibrium points; variance is the expected (or, essentially, the average) squared distance for each point from the mean.⁵⁴ The variance-minimizing point will differ from the median or middle of the distribution mostly in that it will give greater weight to “outliers” that fall far from the center of the population.⁵⁵

Variance-minimization is a strategy for regulating a varied world using a single price, but government is not necessarily limited to setting only one price. In theory, with perfect information, government would identify the exact benefit created by regulating each producer, and set a price unique to that producer.⁵⁶ Of course, information—or the lack of it—is what stymies this strategy. Because regulators usually do not have data this precise, they must rely on second-best approaches.⁵⁷

Fleischer and others argue that this informational dilemma counsels in favor of ex post remedies.⁵⁸ Once the externality producer

51. For a basic discussion of the concept of deadweight loss, see GRUBER, *supra* note 28, at 51–52, 590–601.

52. *Id.* at 594–95.

53. Kaplow & Shavell, *supra* note 14, at 775–79.

54. WILLIAM MENDENHALL ET AL., INTRODUCTION TO PROBABILITY AND STATISTICS 60 (Michelle Julet et al. eds., 14th ed. 2012).

55. *Id.* at 54, 60.

56. Kaplow & Shavell, *supra* note 14, at 724–25.

57. Louis Kaplow & Steven Shavell, *On the Superiority of Corrective Taxes to Quantity Regulation*, 4 AM. L. & ECON. REV. 1, 7–10 (2002).

58. RICHARD A. POSNER, ECONOMICS ANALYSIS OF LAW 490–91 (8th ed. 2011); Fleischer, *supra* note 21, at 21–22; Hanson & Logue, *supra* note 14, at 1278; Shavell, *supra* note 20, at S258–59; Wittman, *supra* note 12, at 200. Gerrit De Geest and Giuseppe Dari-Mattiacci call this the “specification problem.” Gerrit De Geest & Giuseppe Dari-Mattiacci, *The Rise of Carrots and the Decline of Sticks*, 80 U. CHI. L. REV. 341, 388 (2013).

Shavell argues for ex post instruments on an additional ground. He suggests that ex ante, the government cannot easily incentivize victims to take steps to mitigate their own exposure to

has already acted, it becomes easier to assess the consequences of her particular actions.⁵⁹ Tort judgments, for instance, aim to match the defendant to the exact harm she caused, not some average of the expected harm caused by all defendants. Some commentators would also describe tort as a form of Pigouvian “tax.”⁶⁰ Whatever the terminology, Fleischer’s central point remains: correcting externalities *ex ante*, such as through an income or a sales tax, requires government to make decisions before it has full information.

It is worth emphasizing that this informational critique depends heavily on the assumption of unobservable heterogeneity across externality producers.⁶¹ So, for instance, Fleischer finds little problem with taxing carbon emissions: even if society is not sure about the long-run effects of climate change, we are confident that the damage done by a ton of carbon is roughly the same whoever emits it.⁶² Presumably, he also would not object to toll charges for trucks based on their weight: we can measure fairly well the damage heavy vehicles do to roads, and send them to weigh stations to compute that figure precisely. In contrast, whether a glass of wine each day is beneficial or not may depend on (among other things) the genetic makeup, job status, and physical activity of the drinker.⁶³

In any event, my goal over the rest of the paper is to reassess this argument in favor of *ex post* regulation. How clear-cut is the informational advantage? And what about those two other assumptions?

III. REVISITING THE INFORMATION CASE FOR WAITING

We’ve just seen that prior authors argue that government’s lack of information usually counsels in favor of *ex post* regulation. In this Part, I will argue that the information worry may be somewhat overstated. Using a set of mathematical simulations, I show that, with just a little flexibility and some modest information, government can achieve much better results than other authors have appreciated. If government can employ two or three prices, and do a reasonably good

damage. Shavell, *supra* note 20, at S257. But this argument assumes government must use a single instrument to achieve double liability at the margins. As De Geest and Dari-Mattiacci point out, this is not necessary. De Geest & Dari-Mattiacci, *supra*, at 352 n.34. For example, government could impose a tax on polluters and a separate tax or reward for those who invest in mitigating the extent to which they are damaged by pollution.

59. Hanson & Logue, *supra* note 14, at 1278; Shavell, *supra* note 20, at S255–56.

60. Fleischer, *supra* note 20, at 3.

61. *Id.* at 19.

62. *Id.* at 29.

63. Strnad, *supra* note 10, at 1299–1300.

job of sorting producers into those two or three categories, the cost of producer heterogeneity is much less. This is not to say that regulating in advance is perfect, only that it is less costly than the literature so far suggests.

Prior authors seem to assume that government's need for information is high because it must try to closely match prices to marginal social benefits. For example, Strnad and Fleischer each oppose price regulation of unhealthy foods on the ground that the perils of excess diet vary widely across the population.⁶⁴ They argue, probably rightly, that it would be impossible to implement in advance a regime that made each individual pay the costs her consumption will impose.

My claim is that it is both unnecessary and undesirable for the government to match price and marginal benefit so closely. I will attempt to show that even one additional price can greatly reduce deadweight loss. Kaplow and Shavell argue that marginal price is always set optimally at the average expected damage, but this appears to assume that government must set only one price at a time.⁶⁵ My analysis essentially broadens theirs to include the case where government has the power to set multiple prices.

Multiple prices can reduce deadweight loss by diminishing the size of the government's errors. When the government can use more than one price, the deadweight loss of uncertainty about marginal damage depends not on the overall variance across all producers, but instead on the variance within each "cluster," or grouping, that the government uses (and on the government's accuracy in assigning a producer to a cluster).⁶⁶ That is, for each individual, the deadweight loss caused by government mispricing is a function of the distance between the price that individual faces and the marginal social benefit of correcting the externality. Under multiple prices, the government can in effect divide up the population and assign members to the price that is closest to them, thereby diminishing deadweight loss.

How big is this effect? Deadweight loss is a function of the square of the vertical distance from the government's price.⁶⁷ In simple models where our marginal cost and benefit curves are fairly linear over the region of interest, the government should, with two prices and perfect assignment of each member to the nearest price, be able to halve the average distance from each individual to the nearest price, and

64. Fleischer, *supra* note 20, at 31–32; Strnad, *supra* note 10, at 1244.

65. Kaplow & Shavell, *supra* note 14, at 725.

66. For an explanation of clusters as a statistical concept, see JEFFREY M. WOOLRIDGE, *ECONOMETRIC ANALYSIS OF CROSS SECTION AND PANEL DATA* 853 (2d ed. 2010).

67. GRUBER, *supra* note 28, at 125.

therefore to cut deadweight loss to something like a quarter of what it achieves with one price.⁶⁸

This also implies that the incremental benefit of adding more prices falls quickly; most of the social gain the government achieves will come from adding just a handful of within-group distinctions. With 3 prices and an even distribution of individual values, the average distance falls to 1/3 of the single-price policy. Since deadweight loss is a function of the squared distance, the deadweight loss from the new policy should yield deadweight loss of about 1/9, or 11%, of what a single price produces.⁶⁹ With four prices, distance falls to 1/4, yielding deadweight loss of 1/16, or 6.7%. So if we started with a deadweight loss of 100, our progression from one price to four would yield deadweight losses of 100, 25, 11, and 6.7, respectively. In this ideal world, we could eliminate 89% of all the deadweight loss caused by mispricing with just two additional price points.

A critical assumption I've made so far is that government has enough information to correctly assign each producer to the nearest price. What happens when the regulator sometimes makes mistakes, treating some high-damage producers as low, or vice-versa? Errors in assignment will result in greater deadweight loss than under only one price, as the producer will often be farther away from the wrong price than they would have been if there were only a single price. So ultimately any benefit will involve a balancing between reducing variance within each cluster and losses from misassignment. Producers who are very close to the border between two categories will be the hardest to get right, of course, but then the loss from misassigning those will be relatively smaller.

To get a sense of how these tradeoffs might play out, I construct a set of simulated Pigouvian taxes with errors in the government's observations of the marginal social benefit produced by regulating each individual externality producer. For each simulation, I generate a

68. Or, with a bit more math, and assuming that both cost and marginal damage curves are essentially flat over the region of interest, we can say that the deadweight loss of a deviation, delta, is equal to:

$$\delta^2 (\beta_c + \beta_d) / 2\beta_c^2$$

where β_c and β_d are the slopes of the marginal cost and marginal damage curves, respectively. When delta falls from 1 to .5, the result should be .25 of the original value, whatever the slopes may be. Actual results may vary somewhat, since the deviation of each producer may not be uniformly distributed around the mean.

69. For instance, suppose a distance (delta) of 9. That should produce a deadweight loss of 81 times the quantity $(\beta_c + \beta_d) / 2\beta_c^2$. If delta falls to 3, the resulting deadweight loss is only 9 times $(\beta_c + \beta_d) / 2\beta_c^2$.

normally distributed random scatter of 200 marginal damage points around a mean of 100. Using some arbitrary but real-world plausible parameters, I calculate the expected deadweight loss to the government of using only a single, variance-minimizing price for each scatter.⁷⁰ For each scatter, I then allow the government to use two prices, each minimizing the variance of the cluster of prices above or below the average, respectively. After that, I allow the government to use a third price, dividing the sample into low, middle, and high.

When I calculate the deadweight loss for the two- and three-price policies, I assume that government can only observe each MSB point estimate with some degree of randomly-generated error. Government assigns each observation to the price that is closest to the erroneously measured value. The government's measurement error is itself a randomly-generated number with a normal distribution around zero. I generate twenty distributions of 200 random observations. For each grouping of MSB observations, I rerun the results four times, with the standard deviation of the observation errors being equal to, one-half, one-quarter, and one-eighth the standard deviation of the true population, respectively.

Table One summarizes the results. In the table, column two reports the simulated deadweight loss (using arbitrary slope parameters) the government would encounter if it used only one price, averaged over the twenty repetitions of the experiment. Columns three and four are headed "Ratio of Two-to-One-Price DWL" and "Ratio of Three-to-One-Price DWL." These columns are reporting the difference in outcomes between a one-price regulatory strategy and a strategy in which government can use two or three prices, respectively. To generate them, I calculate the simulated deadweight loss under the alternative price strategy, and then divide that number by the figure in column two. Going down the table, the rows represent results when the experiment is repeated with smaller and smaller distributions of the government's observation errors.

70. I estimate deadweight loss following the formula in footnote 68, setting the slope of the marginal cost curve to 2 and the marginal damage curve to .5. I conduct several alternative simulations with differing values of these parameters. Although the resulting deadweight loss of course varies, my results for the *ratio* of deadweight losses in Table 1 is essentially unchanged whatever the slope parameters.

Table 1: Simulations of Multi-Price vs. One-Price Linear Taxes, with Simulated Errors

(1)	(2)	(3)	(4)	(5)	(6)
Ratio of Standard Deviations for Observations: Errors	Projected Deadweight Loss	Ratio of Two- to One-Price DWL	Ratio of Three- to One-Price DWL	Number of Errors, Two Prices	Number of Errors, Three Prices
1	96231 (62316)	.741 (.100)	.728 (.081)	49.25 (7.55)	82.35 (6.46)
2	95453 (59881)	.506 (.047)	.393 (.051)	29.75 (5.78)	53.45 (7.07)
4	93238 (58724)	.405 (.028)	.253 (.018)	17.05 (3.49)	27.9 (4.69)
8	93434 (57592)	.378 (.028)	.226 (.028)	8.8 (2.98)	14.9 (4.75)

Notes: Values reported together with (standard deviation). The “number of errors” columns report the number of observations where the measurement error is large enough to cause the government to impose a price other than the optimal price that would apply to the true value of the observation.

Table One tells a story in which multiple prices can often improve on a single one even when information is far from perfect. In the first row, when government is almost literally guessing—the distribution of its errors is the same as the distribution of the population—multiple prices are barely statistically distinguishable from one. When I calculate the ratio of deadweight loss for two prices to the deadweight loss for one price, the 95% confidence interval runs from .541 to .941. When regulators can do better than that, multiple prices achieve, if not the utopian results we would get in an errorless world, still quite respectable improvements. For example, the second row from the bottom shows simulations where the standard deviation of the population is four times the standard deviation of the simulated observation errors.⁷¹ In that case, as column four shows, three prices

71. To put this another way, the ratio between the two standard deviations captures which varies more: the real-world population, or the government’s observation of it. When the ratio is

produce deadweight loss of, on average, only a quarter of the deadweight loss using a single price.

These results also imply that infinite price flexibility is not optimal, especially in a world with some observational error. With more price categories, it is easier for the government to mistakenly assign a producer to the wrong price point. We see in the simulations that returns when using multiple prices diminish rapidly, especially when measurement errors are large. Let's say that it is also at least a little costly to build a regulatory system that can make each additional price distinction. The payoff for incurring this cost may quickly approach zero. If my simulation results are at all representative of the real world, it will rarely be worthwhile to design systems that can distinguish between even half a dozen different prices. Regimes such as the tort system, which are built to match price exactly to each defendant, may be wastefully over-investing in precision.

In sum, while there clearly are advantages to waiting, that advantage may be more limited than prior authors assume. If government can be reasonably confident *ex ante* in its ability to divide the population into two or three groups, it can achieve most of the benefits that waiting would provide. And government's *ex ante* sorting ability is not fixed; regulators can run experiments, learn from past mistakes, and improve their pricing systems over time.⁷²

IV. THE MYOPIA PROBLEM

Even assuming that waiting supplies more useful information, the critical question remains whether this additional information comes at too steep a cost. To allow us to generalize across fields, I will abstract away from features that might be specific only to one form of *ex post* instrument; for instance, I will not discuss the problem that tort suits face if individual harms are smaller than expected plaintiff court costs and class-action suits are restricted.⁷³ There remain several general factors that can break the relation between *ex post* remedies and *ex ante* behavior, including myopia and liquidity—that is, actors might not be perfectly forward-looking, and might not have unlimited ability to pay the *ex post* penalty. While policy makers and commentators have

larger, the government's errors are spread over a smaller space than the distribution of the population itself, implying that the government is less and less likely to make a very large mistake.

72. See Galle, *supra* note 9, at 862–63 (making this point about both priced and unpriced instruments).

73. See Oren Bar-Gill & Elizabeth Warren, *Making Credit Safer*, 157 U. PA. L. REV. 1, 77–78 (2008) (noting that these factors have limited usefulness of *ex post* remedies in regulation of consumer credit); Shavell, *supra* note 20, at S260 (acknowledging this problem).

invented or proposed several solutions to these problems, their alternatives are all socially costly. This Part and the next look at these issues more closely.

Myopia, for readers who are not bespectacled, means shortsightedness. Actors who do not account for the future are of course difficult to affect with ex post incentives. As Manuel Utset and I have described, extensive evidence shows that humans tend to be excessively inattentive to future events.⁷⁴ In addition, in many cases we are rationally shortsighted. If I expect to be dead before the government catches up to me, I'm not so worried about the bill.⁷⁵ This is a common problem in toxic tort litigation, where damages and court proceedings take decades to resolve.⁷⁶ Similarly, as our friends in Detroit or Greece can attest, politicians may not worry about ruining their county or country credit rating, because they could be out of office by the time the day of reckoning arrives.⁷⁷

Externality producers may also rationally be myopic when the government cannot credibly commit to following up on its threats or promises.⁷⁸ Sometimes the problem is pure politics: producers expect that their concentrated lobbying efforts, set against the interests of a rationally ignorant general electorate, stand a good chance of warding off the worst punishments.⁷⁹ In governments where political corruption

74. Brian Galle & Manuel Utset, *Is Cap & Trade Fair to the Poor? Short-Sighted Households and the Timing of Consumption Taxes*, 78 GEO. WASH. L. REV. 34, 63–67 (2010). For review of evidence in the disaster context, see Howard Kunreuther & Mark Pauly, *Rules Rather Than Discretion: Lessons from Hurricane Katrina*, 33 J. RISK & UNCERTAINTY 101, 105–06 (2006).

75. On the other hand, admittedly many contributors to charity seem to be motivated by building a lasting legacy for themselves after their passing.

76. Michael D. Green, *Successors and CERCLA*, 87 NW. U. L. REV. 897, 900–07 (1993). CERCLA, the federal toxic waste liability regime, attempts to resolve this dilemma by tying liability for cleanup to the polluter's property, so that purchasers inherit the liability. *Id.* Similarly, some state common-law regimes impose liability for torts on both a firm and its successors. John H. Matheson, *Successor Liability*, 96 MINN. L. REV. 371, 383–400 (2011). In this way, expected future liabilities reduce the current value of the asset, translating the ex post liability into an ex ante cost. For the translation to work properly, however, it must be the case that prospective buyers accurately discount the value of the property by the amount of the expected liability. Michael D. Green, *Successor Liability: The Superiority of Statutory Reform to Protect Products Liability Claimants*, 72 CORNELL L. REV. 17, 47 (1986). And, of course, the seller may fail to disclose all of the potential hazards of a property, and may be long gone or judgment proof by the time of any later suit to recover for that failure. *Id.*

77. Alberto Alesina & Guido Tabellini, *A Positive Theory of Fiscal Deficits and Government Debt*, 57 REV. ECON. STUD. 403, 412 (1990); Lars P. Feld & Gebhard Kirchgassner, *Does Direct Democracy Reduce Public Debt? Evidence from Swiss Municipalities*, 109 PUB. CHOICE 347, 350 (2001).

78. Cheryl D. Block, *Overt and Covert Bailouts: Developing a Public Bailout Policy*, 67 IND. L.J. 951, 968–72 (1992).

79. Jonathan R. Macey & James P. Holdcroft, Jr., *Failure Is an Option: An Ersatz-Antitrust Approach to Financial Regulation*, 120 YALE L.J. 1368, 1370 (2011); see Finn E. Kydland & Edward

is extensive, the producer can anticipate that simple bribery will serve the same function. Either way, since most of the social cost is an externality for government officials, the producer should expect that the required payout could well be far less than the optimal Pigouvian price they would otherwise face.⁸⁰ Benefits play out similarly, as officials can threaten to hold up a stream of subsidies in exchange for “rents.”⁸¹

Both U.S. and world evidence tend to confirm this story. U.S. firms lobby most intensively when in trouble or facing regulatory action, and the average returns to lobbying can exceed ten dollars for every dollar spent.⁸² Recent studies of historical wealth inequality also tell a similar tale. Researchers argue that strong correlations between inequality and slow economic growth can be explained by the possibility that, once entrenched interests can capture the political process, regulation of the economy becomes more and more inefficient.⁸³

Other producers may feel relatively impervious to later threats because they know that it will be difficult for the government to punish them without also hurting innocent bystanders. Banks that are too big to fail—and therefore too big to be regulated effectively—are a recent example.⁸⁴ Another prominent group in a similar position are homeowners in disaster-prone areas. Governments often directly insure property against flood, or implicitly offer backup insurance in the form of disaster relief for flood or fire.⁸⁵ Homeowners may rely on this expectation of repayment and decide not to invest fully in disaster-

C. Prescott, *Rules Rather Than Discretion: The Inconsistency of Optimal Plans*, 85 J. POL. ECON. 473, 473–75 (1977) (noting that “decisions of economic agents depend in part upon their expectations of future policy actions.”).

80. See SUSAN ROSE-ACKERMAN, CORRUPTION AND GOVERNMENT: CAUSES, CONSEQUENCES, AND REFORM 79 (1999) (noting that expected value of positive regulatory outcome often greatly exceeds pay of government officials).

81. *Id.* at 115, 117.

82. See Frank Yu & Xiaoyun Yu, *Corporate Lobbying and Fraud Detection*, 46 J. FIN. & QUANTITATIVE ANALYSIS 1865, 1866 (2012) (reporting that fraud-committing firms spend more on lobbying, and that lobbying delays detection of fraud). For information on the returns to lobbying, see Matthew D. Hill et al., *Determinants and Effects of Corporate Lobbying*, 42 FIN. MGMT. 931, 933, 955 (2013) (summarizing prior studies and reporting new findings). These latter studies should probably be taken with several grains of salt, as the econometric challenges in correctly identifying causation are significant.

83. Daron Acemoglu & James A. Robinson, *Economics Versus Politics: Pitfalls of Policy Advice*, 27 J. ECON. PERSP. 173, 177–89 (2013). A helpful overview is James R. Repetti, *Democracy, Taxes, and Wealth*, 76 N.Y.U. L. REV. 825, 840–50 (2001).

84. Levitin, *supra* note 16, at 439; see also Clayton P. Gillette, *What States Can Learn from Municipal Insolvency*, in WHEN STATES GO BROKE 99, 119–21 (Peter Conti-Brown & David A. Skeel, Jr. eds. 2012) (explaining that states can avoid ex post federal sanctions by threatening to cause greater harm if those sanctions are imposed).

85. JUSTIN R. PIDOT, COASTAL DISASTER INSURANCE IN THE ERA OF GLOBAL WARMING 12–17 (2007).

proofing their homes (or might build more lavish houses in places more prone to disaster).⁸⁶ While government may threaten that it will not help owners who failed to protect themselves, leaving neighborhoods scarred and unrepaired damages property values, and property-tax revenues, for everyone.⁸⁷

Regulators can respond at least to the political aspect of this problem by designing commitment devices, but those options are often socially costly. For example, the government can delegate the power to make enforcement decisions to a politically insulated third party, and design that party's incentives in a way that encourages enforcement even in the face of stout political opposition.⁸⁸ The tradeoff, of course, is in flexibility and public accountability.⁸⁹ The third party's rules have to be written in advance, but sometimes the regulatory environment changes in a way that makes those rules look foolish. For example, state governments face judicially-enforced constitutional or statutory limitations on their power to borrow⁹⁰ as a way of constraining state officials from passing the costs of their spending decisions on to later taxpayers. During deep recessions that rule proved disastrous. States cut budgets and hiked taxes dramatically when they should have been doing the opposite.⁹¹

Other devices to translate the future into the past can also be quite costly, introduce increased risk of mis-measurement, or both. For example, credit rating agencies can help voters to recognize the future risk of fiscal failure that their officials are taking on. Bad ratings also raise the cost of borrowing, imposing a budget pinch on contemporary legislators.⁹² Although ratings for municipal debt did not suffer the catastrophic failure that afflicted ratings for securitized private debt,

86. See Raymond J. Burby, *Hurricane Katrina and the Paradoxes of Government Disaster Policy: Bringing About Wise Governmental Decisions for Hazardous Areas*, 604 ANNALS AM. ACAD. POL'Y & SOC. SCI. 171, 180–81 (2006). But see Adam F. Scales, *A Nation of Policyholders: Governmental and Market Failure in Flood Insurance*, 26 MISS. C. L. REV. 3, 12–13 (2007) (pointing to empirical evidence that seems to undercut this aspect of the moral hazard theory).

87. KEITH SMITH, ENVIRONMENTAL HAZARDS: ASSESSING RISK AND REDUCING DISASTER 107–11 (6th ed. 2013). Kunreuther and Pauly argue that the failures of disaster insurance are due more to irrational than rational myopia, Kunreuther & Pauly, *supra* note 74, at 106, but either way my general point remains.

88. Galle, *supra* note 18, at 848.

89. *Id.* at 847–48.

90. See Arik Levinson, *Balanced Budgets and Business Cycles: Evidence from the States*, 51 NAT'L TAX J. 715, 717 (1998).

91. See *id.* at 715, 721; see also Brian Galle & Kirk J. Stark, *Beyond Bailouts: Federal Tools for Preventing State Budget Crises*, 87 IND. L.J. 599, 609 (2012).

92. Craig L. Johnson & Kenneth A. Kriz, *Impact of Three Credit Ratings on Interest Cost of State GO Bonds*, 23 MUN. FIN. J. 1, 1–16 (2002).

the securitized debt debacle does illustrate the possibility that actors can game or influence rating systems.⁹³ I discuss insurance, which can serve a similar informational function, in more detail in the next Part. For now, it may suffice to say that insurers can only price as accurately as the information they can collect from insureds. Insurance companies may threaten sanctions, such as coverage denial, for insureds who are not fully forthcoming, but many myopic actors will be relatively insensitive to that danger.

V. THE LIQUIDITY PROBLEM

Externality producers may also fail to take full account of future liabilities if they expect to be judgment-proof by the time enforcement occurs.⁹⁴ Prior commentators describe this as a problem of liquidity—that is, the producer lacks the cash to cover its penalty, and cannot borrow enough money to pay.⁹⁵ Liquidity raises some issues in addition to the myopia problem. For example, even if producers may not anticipate being judgment proof, so there is no myopia, illiquid producers would reduce the amount of revenue available to compensate victims or lower taxes. In the case of ex post carrots, producers may be unable to self-finance until the time their promised rewards kick in, making them dependent on loans or equity investors. Again, many of these problems have solutions, but the solutions are themselves costly.

Hanson and Logue propose two possible solutions to the problem of illiquid producers in an ex post regime. They note in passing that firms could be required to post a bond that would cover their potential liabilities.⁹⁶ Their main analysis, though, focuses on the possibility of requiring firms to purchase insurance against liability, an option that Logue and other co-authors have also developed in later work.⁹⁷ To be clear, Professor Logue does not argue that these options will work in all scenarios, but instead offers these possibilities as options that may sometimes make ex post regulation more effective.

93. Kathleen C. Engel & Patricia A. McCoy, *A Tale of Three Markets: The Law and Economics of Predatory Lending*, 80 TEX. L. REV. 1255, 1288 (2002); Frank Partnoy, *Historical Perspectives on the Financial Crisis: Ivar Kreuger, the Credit-Rating Agencies, and Two Theories About the Function, and Dysfunction, of Markets*, 26 YALE J. ON REG. 431, 436–43 (2009).

94. See Wittman, *supra* note 12, at 204.

95. See Viscusi & Zeckhauser, *supra* note 20, at 1721.

96. Hanson & Logue, *supra* note 14, at 1300.

97. *Id.*; see also Omri Ben-Shahar & Kyle D. Logue, *Outsourcing Regulation: How Insurance Reduces Moral Hazard*, 111 MICH. L. REV. 197, 238–47 (2011). Kyle Logue and Joel Slemrod also observe that *respondeat superior* liability and similar concepts can provide a fallback if the primary defendant is judgment-proof. Kyle D. Logue & Joel Slemrod, *Of Coase, Calabresi, and Optimal Tax Liability*, 63 TAX L. REV. 797, 818–19 (2010).

The duo are right to skip quickly past the bonding option. For one thing, accurately pricing the amount of the bond that a producer would have to hold requires much the same information that is required to set prices in the first place.⁹⁸ If we had that information, we could just use an ex ante instrument. Requiring bonding also could foreclose many socially useful investments by cash-strapped entrepreneurs.⁹⁹ The money could be borrowed, of course. But any reasonable lender will set rates that depend in part on the likelihood that the bond will have to be paid over to the government instead of returned to the lender. At that point the bond lender becomes, in effect, an insurer.

Let's focus, then, on compulsory insurance. As Logue and his co-authors explain, insurance transforms ex post liability into ex ante costs.¹⁰⁰ To stay in business, insurers must assess the likely costs their clients will experience, and charge up-front prices that reflect those expected outlays. With perfect information and no other frictions, premiums would perfectly match average expected liability. That is, while the insured would collectively pay the full cost of their ex post damages, ex ante each producer would pay only a fraction of the cost, with riskier producers bearing a larger share.¹⁰¹ This greatly reduces the liquidity problem because producers are more likely to be able to cover a monthly insurance premium than a large tort payment, and smoothing out the large lump into small down payments considerably eases the pain of payment for risk-averse payers.¹⁰²

The insurance industry, though, is not frictionless and perfectly informed. To make a very long story short, insurers face not only moral hazard but also adverse selection, which is the propensity of high-cost insureds to prefer more generous plans.¹⁰³ Adverse selection results

98. Cf. Henry Hansmann & Reinier Kraakman, *Toward Unlimited Shareholder Liability for Corporate Torts*, 100 YALE L.J. 1879, 1927 (1991) (raising this information problem as an obstacle to mandating that firms hold minimum amounts of capital available for paying tort claimants).

99. Cf. LoPucki, *supra* note 4, at 88 (arguing that bonding requirements would make it impossible for some investors to launch businesses).

100. Ben-Shahar & Logue, *supra* note 97, at 233; see also STEVEN SHAVELL, *ECONOMIC ANALYSIS OF ACCIDENT LAW* 210–11 (1987) (claiming that insurers can design contract terms to induce insureds to take optimal care).

101. Ben-Shahar & Logue, *supra* note 97, at 233.

102. Shavell, *supra* note 20, at 260. A risk-averse actor is one who experiences diminishing marginal utility from wealth. The basic idea is that losing \$1,000 hurts much worse when we have \$10,000 in income than it does when we have \$1 million. Breaking a big payment up into small chunks diminishes the pain for the risk averse because each extra dollar that goes out the door hurts a little more than the one before it. Will a series of \$100 payments cause our defendant to lose her home? Probably not, but a one-time payment of \$10,000 might, assuming that our defendant cannot borrow to offset it.

103. Ronen Avraham, *The Economics of Insurance Law—A Primer*, 19 CONN. INS. L.J. 29, 43 (2012).

from the fact that there are many potential insurers (including the option of self-insurance).¹⁰⁴ Individuals who know that they are low-cost will not want to pay higher premiums to cover the expected costs of those who are high-risk. An insurer that sets prices high enough to cover high-risk parties therefore risks driving the low-risk, profitable parties to a competitor. Since the insurer cannot easily tell which insureds are high-cost, it faces the danger that all of them will be.

Insurers must invest heavily in contract design and claim processing, among other tools, to mitigate the damage from these problems.¹⁰⁵ In a compulsory system, as Lynn LoPucki points out, insureds have little incentive to share information honestly with their coverage provider.¹⁰⁶ Insurers also must hold large capital reserves, or buy their own insurance, or both, to protect against the possibility that their projections were wrong and costs exceed paid-in premiums.¹⁰⁷ And the presence of multiple insurers means that investments in cost-saving methods or technologies often produce large spillovers for rival insurers, making each firm's incentive to invest in them suboptimal.¹⁰⁸ On top of all of this, many insurers are run as for-profit businesses and must set aside some slice of what they take in to pay off their investors.¹⁰⁹

Proponents of "single payer" health care, along the lines of Britain's National Health Service, argue that single payer sharply constrains adverse selection.¹¹⁰ Single payer reduces adverse selection by requiring everyone to be in a single government pool, thereby preventing low-risk customers from defecting to a lower-cost plan.¹¹¹ A

104. Mark V. Pauly, *Overinsurance and Public Provision of Insurance: The Roles of Moral Hazard and Adverse Selection*, 88 Q.J. ECON. 44, 50 (1974).

105. Kenneth S. Abraham, *Environmental Liability and the Limits of Insurance*, 88 COLUM. L. REV. 942, 949 (1988).

106. LoPucki, *supra* note 4, at 82.

107. Scott E. Harrington, *Capital Adequacy in Insurance and Reinsurance*, in CAPITAL ADEQUACY BEYOND BASEL: BANKING, SECURITIES, AND INSURANCE 87, 88–90 (Hal S. Scott ed., 2005).

108. Ben-Shahar & Logue, *supra* note 97, at 230–31.

109. *But cf.* Peter Molk, *The Puzzling Lack of Cooperatives*, 88 TUL. L. REV. 899, 920 n.92 (2014) (noting the relative prevalence of consumer cooperatives in property insurance).

110. Alain Enthoven & Richard Kronick, *A Consumer-Choice Health Plan for the 1990s*, 320 NEW ENG. J. MED. 29, 32 (1989); Charles Wilson, *A Model of Insurance Markets with Incomplete Information*, 16 J. ECON. THEORY 167, 167–207 (1977).

111. Enthoven & Kronick, *supra* note 110, at 30; *see also* Anthony C. Fisher, *Environmental Externalities and the Arrow-Lind Public Investment Theorem*, 63 AM. ECON. REV. 722, 724 (1973) (making this argument for moral hazard). The "individual mandate" provisions of the Affordable Care Act take a step in this direction, but do not get all the way there. The mandate discourages very low-risk individuals from self-insuring—going without insurance altogether—or from buying only very low-value plans that would not satisfy the mandate. But it does not eliminate adverse selection *between* qualifying insurance plans.

single payer also internalizes all the cost savings of its investments. Critics of single-payer usually do not dispute these points, but instead focus on the potential inefficiencies of a government-run monopoly.¹¹²

The case for (and against) single-payer insurance can be translated into arguments for (or against) ex ante price instruments. Under an ex post penalty regime, it is private insurers who must develop information about the expected costs their customers will bear.¹¹³ In an ex ante regime the government bears that task. Either way, society must pay to design mechanisms for revealing information about costs before they happen. But an ex ante regime saves society on the costs of fighting adverse selection, because there is no longer competition between insurers.

On the other hand, competition among insurers could also lead to more innovative and cost-saving methods for revealing private information, or for enforcement and collection.¹¹⁴ As Ben-Shahar and Logue themselves acknowledge in a slightly different context, though, firms may prefer to free ride on the innovation efforts of others, leading to lower innovation than might be possible with a central authority that directed localized experiments.¹¹⁵ Alternatively, firms may innovate if innovation's value can be captured by the shareholders, but in that case

112. *E.g.*, Peter Diamond, *Organizing the Health Insurance Market*, 60 *ECONOMETRICA* 1233, 1243–44 (1992).

113. LoPucki, *supra* note 4, at 82.

114. *See* Ben-Shahar & Logue, *supra* note 97, at 233–34, 236–37 (arguing that private insurers have better access to information, stronger incentives to employ it, and more innovative tools for obtaining it). On yet another hand, allocating the information-gathering function to government rather than the private sector may lead to more accountability and transparency in the uses of private data. Amy Kapczynski, *The Cost of Price: Why and How*, 59 *UCLA L. REV.* 970, 1019 (2012).

115. Ben-Shahar & Logue, *supra* note 97, at 230–31 (predicting that reinsurers might not invest in innovation to the extent that the benefits are shared with other reinsurers). Professor Logue points out in conversation with this author that groups of insurers can collaborate for innovations that have collective rewards. Existing institutions, such as the Insurance Research Council, offer evidence that these collaborations are real and do produce real results. *INSURANCE RESEARCH COUNCIL, About the IRC and Its Mission*, <http://www.insurance-research.org/about> (last visited Aug. 4, 2015) [<http://perma.cc/Z2VW-LZWN>] (“The insurance industry has come to rely upon the IRC for critically needed property-casualty studies that are not ordinarily undertaken by other research organizations.”). However, members of the collective still have incentives to free ride on their fellows, so that unless the payoff from research is asymmetric (one contributor can gain much more from contributing than others), there are other private rewards for participation (such as, in the individual context, positive emotions from contributing to the group), or there are strong sanctions on free riders, the output of the organization is well below the optimal investment. *See generally* Carlo Carraro & Carmen Marchiori, *Stable Coalitions*, in *THE ENDOGENOUS FORMATION OF ECONOMIC COALITIONS* 156–57 (Carlo Carraro ed., 2003) (describing conditions for cooperative behavior between groups when there are positive spillovers); Todd Sandler & John Tschirhart, *Club Theory: Thirty Years Later*, 93 *PUB. CHOICE* 335 (1997) (summarizing the literature on conditions for production of goods that benefit members of group but not outsiders).

the benefits of the innovation are limited to a small segment of society.¹¹⁶

Moving away from the compulsory insurance analysis, government could also solve the judgment-proof producer problem by switching away from cash sanctions to other enforcement tools.¹¹⁷ That is the classic justification for imprisonment offered by students of the law and economics of crime.¹¹⁸ As I have explained in more detail elsewhere, carrots and “nudges” also serve that function.¹¹⁹ I did not consider, though, whether we should prefer *ex ante* over *ex post* carrots.

Ex post carrots, as I suggested at the outset of this Part, also pose a kind of liquidity problem. A would-be inventor needs to be able to build a working prototype in order to obtain a patent. Where does she get that money?¹²⁰ Innovation scholars recognize that the need for financing can be a very significant barrier to the research and marketing of new products.¹²¹ The problem is similar to the insurance problem: inventors often have private information about the value of the idea and the effort they will be willing to put into it. Investors charge a premium for taking on the risk that the value and effort will be low; transactional lawyers build (and charge for) complex contractual agreements to limit opportunism on both sides; and the very process of opening the invention process to group input and outside financial backers may transform and even undermine the innovative impulse.¹²²

116. See Brian Galle & Joseph Leahy, *Laboratories of Democracy? Policy Innovation in Decentralized Governments*, 58 EMORY L.J. 1333, 1400 (2009).

117. See Kaplow & Shavell, *supra* note 14, at 740 (suggesting that judgment-proof defendants may be an argument in favor of injunctive relief over damages).

118. A. Mitchell Polinsky & Steven Shavell, *The Theory of Public Enforcement of Law*, in 1 HANDBOOK OF LAW AND ECONOMICS 403, 411–12 (A. Mitchell Polinsky & Steven Shavell eds., 2007).

119. Galle, *supra* note 9, at 875.

120. Saul Levmore points to another potential liquidity issue in *ex post* rewards: the liquidity of the payor. His analysis focuses on rewards for rescue, and notes that a *private* duty to pay the rescuer might lead would-be rescuers to worry that the rescuee could not pay. Saul Levmore, *Waiting for Rescue: An Essay on the Evolution and Incentive Structure of the Law of Affirmative Obligations*, 72 VA. L. REV. 879, 888 (1986). We could easily extend this analysis to other kinds of *ex post* carrots. For instance, what is the expected value of a patent for a product that is mostly useful only in impoverished developing countries? See William W. Fisher & Talha Syed, *Global Justice in Healthcare: Developing Drugs for the Developing World*, 40 U.C. DAVIS L. REV. 581, 583 (2007). Vaccine manufacturers raise a version of this concern in their complaints that, given current reimbursement rates for vaccinations, new product development is not cost effective.

121. Ted Sichelman, *Commercializing Patents*, 62 STAN. L. REV. 341, 370–72 (2010).

122. Hemel & Ouellette, *supra* note 17, at 334–36; Shaun P. Mahaffy, Note, *The Case for Tax: A Comparative Approach to Innovation Policy*, 123 YALE L.J. 812, 842–43 (2013); see Ronald J. Gilson, *Locating Innovation: The Endogeneity of Technology, Organizational Structure, and Financial Contracting*, 110 COLUM. L. REV. 885, 894–905 (2010) (exploring the impact of these factors on organizational structure, and vice versa).

As patent scholars are beginning to recognize, these are the kinds of tradeoffs that go into the design of a government incentive system.¹²³ Patents are a form of ex post reward, and the fact that they pay off primarily after invention allows the incentive to, in part, reflect market opinion about the invention's value.¹²⁴ But, as we just saw, they carry heavy transactional costs in translating that value back in time to the moments of discovery and development. Society does have alternatives. The tax system, for instance, offers research and development deductions and credits that can be claimed immediately by profitable firms. However, these deductions and credits are based on how much the inventor spent rather than how much people will pay for the research.¹²⁵

Again, my point is not that ex post incentives are always ineffective. Waiting surely can provide additional information. But it is costly, and that has to be weighed in the balance too.

VI. THE SPECIAL PROBLEM OF LIMITED LIABILITY FIRMS

Finally, both myopia and liquidity issues pose particularly acute problems in the case of incentives aimed at corporations and other firms whose charters guarantee their investors limited liability. Hanson and Logue, for example, point to the danger that firms will deliberately pay out all their profits before liability arrives as "perhaps the most troublesome disadvantage" of ex post incentives.¹²⁶ They acknowledge that ex ante approaches may be preferable when defendants are judgment proof in this way.¹²⁷ As we've seen, firms that expect to be judgment proof will be difficult to influence with an ex post regime.

Even firms that will not make themselves judgment proof still pose special problems for an ex post approach, because firm managers may be insensitive to the threat of future sanctions. Firms of any size

123. See Hemel & Ouellette, *supra* note 17, at 333–45 (discussing pros and cons of ex post and ex ante rewards); Mahaffy, *supra* note 122, at 836–44 (discussing solutions to high delay costs in patents).

124. Hemel & Ouellette, *supra* note 17, at 376–77; see Brian D. Wright, *The Economics of Invention Incentives: Patents, Prizes, and Research Contracts*, 73 AM. ECON. REV. 691, 697–98 (1983) (making this point about the advantage of patents over both ex ante and some other ex post systems).

125. I.R.C. §§ 41(a), 174(a)(1) (2012). Since the credit is not refundable, neither it nor the deduction are immediately useful to inventors without other taxable income to offset, but each can be carried forward until the inventor does have income. *Id.* § 39.

126. Hanson & Logue, *supra* note 14, at 1307; see also Hansmann & Kraakman, *supra* note 98, at 1881 (noting evidence that firm structures are designed to minimize liability risk).

127. Hanson & Logue, *supra* note 14, at 1307; see also POSNER, *supra* note 58, at 491 (suggesting that ex ante regulations, such as restaurant inspections, are preferable for small businesses that would be difficult to collect against).

suffer from the infamous “separation of ownership and control.”¹²⁸ Government might try to affect shareholder incentives, but shareholders can only indirectly control the actual decision makers at the firm. Even if investors fully internalized the government’s preferences, the “slack” between shareholder wants and managerial action could allow the firm to drift well away from optimal externality production.¹²⁹ Adding in the wrinkle that the costs may come far in the future adds considerably to the agency slack, as now the firm’s owners must contract with the manager not only to protect their current interests but also those that occur long in the future. Corporate theorists have recently begun pitching proposals for incentivizing managers over the long run, but these ideas have proved controversial and so far are largely untested.¹³⁰

The problem may actually be worse if shareholders have fairly close control over managers. As commentators have long recognized, shareholders protected by limited liability do not actually internalize all the expected future costs of the firm.¹³¹ Their maximum exposure is the value of their stock, no more. In most cases, if their stock is relatively liquid, their downside risk is limited to the transaction costs of selling and the drop in price that might accompany bad news.¹³²

As a result, if government tries to regulate the managers of the firm directly, shareholders can undercut the government’s efforts by offering countervailing incentives of their own.¹³³ Both sets of incentives

128. Eugene F. Fama & Michael C. Jensen, *Separation of Ownership and Control*, 26 J.L. & ECON. 301, 312–15 (1983).

129. See Hansmann & Kraakman, *supra* note 98, at 1907–08 (acknowledging this possibility but arguing that shareholders could design incentives to reduce its likelihood); LoPucki, *supra* note 4, at 42–43 (same).

130. See Lucian A. Bebchuk & Holger Spamann, *Regulating Bankers’ Pay*, 98 GEO. L.J. 247, 282–86 (2010) (proposing including additional financial instruments in pay of financial firm managers); Sanjai Bhagat & Roberta Romano, *Reforming Executive Compensation: Focusing and Committing to the Long-Term*, 26 YALE J. ON REG. 359, 360–61 (2009) (suggesting alterations to the form of equity-based incentive compensation); Wulf A. Kaal, *Contingent Capital in Executive Compensation*, 69 WASH. & LEE L. REV. 1821, 1840–44 (2012) (proposing the use of contingent convertible bonds for corporate governance improvements); Frederick Tung, *Pay for Banker Performance: Structuring Executive Compensation for Risk Regulation*, 105 NW. U. L. REV. 1205, 1206 (2011) (suggesting paying bankers with subordinated debt securities).

131. Hansmann & Kraakman, *supra* note 98, at 1882–83; Steven Shavell, *The Judgment Proof Problem*, 6 INT’L REV. L. & ECON. 45, 45–46 (1986).

132. See Sanjai Bhagat & Roberta Romano, *Event Studies and the Law, Part II: Empirical Studies of Corporate Law*, 4 AM. L. & ECON. REV. 380, 410–14 (2002) (surveying studies of effects of regulation on stock price).

133. See John C. Coffee, Jr., *Does “Unlawful” Mean “Criminal”? Reflections on the Disappearing Tort/Crime Distinction in American Law*, 71 B.U. L. REV. 193, 229–30 (1991) (noting that even within a regime that monitors firm performance, firms can pressure employees to commit unlawful acts that add value to the firm while disguising this pressure).

will likely be imprecise, but shareholders have the advantage that they have a board of directors working for them, with the power (in theory, at least) to collect every available datum about the manager's preferences and performance. Regulators would not only have to design their own incentive structures but also decide which firm-designed incentives to limit or out-bid.

Many standard forms of executive compensation reduce managers' sensitivity to regulation risks. The average large firm manager earns a large fraction of her compensation in stock options.¹³⁴ Options are more valuable when the stock price is volatile—that is, when the manager is willing to take risks of large losses in order to achieve possible large gains.¹³⁵

Not all the firm-designed incentives will be so obvious. Say I'm the CEO of a company with toxic waste buried in our backyard. One day on my way into work, I spot John Travolta climbing over our fence holding a chemistry kit and a spade. After I press the button that releases the hounds, my next step should be . . . calling my broker? Until John files *a civil action*, I have a window in which I can sell my stock with no market discount. That is, the manager allowed to trade on non-public liability information in effect holds a put option, making her insensitive to future cost.¹³⁶

At first glance it seems like a puzzle why shareholders would not contract around this problem. After all, they'll be the ones left holding the bag of waste if managers take undue risks. Again, though, the shareholders are diversified against the risk of liability and so effectively hold downside protection against it. Managers (absent insider trading of this kind) typically do not. As Carlton & Fischel argued in another context, shareholders actually may want managers to trade on inside information to the extent that such trading increases managers' preference for risk taking to something more like the shareholders' own.¹³⁷ That contract is arguably an efficient one, at least

134. David I. Walker, *The Law and Economics of Executive Compensation: Theory and Evidence*, in RESEARCH HANDBOOK ON THE ECONOMICS OF CORPORATE LAW 232, 235 (Claire A. Hill & Brett H. McDonnell eds., 2012).

135. *Id.* at 241.

136. In addition, once a firm is already liable for enough damages to put it in bankruptcy, managers may have little marginal downside risk. Hansmann & Kraakman, *supra* note 98, at 1909 n.83. Managers with substantial pensions subject to the claims of creditors might retain some exposure, however. Cf. Yair Listokin, *Paying for Performance in Bankruptcy: Why CEOs Should be Compensated with Debt*, 155 U. PA. L. REV. 777, 803–10 (2007) (arguing that pensions give executives marginal incentives to preserve firm value in bankruptcy).

137. Dennis W. Carlton & Daniel R. Fischel, *The Regulation of Insider Trading*, 35 STAN. L. REV. 857, 869–72, 875–76 (1983).

when the only risk of harm is to the shareholders.¹³⁸ But when the manager is taking risks that lead to outside harms, the rule no longer looks quite so appealing to society as a whole.

This analysis supplies a new rationale for limits on insider trading.¹³⁹ At a minimum, regulators should want to prohibit managerial trading on non-public information about regulatory action or tort liability. In any event, the more general point is that there may be many ways in which shareholders could allow managers to hedge against risks the firm wants them to pursue.

Hanson and Logue argue that their proposal to require firms to purchase insurance coverage sufficient to pay out any ex post claim would help to mitigate these kinds of problems.¹⁴⁰ They claim that insurance coverage would eliminate the danger of judgment-proof firms, illustrated earlier. Presumably insurers would also have strong incentives to find ways to make firm managers internalize the costs the managers' decisions would impose on the insurer.

In my view, the available evidence suggests that insurers would not, in fact, be able to effectively sensitize managers to future costs. Credit markets offer us decent evidence right now of how a compulsory insurance scheme might work. As Hanson and Logue observe, creditors of the firm are in a similar position to a possible insurer: if the firm commits a violation and plunges into bankruptcy, the creditor stands to lose most of its money, which from the perspective of the creditor is quite similar economically to the insurer that pays out in the event of

138. The argument on the other side is that insider trading could create a market for lemons that would damage current shareholders; individual firms have insufficient incentives to prohibit insider trading because the effect on market liquidity is mostly an externality. Viral V. Acharya & Timothy C. Johnson, *Insider Trading in Credit Derivatives*, 84 J. FIN. ECON. 110, 111–13 (2007); George W. Dent, Jr., *Why Legalized Insider Trading Would Be a Disaster*, 38 DEL. J. CORP. L. 247, 261–62 (2013); see also Sung Hui Kim, *Insider Trading as Private Corruption*, 61 UCLA L. REV. 928, 966–67 (2014) (suggesting insider trading reduces public confidence in markets). Carlton & Fischel acknowledge this point, but their response is not overly convincing; essentially, they say that traders always know that there is someone better informed than them, and yet this does not seem to paralyze markets. Carlton & Fischel, *supra* note 137, at 879–80. But there may be a large difference of degree in the advantage held by insiders relative to well-informed outside traders. Dent, *supra*, at 262. This difference is important because the larger the discount a rational uninformed investor would apply, the less likely it is that a rational well-informed counter-party would sell at that discounted price. The next step in the game theory analysis is that buyers, if they recognize the discount is too large, will conclude that the item must be a lemon, driving the price down even further. But small price changes might not have that impact. In other words, not all slopes are slippery enough to cause a lemons problem, and insider trading is a rather slipperier one than other forms of asymmetric information.

139. On the general scholarly consensus against the prohibition on insider trading, see Kim, *supra* note 138, at 945–47.

140. Hanson & Logue, *supra* note 14, at 1273–81.

the same adverse event.¹⁴¹ Both creditors and insurers therefore should logically charge firms more to reflect the risk of adverse regulatory events, and creditors, like insurers, should invest in monitoring the firm for changes in this risk level.¹⁴²

Creditor monitoring, however, has been at best imperfect. Monitoring firms for risk is costly, such that lenders tend to free ride on one another's supposed monitoring or depend on the firm's need for additional credit to keep the firm's risk taking in check; in practice, many creditors simply rely on credit rating agencies.¹⁴³ Modern credit transactions often allow the initial lender to securitize its investment or purchase insurance against default, allowing the lender to diversify its risk.¹⁴⁴ With their individual downside risk largely hedged, creditors have little to gain by investing much money in monitoring.¹⁴⁵

Insurers are also likely to economize on direct monitoring, using similar tools. Reinsurance and other financial tools provide insurers with securitization-like mechanisms for off-loading much of the risk of writing the initial contract with a firm.¹⁴⁶ In a perfectly functioning

141. *Id.* at 1311. However, secured creditors have priority over tort claimants in bankruptcy, so that they, too, are effectively granted the firm's limited liability from tort. Hansmann & Kraakman, *supra* note 98, at 1884.

142. Hansmann & Kraakman, *supra* note 98, at 1884 n.12, 1906. Oddly, since interest is tax-deductible, I.R.C. § 165 (2012), the government is effectively underwriting some of the added costs faced by high-risk firms. *But see* I.R.C. § 165(j) (2012) (disallowing corporate deduction for certain "excess" interest payments).

143. *See* Charles K. Whitehead, *Creditors and Debt Governance*, in RESEARCH HANDBOOK ON THE ECONOMICS OF CORPORATE LAW 68, 69, 75 (Claire Hill & Brett McDonell eds., 2012) (describing effects of free riding and need for repeated access to credit on firm incentives). Yair Listokin finds that creditors actually impose lower costs on tort-prone defendants in one respect: firms with large expected tort costs are less likely to issue secured debt. Listokin suggests this negative relationship is due the higher cost of resolving secured debts in a liquidation. Yair Listokin, *Is Secured Debt Used to Redistribute Value from Tort Claimants in Bankruptcy? An Empirical Analysis*, 57 DUKE L.J. 1037, 1077-78 (2008).

144. Charles K. Whitehead, *The Evolution of Debt: Covenants, the Credit Market, and Corporate Governance*, 34 J. CORP. L. 641, 656-58, 661-67, 674 (2009).

145. *Id.* at 661; *see* Kathleen C. Engel & Patricia A. McCoy, *A Tale of Three Markets: The Law and Economics of Predatory Lending*, 80 TEX. L. REV. 1255, 1286-89 (2002) (describing this dynamic in market for sub-prime loans); *see also* Scales, *supra* note 86, at 19 (suggesting that similar features of the home mortgage market explain why mortgage lenders do not require flood insurance coverage).

146. While direct empirical evidence is limited mostly to anecdote, *see* Howard Kunreuther & Mark Pauly, *Insurance Decision-Making and Market Behavior*, in FOUNDATION AND TRENDS IN MICROECONOMICS 63, 112 (W. Kip Viscusi ed., 2005) (claiming that insurers tend not to reward policyholders for mitigating risk), Tom Baker and Sean Griffith report that D&O insurers invest very little in monitoring, or even in contract terms that would require insureds to minimize exposure, TOM BAKER & SEAN GRIFFITH, *ENSURING CORPORATE MISCONDUCT: HOW LIABILITY INSURANCE UNDERMINES SHAREHOLDER LITIGATION* 109 (2010). *But see* Ben-Shahar & Logue, *supra* note 97, at 217-28 (offering examples of quasi-regulatory policy terms in insurance contracts).

market, we might expect that reinsurers will provide differential pricing for insurers who in turn invest in risk mitigation. However, the reinsurance market instead tends to tie prices to whether there has been a recent disaster.¹⁴⁷ Even if reinsurers did reward investments in risk reduction, that investment would be suboptimal to the extent some of it would benefit other reinsurers.¹⁴⁸

As a result, it seems likely that the insurance premiums set by insurers under Hanson and Logue's proposal would only very loosely match the actual expected harms created by producers. Modern creditors are in an economically similar position to the one that Hanson and Logue's insurers would occupy. But these creditors have not found effective mechanisms for aligning managerial risk-taking with their own interests.

So the quasi-regulatory rules that an insurer would put in place to implement an *ex post* regime would not optimally regulate externalities, but that is not to say governments would do better. Governments may also face obstacles to effective monitoring, of course. As I've already discussed, government monitors and the public often will prefer to look the other way, trading off present gains for future pain. My point is only that regulating for the future is tough no matter who does it, with privatization no magical solution. Privatizing the task of monitoring may help to contain rent-seeking, but it also introduces new incentives to free ride or take shortcuts.

* * *

Let's pause a moment to sum up the *ex post* problem. Unobservable individual variations in marginal damage or benefit do complicate the regulator's task. But the prospects in some ways are not as dim as others have argued. Even if taxes are a relatively inflexible tool, just one or two additional prices, if applied with a fair degree of rough accuracy, can greatly improve over one. While it may sometimes be worthwhile to delay enforcement or reward until after the government can better observe individual variation, waiting carries some heavy costs, as well. It seems that often the government would be better off to use two or three reasonably accurate *ex ante* incentives rather than many very precise prices *ex post*.

147. Kunreuther & Pauly, *supra* note 74, at 107.

148. Ben-Shahar & Logue, *supra* note 97, at 230-31.

VII. EXAMPLES

To see some of my analysis in action, let us consider a few applications. First, I will examine the use of taxes to achieve regulatory goals, and follow with a discussion of fat taxes, which offer a key example for Fleischer. I'll then look at banking regulation, an area where there has been a raft of competing proposals. No commentator has yet stepped back, though, and considered the implications of the general theory of regulatory instruments for the decision on how best to regulate banks. I then discuss the similar problem of sovereign fiscal crises. Finally, changing gears a bit, I switch to the positive externality case, and look at the timing of incentives for innovation.

A. Corrective Taxation

As we saw earlier, Professor Fleischer—and to a lesser degree other scholars, such as Hanson and Logue—are skeptical of the tax system's capacity to serve as a regulatory instrument. Fleischer's account is basically a story about the limited flexibility of taxing institutions. We've seen that an optimal regulatory framework should be able to adjust the price facing producers when the marginal harm or benefit created by those producers varies.¹⁴⁹ For a time economists assumed that tax systems were not flexible enough to match penalty or subsidy rates to variations in social marginal gains, but that instead taxes were limited to imposing a flat penalty or reward per unit of production.¹⁵⁰ In an influential 2002 article, Louis Kaplow and Steven Shavell argued that, in theory, there is no reason taxes have to be "linear" in this way.¹⁵¹ For instance, they pointed out, pollution could be taxed at one rate up to a certain amount, and then all emissions above that amount could be taxed at another, higher rate.¹⁵²

Fleischer is skeptical that real-world tax systems can implement non-linear prices.¹⁵³ To match tax rates with marginal social benefit, the tax authority requires highly detailed information about the government's policy goals and the nature of each externality producer. But, he argues, this kind of subject matter expertise is rarely lodged in a tax agency.¹⁵⁴ And our norms of egalitarian treatment in taxation—norms that rest on concerns about government self-dealing and the

149. GRUBER, *supra* note 28, at 143–46.

150. *See id.*

151. Kaplow & Shavell, *supra* note 57, at 7–10.

152. *Id.*

153. Fleischer, *supra* note 21, at 19–23.

154. *Id.* at 19–20.

destructive power of taxation—make differential treatment of different taxpayers politically difficult.¹⁵⁵ Bundling the revenue and non-revenue tasks together also leaves each vulnerable to political risks to the other, as the recent IRS episode involving angry Republican responses to IRS enforcement of political limits on tax-exempt organizations illustrates.¹⁵⁶

This is not to say that Fleischer necessarily rejects the possibility of any government action when variance is high. He suggests that more traditional regulation often has greater flexibility to calibrate rewards or penalties to the correct level.¹⁵⁷ Alternately, he suggests that governments might do better to employ ex post remedies, such as the tort regime, rather than attempting to tax bad behavior before it occurs.¹⁵⁸

We've already seen that ex post instruments have some unique costs, so I'll just add here that abandoning the tax system in favor of "command and control" regulation also may be costly. Proponents of price instruments point out that Pigouvian taxes are superior to regulation in that they generate resources that can be used for other socially useful projects, such as lowering the income tax.¹⁵⁹ I've argued that claim is not inevitably true, but it is accurate at least in the case of traditional regulation (as opposed to "nudges"), and where the government's alternative is to use sticks and set aside that money for public, rather than private, use.¹⁶⁰ In other words, if we follow Fleischer's suggestion, we may get more accuracy, but at the cost of the revenue benefits we might have gained from a tax. If, however, government's alternative was to use a subsidy or "carrot," then Fleischer's proposal is more appealing in comparison, since regulation saves the government on the cost of paying out rewards.¹⁶¹

On the other hand, it is also possible that Fleischer intends to argue not against all Pigouvian taxes, but rather only against those that are part of the traditional tax system. For example, some industries must pay licenses in order to operate. Often these licenses vary

155. *Id.* at 23.

156. See George K. Yin, *Reforming (and Saving) the IRS by Respecting the Public's Right to Know*, 100 VA. L. REV. 1115, 1133–40, 1164 (2014) ("Current law also makes the agency susceptible to unfounded charges.").

157. Fleischer, *supra* note 20, at 20.

158. *Id.* at 22.

159. Ian W.H. Parry & Wallace E. Oates, *Policy Analysis in the Presence of Distorting Taxes*, 19 J. POL'Y ANALYSIS & MGMT. 603, 606–07 (2000).

160. Galle, *supra* note 9, at 865–68.

161. See *id.* at 851–52.

depending on the location and intensity of the industrial operation.¹⁶² From an economic perspective (and sometimes a legal one), licenses work very similarly to “taxes.”¹⁶³ The difference is that they are administered by a regulatory agency, rather than the tax collector. This may seem a minor difference, but a number of scholars point to differences in expertise and institutional norms in the two bureaucracies; these differences are not coincidental but instead are the structural result of the underlying goals and functioning of each.¹⁶⁴

If this is Fleischer’s argument, then the lost-revenue concern is mitigated. License revenues may be less useful than taxes, however, to the extent that they are dedicated to some specialized purpose, as that purpose may not always be the most socially beneficial. For example, banking examination fees often go to pay for the operation of bank examiners, even if the bank examiners’ need for additional funding is minimal.¹⁶⁵

Whatever the costs of Fleischer’s alternatives, the core of his case against the tax system overlooks the possibility that our traditional tax system might be flexible enough to get most of the benefits of flexible pricing. I’ve argued that two or three prices usually are adequate for many purposes, and our tax system can typically achieve that level of detail. Our income tax, for instance, routinely offers multiple prices for the subsidies built into it. Taxpayers who itemize can claim deductions for many activities not available to non-itemizers.¹⁶⁶ Itemizing taxpayers who suffer medical expenses or unexpected loss of property can claim deductions, but only if their costs exceed a floor.¹⁶⁷ Charitable contributors can no longer claim a deduction once their contribution exceeds half their adjusted gross income.¹⁶⁸ The Alternative Minimum Tax reduces the value of the federal subsidy for state and local governments.¹⁶⁹ Judicial interpretation of rules might add some flexibility not evident on the face

162. See Andre van Stel et al., *The Effect of Business Regulations on Nascent and Young Business Entrepreneurship*, 28 SMALL BUS. ECON. 171, 172–73 (2007) (equating taxes to licensing requirements).

163. *The License Tax Cases*, 72 U.S. (5 Wall.) 462, 471, 474–75 (1866).

164. David Weisbach & Jacob Nussim, *The Integration of Tax and Spending Programs*, 113 YALE L.J. 955, 983–97 (2004); Lawrence Zelenak, *Tax or Welfare? The Administration of the Earned Income Tax Credit*, 52 UCLA L. REV. 1867, 1881–91 (2005).

165. Bar-Gill & Warren, *supra* note 73, at 93–94.

166. I.R.C. § 63 (2012).

167. *Id.* §§ 165(h)(2), 213(a).

168. *Id.* § 170(b).

169. *Id.* § 56(b)(1)(A).

of a rule or statute.¹⁷⁰ And the value of all deductions varies depending on the taxpayer's marginal rate.¹⁷¹

This is not to say that all of these existing price variations are accurately matching the value of the government's subsidy to the marginal benefit of those who face a given price.¹⁷² Some existing rules are defensible on that ground; for example, evidence suggests that wealthier households are (to a point) more responsive to tax incentives for charitable giving, and so it makes some sense that top-earners' higher marginal rates give them a larger subsidy for each dollar they donate.¹⁷³ My goal is not necessarily to defend all the particulars of our existing system, however, as much as it is to show that matching prices and marginal damage or benefit through the tax code is not pure science fiction. Indeed, in recent work, Jim Hines and Kyle Logue set out in greater detail how the model of the Alternative Minimum Tax could be used to do a better job of matching within our existing tax structure.¹⁷⁴

Finally, as other authors have noted, Pigouvian taxes can also be combined with other instruments,¹⁷⁵ which adds yet another layer of flexibility. For instance, in some states, drivers who explore the top end of their sports cars' performance on public roads can receive jail time as well as a speeding ticket.¹⁷⁶ For extreme outliers like the man in the Mazerati, a linear price does not fit very well. But for most of the population, the usual speeding ticket does a reasonable job of approximating the social harm, and has the added benefit of bringing in some revenue.

All of this is to say that corrective taxes likely can play an important role in regulatory policy. While they are not perfect instruments, they are better than Fleischer maintains, and none of the alternatives are without flaws either.

170. Cf. Dan L. Burk & Mark Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575, 1577 (2003) (making this point about intellectual property).

171. See STANLEY S. SURREY, *PATHWAYS TO TAX REFORM* 36–37 (1973).

172. See Mark P. Gergen, *The Case for a Charitable Contribution Deduction*, 74 VA. L. REV. 1393, 1402–03 (1988) (critiquing subsidy for charitable giving on grounds that it fails to match marginal social benefits of different charities).

173. Jon Bakija, *Tax Policy and Philanthropy: A Primer on the Empirical Evidence for the United States and Its Implications*, 80 SOC. RES. 557, 564–65, 577–78 (2013).

174. Kyle Logue & James R. Hines, Jr., *Understanding the AMT, and its Unadopted Sibling, the AMxT*, (Univ. of Mich. Law & Econ Working Paper No. 78, 2013), http://repository.law.umich.edu/law_econ_current/78/ [<http://perma.cc/Y9H7-PPAS>].

175. Stefanie Engel et al., *Designing Payments for Environmental Services in Theory and Practice: An Overview of the Issues*, 65 ECOLOGICAL ECON. 663, 669 (2008); Michael P. Vandenbergh et al., *Regulation in the Behavioral Era*, 95 MINN. L. REV. 715, 719 (2011).

176. *E.g.*, ME. REV. STAT. ANN. tit. 29-A § 2074(3) (2013).

B. Obesity

Fat taxes have attracted a lot of attention as a possible policy option for reducing the social costs of obesity.¹⁷⁷ But some of the attention is critical. Jeff Strnad rejects the traditional Pigouvian rationale for fat taxes on the ground that individuals may vary greatly in their propensity to produce those costs, although he does support a kind of government-constructed insurance premium for unhealthy eaters.¹⁷⁸ Fleischer adds the important point that our tax institutions seem incapable of implementing a fat excise that would actually vary with marginal damage.¹⁷⁹

Unfortunately, available *ex post* institutions for regulating obesity, such as tort liability, are unpromising. Investors in food and beverage firms can easily judgment-proof themselves, and there is already evidence that these firms have restructured to minimize their potential exposure to lawsuits.¹⁸⁰ Requiring manufacturers to acquire liability insurance might help to provide for some victim compensation, but it is far from clear that insurers will be willing to offer full coverage. Even if they are, competition among them, and their own myopia, could drive down premiums well below socially optimal levels. That route also adds transaction costs resulting from adverse selection and the contract writing necessary to diminish it. Sugarman and Sandman propose a highly sophisticated version of an *ex post* liability system that overcomes a number of problems in the traditional tort system,¹⁸¹ but even their proposal does not cleanly grapple with the possibility that it will be cheaper for firms to shield themselves from liability than to remedy the obesity epidemic.¹⁸²

Suppose, though, that we could implement a two-tiered, *ex ante* penalty on unhealthy eating and drinking. Admittedly, it would be

177. See Galle, *supra* note 10.

178. *Id.* at 1294–1322.

179. Fleischer, *supra* note 21, at 19–23.

180. See J.P. MORGAN CHASE, OBESITY: RESHAPING THE FOOD INDUSTRY 7 (2006), http://www.unepfi.org/fileadmin/documents/materiality2/obesity_jpmorgan_2006.pdf [<http://perma.cc/A4QN-VU3E>] (describing “limited liability” as a tool food and beverage firms can use to limit litigation risk).

181. Sugarman & Sandman, *supra* note 10, at 1439–76.

182. Sugarman and Sandman do include a mechanism for firms that divide the entity after penalties are imposed. *Id.* at 1465. Potentially, they could extend that regime further. For instance, they could impose their penalty on any equity holder or other investor in a junk-food-selling firm, which would obviously diminish the judgment-proofing problem. But such a radical departure from the traditional regime of limited liability seems unlikely to ever win political support. Given the solid pro-efficiency benefits of most forms of limited liability (such as the ability of shareholders to diversify risk, and of the firm to sell stock on a mass scale despite asymmetric information and the possibility of hidden liabilities inside the firm), that move would also carry significant social costs.

difficult to charge higher prices to, say, individuals with greater genetic predisposition for diabetes. But low willpower is another predictor of obesity. “Asymmetric” regulations, such as New York’s infamous limit on soda portion size, impose higher costs on individuals with low willpower.¹⁸³ High willpower individuals, whose average expected externality costs from obesity are lower, experience only small inconvenience from the “nudge.”¹⁸⁴ In effect, as in my simulations, we have two prices, each targeted at a cluster of individuals. With the lower resulting deadweight loss, the ex ante alternative could be competitive, maybe even superior, to ex post liability, even if there is wide variation among individuals.

More prosaically, and maybe less controversially, governments could impose different rates of tax on foods and beverages depending on their portion size. For example, a single Twinkie might be taxed at \$.29 per Twinkie, while a box-full could carry a surcharge of \$.40 per golden bar of spongie goodness. Obviously, this would encourage the use of smaller portion sizes, but that is precisely the point. The inconvenience of making individual purchases is psychologically costlier for the impatient, and that “cluster” of individuals has a higher average expected obesity cost.

These ex ante alternatives are not necessarily a panacea. A thorough comparison would require some experimental policy investigation into the extent to which asymmetric regulation can match incentives to social benefit, and of the extent to which ex post liability systems fail because of judgment-proofing or the costs of insurance. My goal is simply to show that these next steps are worthwhile, because, contrary to what others have suggested, ex ante approaches to obesity are worthy competitors to the ex post regime.

C. Banking Regulation

Now let’s look at banks. The essential problem, again, is that the failure of some banks poses a “systemic” risk, in which one bank’s collapse threatens the stability of a network of related entities and their customers. One set of proposed solutions to this “too big to fail” problem are largely ex ante: they aim to shrink banks or stabilize them before they can fail. For example, commentators have proposed using antitrust regulation to limit bank size, taxing banks based on how much capital

183. Colin Camerer et al., *Regulation for Conservatives: Behavioral Economics and the Case for “Asymmetric Paternalism,”* 151 U. PA. L. REV. 1211, 1219, 1222 (2003).

184. Galle, *supra* note 9, at 885–86.

they hold, limiting bank leverage, and requiring banks to hold enough capital to provide them with a “cushion” against default.¹⁸⁵

Another set of solutions is largely ex post. They include fully or partially “wiping out” equity holders, so that existing investors will lose all their money in the event the bank must be bailed out, imposing “haircuts” on creditors, imposing “living wills” that direct how banks will proceed through any bankruptcy-type resolution process, and of course just allowing government or other entities to absorb the liabilities of failing banks.¹⁸⁶ Other ex post options comprise personal liability for managers, as witnessed by calls for prosecution of Wall Street executives in the wake of the financial crisis.¹⁸⁷

Uncertainty about the risks individual banks pose is, to be sure, a problem common to all the ex ante proposals. What is the biggest bank antitrust law should permit? What should be the tax on bank size? What is the optimal ratio of debt to equity in a bank’s capital structure? Answering any of those questions in advance is guesswork, and probably depends to a good extent on just how interconnected any particular bank is to others.¹⁸⁸ Overregulating banks surely has costs, such as distorting investment decisions or financial structure¹⁸⁹ or reducing possible economies of scale and scope in the writing and transfer of financial instruments.

But the ex post options seem worse. Punishing shareholders is a futile gesture, since the social cost of bank failure will greatly exceed the value of the bank’s equity. Investors may also use complex financial structures to cabin off portions of the bank and further limit their exposure. Government can threaten the managers, but investors can always offer managers a bundle of stock options to encourage added risk-taking.

185. Edgar, *supra* note 20, at 414–22; Michael Keen, *Rethinking the Taxation of the Financial Sector*, 57 CESIFO ECON. STUD. 1, 10–20 (2011); Rashid et al., *supra* note 16, at 115–23; see generally Patricia McCoy, *Countercyclical Regulation and Its Challenges* 18–41 (Feb. 2015) (unpublished manuscript), <http://lawdigitalcommons.bc.edu/lisfp/934/> [<http://perma.cc/6WV3-J3BJ>] (offering a helpful overview of the tools for ex ante regulation of the financial sector).

The choice among these options may depend on whether government would prefer to use a price instrument (taxes, capital requirements) or command-and-control (antitrust), and, as between price instruments, whether it prefers a transfer instrument (taxes) or non-transfer (capital requirement). For more on the tradeoffs among those options, see Galle, *supra* note 9, at 860–72.

186. Anabtawi & Schwarcz, *supra* note 16, at 103–22, 124–25; Keen, *supra* note 185, at 7.

187. Frank Partnoy, *The Right Way to Regulate from Behind*, 18 N.C. BANKING INST. 113, 119–20 (2013).

188. See Keen, *supra* note 185, at 13–14 (making this point about taxes); cf. McCoy, *supra* note 185, at 47 (“Countercyclical regulation depends on . . . data.”).

189. Anabtawi & Schwarcz, *supra* note 16, at 99–101.

Again, the financial world is complex, and I do not want to claim to have all the answers. My analysis simply adds some weight to the side of those who have argued for ex ante solutions, and perhaps counsels for the use of mechanisms tailored to the potential weaknesses of ex ante regulation. For example, the deadweight loss of some of the ex ante options could be trimmed with a bit of flexible pricing. Systemically imbedded banks, or those that use structures that are especially risky, could face a higher rate of tax than others.¹⁹⁰ Our current system relies largely on capital requirements as a tax-like drag on risk taking,¹⁹¹ but some banks face higher or lower costs of holding extra capital. We might consider adding a second “price” for risk, perhaps in the form of an actual tax, to make up for the ineffectiveness of capital requirements at low-cost firms.

D. Government Finance

Like banks, governments sometimes fail disastrously. Sometimes the failure is, as with banks, a cascade of fiscal interconnections triggered by a bond default, such as in Greece and Spain.¹⁹² In other instances, the damage is more subtle, as when American states raised taxes and slashed jobs during the recent recession and recovery period.¹⁹³ These local fiscal decisions hurt not only the states themselves but also the economy of the nation as a whole.

Many proposed solutions to the sovereign debt problem are fundamentally ex post. For instance, commentators suggest that the EU should more forcefully commit itself to refusing to bail out future debt disasters.¹⁹⁴ Others propose to use special “resolution” or bankruptcy-type proceedings to force over-committed governments—or those who have benefitted from their largesse, such as unions that have

190. See Kathryn Judge, *Fragmentation Nodes: A Study in Financial Innovation, Complexity, and Systemic Risk*, 64 STAN. L. REV. 657, 716 (2012).

191. See, e.g., Dodd-Frank Wall Street Reform and Consumer Protection Act § 171, 12 U.S.C. § 5371 (Supp. IV 2010) (requiring the appropriate federal banking agencies to establish minimum risk-based capital requirements and providing guidance as to how those standards should be established and implemented); BASEL COMM. ON BANKING SUPERVISION, BASEL III: A GLOBAL REGULATORY FRAMEWORK FOR MORE RESILIENT BANKS AND BANKING SYSTEMS 2 (rev. ed. 2011), <http://www.bis.org/publ/bcbs189.pdf> [<http://perma.cc/X8P8-QUD2>].

192. Christoph Paulus, *The Interrelationship of Sovereign Debt and Distressed Banks: A European Perspective*, 49 TEX. INT'L L.J. 201, 207–15 (2014).

193. David Super, *Rethinking Fiscal Federalism*, 118 HARV. L. REV. 2544, 2611–14 (2005).

194. Mark Hallerberg, *Fiscal Federalism Reforms in the European Union and the Greek Crisis*, 12 EUR. UNION POL. 127 (2011).

been promised large pensions—to absorb some of the fiscal pain of the cleanup.¹⁹⁵

My analysis suggests these proposals, while perhaps salvageable, have serious obstacles to overcome. Politicians who shift too much wealth from the future to the present, whether by borrowing from investors or by promising pension payouts, have already demonstrated their myopia, their relative insensitivity to future consequences.¹⁹⁶ Threatening these same actors with bad future consequences thus seems an unpromising route. Further, the threats are often not credible, as refusing bailouts would impose serious pain on vulnerable and politically sympathetic groups, not to mention damaging neighboring economies. Some systems, such as the “resolution” authority, attempt to delegate the power to deny relief to courts and other less-political actors. But the U.S. experience with litigation over state balanced-budget rules during recessions has shown that courts, too, are sensitive to the economic pain of a hard-line decision.¹⁹⁷

Similarly, while commentators have proffered a variety of solutions for the poor recession performance of U.S. state and local governments, my analysis here implies that many of the solutions will not perform as hoped. For instance, the U.S. system of unemployment insurance (“UI”) is partially funded, and almost wholly administered, by states.¹⁹⁸ In order to obtain federal fiscal support, states must impose taxes on their local businesses to cover the claims of local unemployed workers, and states decide which workers are entitled to benefits. This arrangement presents states with a stark tradeoff between present and future: in order to have enough money available to pay benefits claims during recessions, the states must impose enough tax during good times to build up substantial reserves. Between 2008 and 2010, most of the states ran out of money, and had to borrow, on damaging terms, from the federal government.¹⁹⁹ They then had to raise taxes and slash

195. WHEN STATES GO BROKE, *supra* note 84, at 195, 201, 237–40.

196. Cf. Amy Monahan, *State Fiscal Constitutions and the Law and Politics of Public Pensions* 11–12 (University of Minnesota Law School Research Paper No. 14-24, 2014), <http://ssrn.com/abstract=2436587> [<http://perma.cc/7RVN-357W>] (describing choice to under-fund pensions as result of political preference for “immediate returns”).

197. Richard Briffault, *Foreword: The Disfavored Constitution: State Fiscal Limits and State Constitutional Law*, 34 RUTGERS L.J. 907, 909, 918–25 (2003); see also Buccola, *supra* note 20, at 277 (noting limited power of courts to adjust major fiscal policy levers).

198. See generally Chad Stone & William Chen, *Introduction to Unemployment Insurance*, CTR. ON BUDGET & POLICY PRIORITIES (Jul 30, 2014), <http://www.cbpp.org/sites/default/files/atoms/files/12-19-02ui.pdf> [<http://perma.cc/WA5Q-EXS2>].

199. Wayne Vroman & Stephen Woodbury, *Financing Unemployment Insurance*, 67 NAT'L TAX J. 253, 253–54 (2014).

benefits, often while still in the throws of recession, to repay the loans.²⁰⁰

In the wake of the debacle, the Obama Administration and leading unemployment-insurance commentators have suggested revamping some aspects of the system. They propose paying states higher rates of interest on money set aside to pay future UI claims, and adjusting federal taxes in a way that would have the effect of imposing a bigger penalty on states that are forced to borrow from the federal government.²⁰¹ Interest deposited into UI savings accounts, however, is unlikely to fully compensate myopic state officials for the subjective time value of their money, since the interest is useful only during some future crisis in which payouts exceed contemporaneous revenues.²⁰² Likewise, the threat of a future penalty, to be imposed at a time of economic hardship for the state, is both an unfortunate policy choice as well as a threat that present legislators will be relatively indifferent to.

To be fully effective, intergovernmental incentives of this kind likely have to be targeted instead at the legislators who must decide now whether to save or borrow, as well as the constituents whose favor those legislators need. Penalties or rewards should be imposed or offered at the time the bad fiscal decision is made, not when its consequences are felt.²⁰³ Incentive structures can be designed in ways that induce governments to reveal whether they are myopic or not, allowing for different “price” points for each group.²⁰⁴ Alternately, policy makers could remove certain key decisions from the hands of those who would be most tempted to sacrifice the future for present gain, such as by transferring responsibility for UI claims administration to the federal government, or entrusting municipal pensions to state-level administrators.²⁰⁵

200. *Id.*

201. U.S. ADVISORY COUNCIL ON UNEMPLOYMENT COMPENSATION, COLLECTED FINDINGS AND RECOMMENDATIONS: 1994-1996, at 11 (1996); Vroman & Woodbury, *supra* note 199, at 11-16; Wayne Vroman, *Unemployment Insurance: Current Situation and Potential Reforms*, URBAN INSTITUTE 9-12 (Feb. 3, 2009), http://www.urban.org/UploadedPDF/411835_unemployment_insurance.pdf [<http://perma.cc/3ME8-BCL6>].

202. Or, worse, the payment of interest crowds out the state's own contributions, resulting in no net increase in savings.

203. Galle & Stark, *supra* note 91, at 630-31; see Buccola, *supra* note 20, at 280-81 (proposing up-front federal encouragement for a state to use a form of borrowing that limits state ability to externalize borrowing costs). Although she does not rely on my analysis here, Amy Monahan's suggestion that states be fined for inadequate pension fund balances, Monahan, *supra* note 196, at 41, would fit with the spirit of my proposals.

204. Galle & Stark, *supra* note 91, at 630; see also *id.* at 619-40 (providing other possibilities).

205. See Brian Galle, *Myopia, Fiscal Federalism, and Unemployment Insurance* 18 (B.C. Law School Legal Studies Research Paper No. 265, 2012), <http://ssrn.com/abstract=2031728>

VIII. CONCLUSION

Uncertainty is certainly a problem for government regulators. It may be that it makes the most sense for governments to delay incentives until after they have an opportunity to observe the cost or benefit of regulation. I have tried to show here, though, that delaying the time when penalties or rewards pay out may not be worth the benefit of the extra information it produces. Small-scale experiments can substitute for waiting, and the supposed heavy costs of uncertainty can be often mitigated with even a relatively small degree of up-front knowledge and price flexibility. Waiting may be ineffective when parties are myopic, and the tools for translating ex post incentives into the present can be extremely socially costly.

In addition to the examples I point to here, my analysis in theory could be applied to virtually any area of government regulation. My argument is not that ex ante regulation should always prevail, but instead that the right regulatory instrument will depend on the tradeoffs I've outlined. In some settings, myopia may be minimal, or government's up-front information too threadbare. But these are factors that policy makers should at least consider before they set their designs in motion.
