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The Tragedy of the Carrots: Economics and Politics in the Choice of Price Instruments

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ARTICLES

THE TRAGEDY OF THE CARROTS: ECONOMICS AND POLITICS IN THE CHOICE OF PRICE INSTRUMENTS

Brian Galle*

Externalities are one of the most fundamental market failure justifications for government action, and Pigouvian taxes and subsidies are standard tools for correcting them. Even so, neither the legal nor the economic literature offers any comprehensive account of when policymakers should prefer taxes to subsidies or vice versa. This Article takes up that task. Prior efforts to distinguish between “carrots” and “sticks” have generally been limited to the context of pollution regulation, and I show here that even those efforts are incomplete. I also extend the analysis to the case of positive externalities, where there is little prior literature to speak of. Overall, I find that sticks are usually superior to carrots, but that there are some interesting exceptions.

Nonetheless, carrots are rampant in modern lawmaking, especially carrots in the form of tax expenditures. I identify features of modern politics and law that contribute to the current inefficient overproduction of carrots. Among others, I find that federalism contributes to political preferences for carrots. That implies an until-now unrecognized reason to centralize certain forms of government regulation.

Finally, I take issue with the claims of the environmental literature that carrots, even if the inferior policy choice, should be used when politics would be likely otherwise to frustrate any regulation. Using carrots in critical and closely contested situations only contributes to externality producers’ incentives to raise the political stakes, either by cranking out more negative externalities or withholding benefits.

* Assistant Professor, Boston College Law School. I’m grateful for helpful comments from Michael Abramowicz, Ilan Benshalom, Ryan Bubb, Gerrit De Geest, David Gamage, Shi-Ling Hsu, Dan Markel, Donald Marron, Jonathan Masur, Zyg Plater, Gregg Polsky, Adam Rosenzweig, Darien Shanske, Henry Smith, Eric Toder, and attendees of presentations at the 2011 Junior Tax Conference and the Urban/Brookings Tax Policy Center.

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INTRODUCTION

Humans sometimes need a bit of encouragement to do good for other people. In a well-known passage of the Old Testament, Jehovah castigates the Israelites for failing to pay a tithe to support His temple, and notes that He has cursed their nation for their collective failures.¹ Then, lightening up a bit, He also promises three blessings for those who tithe.² Modern secular leaders offer more worldly rewards, in the form of a federal income tax deduction, for those who support churches and other goods shared jointly with others.³ In this Article, taking a lead from Malachi, I ask: What about the curse? Why not incentivize charitable giving with a penalty provision, instead of giving away public money? More generally, when should incentives take the form of punishments, rather than rewards?

A more familiar path to the same questions would be to suppose that we were all to agree that the U.S. government should take steps to slow global climate change. How should we do it? We might cap directly the amount of greenhouse gases emitted—for example, by issuing a limited number of per-

1. *Malachi* 3:8-9.

2. *Malachi* 3:10-12.

3. 26 U.S.C. § 170 (2006).

mits to emit those gases and letting firms exchange them.⁴ Or we might change the price of greenhouse gas components, such as through a “carbon tax.”⁵ And, though it may not be obvious at first glance, a very similar approach to the carbon tax would simply be to pay polluters to stop, much as the United States did during the brief life of its “cash for clunkers” program, and as it continues to do now through a variety of renewable energy tax credits, home rehabilitation tax credits, and so on.⁶

What policymakers have failed to consider closely is: Which of the price approaches is better? Taking money from polluters, or giving to those who clean things up? The stick, or the carrot? Surprisingly, the environmental literature has given only glancing attention to that question, and outside the carbon-tax debate it seems hardly to have been considered in a systematic way at all.⁷ This Article fills that gap.

4. This proposal passed the U.S. House of Representatives. American Clean Energy and Security Act of 2009, H.R. 2454, 111th Cong. (2009).

5. See, e.g., Gilbert E. Metcalf & David Weisbach, *The Design of a Carbon Tax*, 33 HARV. ENVTL. L. REV. 499 (2009).

6. For an overview of the many provisions, see STAFF OF J. COMM. ON TAXATION, 111TH CONG., TAX EXPENDITURES FOR ENERGY PRODUCTION AND CONSERVATION 21-107 (Comm. Print 2009), available at <http://finance.senate.gov/imo/media/doc/042309jctdoc1.pdf>.

7. There is an environmental economics literature on the use of subsidies, sometimes known as “PES,” or “payment for environmental services.” See THOMAS STERNER, POLICY INSTRUMENTS FOR ENVIRONMENTAL AND NATURAL RESOURCE MANAGEMENT 167-80 (2003); Stefanie Engel et al., *Designing Payments for Environmental Services in Theory and Practice: An Overview of the Issues*, 65 ECOLOGICAL ECON. 663, 663-74 (2008); see also Howard F. Chang, *An Economic Analysis of Trade Measures to Protect the Global Environment*, 83 GEO. L.J. 2131, 2149-64 (1995) (comparing subsidies and penalties as tools for encouraging international climate agreements); Jonathan Baert Wiener, *Global Environmental Regulation: Instrument Choice in Legal Context*, 108 YALE L.J. 677, 701-96 (1999) (examining subsidies together with other policy options for containing global warming). For the most part that literature is descriptive, see Engel et al., *supra*, at 664, although Chang, Sterner, and Weiner ask explicitly whether subsidies are ever normatively preferable to penalties.

Other writers have also investigated the relative cost-effectiveness of taxes and subsidies. An early economics literature examined the so-called “output” effect, which is one of the several factors I examine here. E.g., WILLIAM J. BAUMOL & WALLACE E. OATES, THE THEORY OF ENVIRONMENTAL POLICY 211-34 (Cambridge Univ. Press 2d ed. 1988) (1975); Robert E. Kohn, *When Subsidies for Pollution Abatement Increase Total Emissions*, 59 S. ECON. J. 77 (1992); Stuart Mestelman, *Production Externalities and Corrective Subsidies: A General Equilibrium Analysis*, 9 J. ENVTL. ECON. & MGMT. 186 (1982); A. Mitchell Polinsky, *Notes on the Symmetry of Taxes and Subsidies in Pollution Control*, 12 CAN. J. ECON. 75 (1979). Others consider the transaction costs of the two systems. See, e.g., Donald Wittman, *Liability for Harm or Restitution for Benefit?*, 13 J. LEGAL STUD. 57, 62-65 (1984); Gerrit De Geest & Giuseppe Dari-Mattiacci, *Carrots Versus Sticks* 8-31 (Wash. Univ. in St. Louis Sch. of Law Legal Studies Research Paper Series, Paper No. 09-09-03, Aug. 2009) [hereinafter De Geest & Dari-Mattiacci, *Carrots Versus Sticks*], available at <http://ssrn.com/abstract=1470129>. The most recent evolution of that project is Giuseppe Dari-Mattiacci & Gerrit De Geest, *Carrots, Sticks, and the Multiplication Effect*, 26 J.L. ECON. & ORG. 365 (2009) [hereinafter Dari-Mattiacci & De Geest, *Multiplication Effect*], which argues that the relative price-efficacy of sticks is a reason to prefer them to carrots, and that theirs is the first

As many readers know, there is a vigorous debate in the environmental literature on the first set of choices I just mentioned: whether pollutants can best be controlled by regulating their quantity, or instead by affecting their price.⁸ Within the subset of price options, the choice of carbon-tax design might call to mind prominent recent debates over the use of so-called “tax expenditures,” which consist mostly of arguments over whether the tax system should be used to implement spending programs.⁹

These questions are interesting and important, but so far they have mostly obscured the fact that there is a third key set of decisions to be made about regulatory goals that, like global climate change policy, attempt to grapple with the costs one group of society imposes on another. Such costs (as, again, most readers likely know) are commonly called “externalities,” and at least since A.C. Pigou economists have known that when a consumer does not pay the full cost of consuming a unit of a good, she is likely to purchase more than society optimally would want.¹⁰ One mechanism for correcting that inefficiency is to change the price the consumer pays for that next unit of a good—its “marginal” price—to reflect the total cost society bears from its consumption.¹¹ As it turns out, there are two ways of accomplishing that task: tax the good, or pay the consumer not to consume it.¹² In other words, we can make the externality producer worse off than under the status quo: a stick. Or we can make the producer better off: a carrot.

Choices between carrots and sticks are hardly unique to environmental regulation. Indeed, they pop up anywhere we might use a price mechanism for overcoming externalities. Since externalities are one of a handful of fundamental justifications for government regulation, the carrot/stick problem, I will ar-

sustained attempt to distinguish normatively between the two instruments. *Id.* at 367-68. I agree on both fronts, but there are a number of other relevant factors in the debate, some of which may point in the opposite direction.

8. Compare Robert N. Stavins, *A Meaningful U.S. Cap-and-Trade System to Address Climate Change*, 32 HARV. ENVTL. L. REV. 293, 348-53 (2008) (quantity), with William D. Nordhaus, *To Tax or Not to Tax: Alternative Approaches to Slowing Global Warming*, 1 REV. ENVTL. ECON. & POL'Y 26 (2007) (price), Marc J. Roberts & Michael Spence, *Effluent Charges and Licenses Under Uncertainty*, 5 J. PUB. ECON. 193 (1976) (price), and Martin L. Weitzman, *Prices vs. Quantities*, 41 REV. ECON. STUD. 477 (1974) (price).

9. Compare Daniel N. Shaviro, *Rethinking Tax Expenditures and Fiscal Language*, 57 TAX L. REV. 187, 192-99, 206-21 (2004) (suggesting some merits to use of the tax system for policy implementation), and Edward A. Zelinsky, *James Madison and Public Choice at Gucci Gulch: A Procedural Defense of Tax Expenditures and Tax Institutions*, 102 YALE L.J. 1165, 1175-84 (1993) (same), with J. Clifton Fleming, Jr. & Robert D. Peroni, *Can Tax Expenditure Analysis Be Divorced from a Normative Tax Base?: A Critique of the “New Paradigm” and Its Denouement*, 30 VA. TAX REV. 135, 172-79 (2010) (criticizing use of tax system for non-tax policy goals), and Edward D. Kleinbard, *The Congress Within the Congress: How Tax Expenditures Distort Our Budget and Our Political Process*, 36 OHIO N. UNIV. L. REV. 1, 4-30 (2010) (same).

10. See A.C. PIGOU, *THE ECONOMICS OF WELFARE* 172-203 (4th ed. 1932).

11. JONATHAN GRUBER, *PUBLIC FINANCE AND PUBLIC POLICY* 134 (2d ed. 2007).

12. *Id.* at 134-35.

gue, is pervasive throughout government action.¹³ Another prominent recent example is health insurance. Individuals who seek medical care when they lack insurance (or other means to pay) create fiscal externalities for other users of the health system: either paying customers pay more, or health providers take home less, to cover the expense of those who can't afford care.¹⁴ The Affordable Care Act implements both a carrot and a stick to deal with this externality, and it applies those two tools selectively to two different populations. The poorest households get a carrot: they receive a subsidy to buy their own health insurance.¹⁵ Everyone else gets a stick: they must buy health insurance, or pay a penalty tax.¹⁶

By one measure, penalties and subsidies, or what I've been calling sticks and carrots, are largely indistinguishable. One way to put this point is that there is no *marginal* difference between taxing you a dollar if you do something and paying you a dollar if you don't. Smoke that cigarette? One dollar, please. Throw it away? Here's a buck. Either way, the marginal cost of choosing to smoke your next butt, rather than discarding it, is one dollar. This equivalence turns on the concept of opportunity costs, which I explain in more detail in Part I.B.

But carrots can also differ importantly from sticks in their other economic and even moral effects.¹⁷ Relative to present policy, a carrot transfers wealth from taxpayers to its recipients, while sticks have the opposite effect. This transfer can change the preferences of the regulated party, fill or drain government coffers, suit or offend our preferences for punishment and just distributions, and change the incentives of parties who are planning for the next change in regulation. Many of the individual components of this analysis are familiar from other literatures, such as debates over the law of takings or the best way to compensate parties affected by changes in legal rules.

What is novel about my argument here is that it synthesizes these other literatures to reach a global assessment of the relative merits of carrots and sticks as policy tools.¹⁸ Prior analyses, to the extent they've considered the question

13. *Id.* at 122.

14. *Id.* at 422.

15. Patient Protection and Affordable Care Act, Pub. L. No. 111-148 §§ 1401(a), 1402(a)-(c), 1421(a), 2001(a), 124 Stat. 119, 213, 220, 237, 271 (codified as amended in scattered sections of the U.S. Code).

16. 26 U.S.C. § 5000(a) (Supp. IV 2010).

17. For more detail on the points in this paragraph, see Part III below.

18. To be sure, there are literally dozens of other sources that discuss "carrots and sticks." But in nearly all cases these other works merely discuss the role of incentives in human behavior, rather than attempting to distinguish between the two mechanisms. Ian Ayres's recent book, intended for popular audiences, does suggest differences between carrots and sticks as policy tools, but heavily emphasizes the difference in framing between the two and does not discuss the considerations addressed here. IAN AYRES, *CARROTS AND STICKS: UNLOCKING THE POWER OF INCENTIVES TO GET THINGS DONE* 45-72 (2010). Another cousin is Howard F. Chang, *Carrots, Sticks, and International Externalities*, 17 INT'L REV.

at all, have tended to dismiss carrots out of hand because of their supposed propensity to encourage some actors to do bad in order to be paid to stop.¹⁹ As I argue here, there is actually considerably more nuance to the problem, with a number of factors that favor carrots in some circumstances. Still, at least when it comes to discouraging negative behavior, I agree we should often prefer sticks. Sticks reduce the wealth of those who make the rest of us miserable, which makes sense both in terms of the effect of income on preferences and also in terms of our sense of justice. Sticks also replace other costly forms of revenue, where carrots instead put extra burdens on the treasury.

Another contribution I make is to extend my analysis to the production of positive externalities.²⁰ Nearly all the existing discussion related to the choice of price instruments focuses on the classic case of pollution and close analogues.²¹ But there is no reason the same analysis cannot be extended to the production of social goods, such as charity or innovation. Why do we reward donors instead of punishing the tightfisted? As I show, there is a surprisingly good case for using sticks to produce positive externalities, although it is not as clear-cut as with negative externalities.

I also add to the existing lore by analyzing the political tragedies that lead us to choose carrots over sticks.²² Once we recognize the basic economic structure of sticks as transfers from a concentrated interest group to society at large, it becomes fairly obvious that politics will tend to favor carrots. Less obviously, many aspects of judge-made law, such as the doctrines of standing, unconstitutionality conditions, and the dormant Commerce Clause, also contribute inadvertently to our hunger for carrots. Prior commentators have treated these political preferences for carrots as a reason to use carrots, especially in high-stakes leg-

L. & ECON. 309 (1997), which considers the strategic incentives of nations bargaining over international environmental law. Both Chang and Ayres have insights to contribute to my project, but their main focus is elsewhere.

19. See, e.g., Chang, *supra* note 7, at 2150-64; Wiener, *supra* note 7, at 726-27, 755-56.

20. As far as I am aware, Wittman's brief discussion is the only prior example of any analysis of the carrot/stick decision for positive externalities, and he limits his discussion to transaction costs. See Wittman, *supra* note 7, at 71, 79.

21. E.g., BAUMOL & OATES, *supra* note 7, at 213; Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 1089, 1115-24 (1972); Wiener, *supra* note 7. A possible exception is Cass R. Sunstein, *Television and the Public Interest*, 88 CALIF. L. REV. 499, 543-48 (2000), which, although framed as a choice among different kinds of property rules, does briefly discuss a few factors influencing the choice among price mechanisms and other options for encouraging the production of public interest programming. Some authors have considered why the tort system punishes wrongdoing but does not require restitution for gratuitous good deeds, see, e.g., Giuseppe Dari-Mattiacci, *Negative Liability*, 38 J. LEGAL STUD. 21, 26-30 (2009) (discussing prior literature), but these studies do not consider whether the best incentives for good deeds would instead be sticks for failure to provide the good.

22. For discussion of the points in this paragraph, see Part V below. Prior literature does include some discussion of the political economy of the choice between carrots and sticks, most notably STERNER, *supra* note 7, at 180-202.

isolation. I argue instead that acceding to demands for carrots is like capitulating to blackmail: it only leads to greater incentives for bad behavior in the future.

My analysis of the politics of carrots also raises a point of particular interest for those who study federalism. At this point there is a standard list of policy arguments either for assigning government responsibilities to the national government or devolving them to states and localities.²³ Federalism commentators have mostly devoted their efforts to rebalancing among these well-known points.²⁴ I offer here a new reason for preferring central government to local: local governments face excessive pressure to use carrots, and carrots are often inefficient. Thus, while the existing federalism literature recognizes that the presence of externalities that spill across borders might be a justification for federal action, my analysis implies that even externalities that *do not* cross borders might better be handled by the central government.

In short, our practice to date of neglecting the importance of the choice between carrots and sticks has led to some unfortunate policy decisions. Thinking about that carrot/stick choice systematically can teach us some useful lessons for institutional design. Thus, I also use the synthesis I develop to cast a new light on a wide variety of existing government programs. Some, such as the new Affordable Care Act, turn out reasonably well. But many others, some costing tens of billions of dollars per year, don't.

In Part I, I will define more explicitly what I see as the difference between carrots and sticks, and offer up some background in the basic economics that motivates their use. Part II details the ways that carrots and sticks differ economically and ethically, in particular in their impact on revenue, income and output effects, distribution, and incentives. Part III applies that framework to the regulation of negative externalities, and offers a number of examples. Part IV does the same for positive externalities. Part V explains why the political system inefficiently overproduces carrots, identifies the legal rules that further push politics in that direction, and argues that carrots should probably be rejected even in the case of important legislation that could not otherwise pass.

I. BACKGROUND

A. *Carrots and Sticks Defined*

Before beginning our discussion of carrots and sticks, it will be useful to explain what I mean when I use those terms. I define a carrot here as a wel-

23. For definitive reviews, see Wallace E. Oates, *An Essay on Fiscal Federalism*, 37 J. ECON. LITERATURE 1120 (1999); Wallace E. Oates, *Toward a Second-Generation Theory of Fiscal Federalism*, 12 INT'L TAX & PUB. FIN. 349 (2005).

24. See Brian Galle & Joseph Leahy, *Laboratories of Democracy? Policy Innovation in Decentralized Governments*, 58 EMORY L.J. 1333, 1335-37 (2009) (describing the back-and-forth claims).

come change against a given, usually pre-existing, policy baseline; a stick is simply an unwelcome change in the opposite direction. As I'll explain in a moment, the phrase "against a given policy baseline" is important, since for my purposes it is all that separates the two.

Carrots and sticks can take many forms. Being relieved from an obligation one expects to have can be a carrot. For instance, suppose I expect to have to pay \$10,000 in income taxes at the end of the year. To avoid some awkward moments, such as audits and jail time, I set aside that amount in anticipation of the bill.²⁵ Congress changes the law so that my tax bill will be only \$9,000 if I buy a hybrid car.²⁶ Now, as soon as I roll off the dealer's lot with my new Prius, I have an extra grand to spend that I didn't expect.²⁷ So these kind of "tax expenditures," as they are sometimes known, count as carrots, even though in a sense they are just relief from some other burden.²⁸ A stick can be the opposite. When the federal government threatens to withhold highway dollars from states if they don't increase their drinking age to twenty-one, as it did to prompt the famous Supreme Court case *South Dakota v. Dole*,²⁹ that is a stick: a denial of some portion of an expected benefit.³⁰

There is something a little bit strange about calling the condition on highway dollars a stick, though. After all, even if the state gets less than expected, it still gets some federal money. And who is to say that the state was entitled to any money at all? If we were to measure whether a rule is a carrot or stick from some baseline of what the "right" outcome is, or the economically efficient one, then it isn't clear at all what to call the drinking-age rule. The answer depends on how much money we think South Dakota "should" get, in some normative sense, and then whether the rule departs upwards or downwards from there.

Perhaps it is possible to make these distinctions, but that is not my goal here. As others have pointed out in a variety of legal contexts, establishing the normatively correct baseline for deciding when departures up or down from

25. Typically, in the United States, our employers are obliged to do this for us, a procedure known as income tax withholding. IRS, PUBLICATION 15, (CIRCULAR E), EMPLOYER'S TAX GUIDE (2011).

26. Actually, when the author purchased his Prius, the tax credit was \$3150. See *Summary of the Credit for Qualified Hybrid Vehicles*, IRS, <http://www.irs.gov/newsroom/article/0,,id=157557,00.html> (last updated Nov. 8, 2007); see also 26 U.S.C. § 30B (2006 & Supp. IV 2010) (establishing the credit).

27. Assuming, of course, that the dealer doesn't increase its price by \$1000 in anticipation of my windfall. Sometimes the economic benefits of a carrot go to a party other than the one the law assigns them to. But that doesn't reduce the efficacy of the carrot, as I'll explain shortly.

28. Stanley S. Surrey & Paul R. McDaniel, *The Tax Expenditure Concept: Current Developments and Emerging Issues*, 20 B.C. L. REV. 225, 228 (1979).

29. 483 U.S. 203 (1987).

30. On the withholding of an expected carrot as equivalent to a stick, see Lior Jacob Strahilevitz, *Reputation Nation: Law in an Era of Ubiquitous Personal Information*, 102 NW. U. L. REV. 1667, 1712 (2008).

that base should be called “subsidies” is challenging.³¹ What I offer instead is simply a framework for evaluating departures from any given baseline. From wherever we start, should we move up (carrots) or down (sticks)?

If it isn't obvious from what I have just said, let me emphasize that defining any particular policy as either carrot or stick is mostly arbitrary. Given a different baseline, any carrot can morph into a stick and vice-versa. To see this, consider the recent health care legislation, which imposes a tax on individuals who do not purchase qualifying health insurance.³² That tax, with some exceptions, is two percent of annual income.³³ Is this a carrot or a stick? Seen from before the legislation was put into place, it looks like a stick: do this thing or pay this new, higher amount. But once the legislation is in place, it looks like a carrot: if taxpayers buy insurance, they get a discount on their income taxes, which happen to be two percent higher than they were at a time in the recent past.³⁴

From a normative perspective, this fluidity of definitions turns out not to be a problem for my analysis, because almost everything that I will argue is perfectly symmetrical. As we'll see, granting carrots enriches recipients at the cost of the general public, and that has implications for the strategic behavior of parties who might be awarded carrots. Using sticks enriches the public at the cost of those menaced with the stick, and has the opposite strategic incentives. My framework can therefore be used to compare any two levels (including zero) of price instruments to each other, since the relative effect of moving from one to the other is the same regardless of direction. For instance, comparing a big stick to a small stick is the same as thinking about moving from neutrality to a carrot (if a small stick is the baseline) or from neutrality to a stick (if a big stick is the baseline). Either way, we will find that, as compared to the small stick, the big stick enriches the general public at the expense of the regulated party, and that this difference will spur similar incentive effects whichever baseline we start with. Given the difficulty of establishing normatively correct baselines, I view this indifference to baseline as a feature, not a weakness, of the carrot/stick framework.

As I'll try to show, though, the political and psychological dimensions of a policy change are *not* perfectly symmetrical. The current state of the world has an important impact on how people and governments respond to proposed changes. These responses are, to say the least, not always in accordance with the normative prescriptions of the rest of the framework.

31. E.g., Robert Carroll et al., *Income Versus Consumption Tax Baselines for Tax Expenditures*, 64 NAT'L TAX J. 491, 492-93 (2011); Julie Roin, *Truth in Government: Beyond the Tax Expenditure Budget*, 54 HASTINGS L.J. 603, 610-22 (2003); Peter Westen, *The Empty Idea of Equality*, 95 HARV. L. REV. 537, 547 (1982).

32. 26 U.S.C. § 5000A(a)-(b) (Supp. IV 2010).

33. *Id.* § 5000A(c).

34. Edward D. Kleinbard, *Constitutional Kreplach*, 128 TAX NOTES 755 (2010) (pointing out that these two structures are economically identical).

Along those lines, another issue readers should keep in the back of their minds is that the literature on price instruments assumes that individuals in fact respond to changes in their self-interest. To the extent that some instruments may be more difficult for individuals to notice or understand, they may not fully produce the predicted effects. In other cases, actors may fail to respond fully to incentives because of agency problems: those who decide on behalf of the actor could have self-interested goals that don't fully align with their principal's. For purposes of this Article, though, I will assume away these problems, in the hope that simplification will allow me to better focus on the basic lessons of fully operational price theory.

B. *Economics of a Pigouvian Tax*

In this next introductory Subpart, I will explain how carrots and sticks are usually used as policy tools. I provide, in other words, a brief overview of the theory of price mechanisms, and explain why that theory treats carrots and sticks as equivalent in most ways. Readers familiar with basic microeconomic theory can safely skip to Part II.

Most policy analysts to date have not focused closely on the differences between carrots and sticks because in at least one important aspect the two are identical. Either a penalty or a subsidy can be equally effective as a price mechanism for setting the "right" marginal price of a good.³⁵ To see this, it's helpful to first step back and ask what it means for society to have the "wrong" amount of a good (and when I say "good" here, I mean anything humans might want, ranging from hunks of cheese to leisure time).

Externalities are a common reason why private markets fail to produce the amount of a good that best satisfies society.³⁶ An externality is just some other person's reaction to the things that I do.³⁷ For instance, if I grow oranges in my backyard, some rotten oranges might fall into my neighbor's driveway, producing sticky juice stains on his new car.³⁸ If I am totally self-interested, I have no reason to care about my neighbor's car. As the economist Ronald Coase pointed out, though, my neighbor may find ways to persuade me to clean up the situation: either by paying me to prune my trees, or perhaps by threatening to prune something else if I don't.³⁹

35. A "marginal" price is just the cost for the purchase of one incremental unit of some good.

36. GRUBER, *supra* note 11, at 122.

37. For more nuance, see BAUMOL & OATES, *supra* note 7, at 15-18.

38. The author denies that this ever happened while he lived in Florida, Bob.

39. See Ronald H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1 (1960), reprinted in R.H. COASE, *THE FIRM, THE MARKET, AND THE LAW* 95 (1988). And really, Bob, that was uncalled for.

Externalities can be either negative or positive.⁴⁰ Maybe my neighbor also enjoys the shade of my tree, or even collects a few tasty oranges that make a softer landing on his property: these could be positive externalities. In either case, because the producer of the externality does not have any direct reason to care about the effects of the externality on others, she produces either too much or too little of the good. If there are negative externalities, she produces too much; if there are positive, too little. In conventional economic terms, the total production of the good deviates from the “optimal” social amount, because the net social cost or benefit of each unit of the good differs from the producer’s private cost or benefit.⁴¹

One typical economist’s solution to these failures of the private market to get things right is to adjust the producer’s price to match society’s preferences.⁴² For example, suppose that each orange tree I grow causes an expected \$1000 of damage to my neighbor’s property. If my neighbor has no legal recourse against me, I will grow more trees than the optimal amount, since when I decide whether to plant another tree I consider only my own costs and benefits and not his. But if there were, say, a \$1000 orange tree tax, or if my neighbor could file a \$1000 lawsuit against me for creating a sticky orange nuisance, then I will produce only as many trees as would be cost-justified given *both* my own preferences and also his. Alternately, if he enjoys my shade and tasty fruit, society might give me a \$1000 subsidy to grow trees, so that I will be willing to plant even if my own benefits from tree growing are small. These price mechanisms are often called “Pigouvian” (or, sometimes, “Pigovian”) taxes, after the economist A.C. Pigou, who first suggested them.⁴³ They are usually thought to be superior to more direct forms of government control in that they reveal private market information about the efficient amount of regulation, and allow the market to allocate externality reduction to the least-cost reducers.⁴⁴ All of this assumes, I should note, that the Coasean solution of direct bargaining would not work. That may be untrue of me and my neighbor,⁴⁵ but seems more plausible for goods with widespread impact, such as pollution or education.⁴⁶

40. GRUBER, *supra* note 11, at 135.

41. *Id.* at 134.

42. Another tool, which I omit here for simplicity, is a so-called “quantity” regulation. In that case, society would simply determine how many trees I should grow, and force or incentivize me to grow that many. The mechanisms can be similar in many respects, but do differ in some important ways, as others have ably explained. *See, e.g.*, STERNER, *supra* note 7, at 136-47; Louis Kaplow & Steven Shavell, *On the Superiority of Corrective Taxes to Quantity Regulation*, 4 AM. L. & ECON. REV. 1, 2-15 (2002); Wiener, *supra* note 7, at 727-34.

43. GRUBER, *supra* note 11, at 134.

44. Kaplow & Shavell, *supra* note 42, at 4; Wiener, *supra* note 7, 714-15 (describing this point as the general consensus of economists).

45. Unjustified pruning threats notwithstanding. Actually, even bargaining between two parties can fail for a variety of reasons, including strategic behavior and the possibility that the parties assign different utility to an identical amount of dollars. Herbert Hovenkamp,

Society can use either carrots or sticks interchangeably to get externality producers to “internalize” the marginal effects of their decisions on others.⁴⁷ Again, one way to force me to recognize the \$1000 per tree impact of my rotten oranges is to tax me \$1000 per tree. But another way would be to offer to pay me \$1000 not to plant the new sapling I’ve purchased. These are equivalent on the margin—that is, from the perspective of my single decision to plant the sapling or not—because of opportunity costs.⁴⁸ An opportunity cost is just the value of what I give up when I make a particular decision.⁴⁹ If I am self-employed and I take the day off to watch Oprah reruns, my opportunity cost is the revenue I could have earned working. So, too, with the sapling. If you offer me \$1000 to throw away the sapling, then my opportunity cost of planting instead is \$1000.

To see this more clearly, consider my economic position under the tax and the subsidy. If there is a tax, and I choose to plant the tree, I have a new tree and I am poorer by \$1000. If I don’t plant, I have no tree and \$1000 in my pocket. Now the subsidy. If I don’t plant, I have no tree, and I have an extra \$1000 in my pocket from your subsidy. If I do plant, I have a nice new tree, but my pockets are empty. Either way, the decision to plant the tree costs me \$1000: an economist would say the marginal cost of planting is \$1000.

If this equivalence seems unnatural to you, reader, you are not alone.⁵⁰ Researchers have found time and again that we perceive gains differently from losses.⁵¹ We take the status quo (or, sometimes, other salient events, such as the price we paid at purchase) as a fixed point of reference, and we evaluate departures from it in different directions differently.⁵² In particular, we tend to

Marginal Utility and the Coase Theorem, 75 CORNELL L. REV. 783, 789-806 (1990); Louis Kaplow & Steven Shavell, *Property Rules Versus Liability Rules: An Economic Analysis*, 109 HARV. L. REV. 713, 724, 734 (1996).

46. See Calabresi & Melamed, *supra* note 21, at 1107-10; Kaplow & Shavell, *supra* note 45, at 749.

47. This insight is usually credited to ALLEN V. KNEESE, *THE ECONOMICS OF REGIONAL WATER QUALITY MANAGEMENT* 90-93 (1964).

Interchangeability also requires that the tax system treat sticks and carrots identically, which it does not always do. See Gregg D. Polsky & Dan Markel, *Taxing Punitive Damages*, 96 VA. L. REV. 1295, 1302-27 (2010) (explaining how the federal tax system may distort intended incentive effects of state tort law); Ethan Yale, *Taxing Cap-and-Trade Environmental Regulation*, 37 J. LEGAL STUD. 535, 548 (2008) (examining interactions between corporate income tax and environmental controls).

48. RICHARD A. POSNER, *ECONOMIC ANALYSIS OF LAW* 10 (8th ed. 2011).

49. *Id.* at 7-12.

50. See Dari-Mattiacci & De Geest, *Multiplication Effect*, *supra* note 7, at 367 (pointing out that framing effects may undermine traditional equivalence between taxes and subsidies).

51. JONATHAN BARON, *THINKING AND DECIDING* 269-70 (4th ed. 2007) (summarizing studies).

52. *Id.* at 267-68.

be “loss averse”: we fear losses more than we prize gains.⁵³ But often the difference between a gain and a loss is just a matter of how it’s framed: is the loss of the \$1000 subsidy a “loss,” or not? These kinds of “framing effects” impact how actors respond to incentives, even when those incentives are economically equivalent.⁵⁴ But framing effects are a matter of the happenstance of how a given policy is described, and so can potentially be changed to suit our policy objectives.

II. CARROTS AND STICKS AS PRICE INSTRUMENTS

What then are the real, rather than perceived, differences between carrots and sticks? If we put together a mosaic with pieces of the arguments scattered through the instrument-choice literature, our mosaic would have four basic kinds of tiles. I will call them income effects, revenues, distributional consequences, and incentives. A possible fifth tile, closely related to income effects, is what I will call output effects; output effects are like income effects, but for firms rather than people.

Income effects are changes in individual behavior resulting purely from changes in that person’s budget.⁵⁵ Most of what we buy are items an economist would call “normal” goods: the more money we have, the more we want of the things we want.⁵⁶ Typically our budget isn’t large enough to permit us to consume all we might desire. As our budget constraint loosens, we consume more. In some cases, our deeper pockets allow us to shift away from the bargain goods we were buying and now consume a more desirable alternative; an economist would call the goods we abandon in this process “inferior” goods.⁵⁷ Either way, modest changes in the price of one good among many probably won’t have large effects on the wealth-driven preferences of an average household, but could have more significant impacts on the preferences of very poor families.⁵⁸

The change in preferences resulting from income effects can sometimes either reinforce or undermine the change in demand resulting from a carrot or stick.⁵⁹ While both price mechanisms change the marginal cost of an additional unit of a good, they have opposite effects on the individual’s wealth. Carrots, obviously, make the recipient richer than she was under the prior policy, while

53. *Id.*

54. *Id.* at 267 & n.8.

55. GRUBER, *supra* note 11, at 36.

56. *Id.* at 36 n.1. *But see* THE NOTORIOUS B.I.G., *Mo Money Mo Problems*, on LIFE AFTER DEATH (Bad Boy Records 1997).

57. GRUBER, *supra* note 11, at 36 n.1.

58. *See* POSNER, *supra* note 48, at 7 & n.8 (noting that no one has successfully identified an inferior good for which the income effect would exceed the substitution effect).

59. *Cf.* Calabresi & Melamed, *supra* note 21, at 1095-96 (observing that assigning a legal entitlement enriches the entitled party and so may change its preferences).

sticks if triggered impoverish the payer. The resulting income effect may or may not be in the same direction as the substitution effect of the price change. For example, cigarette taxes both make cigarettes more expensive and also effectively shrink the budgets of those who buy them anyway. If cigarettes are “normal” goods, these are complementary effects, since both will tend to discourage cigarette purchases.

Income effects can dominate other incentives when demand for a good is highly inelastic.⁶⁰ In that case, the “substitution” effect of the Pigouvian tax is small. Price hikes, for example, may not do much to deter nicotine addicts from smoking.⁶¹ Rather, it would be the smoker’s budget that determines how many packs he can buy. Income effects can also be magnified by impulsiveness; large changes in transitory wealth may have disproportionately large effects on household consumption behavior.⁶²

Business firms and other organizations do not have preferences as such, but changes in price can have a similar impact on their output by changing the supply of, rather than the demand for, a good.⁶³ Of course, the equilibrium supply of a good depends on both supply and demand curves. The supply curve of a firm in turn depends on the costs of its inputs, such as labor and raw materials. If a government policy changes the cost of these inputs, the firm’s supply curve shifts, likely altering the equilibrium point where supply and demand intersect.⁶⁴ The change in price can come anywhere in the chain of supply, including at the end: cigarette taxes are collected by retailers, but the resulting increase in price still depresses equilibrium supply.⁶⁵

60. “Inelastic” means simply that demand doesn’t change much when price changes. GRUBER, *supra* note 11, at 45-46.

61. See Jon D. Hanson & Kyle D. Logue, *The Costs of Cigarettes: The Economic Case for Ex Post Incentive-Based Regulation*, 107 *YALE L.J.* 1163, 1218-20 n.254 (1998) (analyzing studies of price elasticity of tobacco products).

62. Cf. Brian Galle & Manuel Utset, *Is Cap-and-Trade Fair to the Poor? Shortsighted Households and the Timing of Consumption Taxes*, 79 *GEO. WASH. L. REV.* 33, 68-71 (2010) (surveying studies of the relationship between timing of income and household consumption). Another way to put this point is that, if saving and borrowing are costless, a household will base purchasing decisions on expected lifetime income. Borrowing, however, may be limited by transaction costs and psychological barriers, *see id.*, so that perceived income shrinks to the amount available to satisfy budget demands within a relatively short period.

63. STERNER, *supra* note 7, at 167-70.

64. I assume here a competitive market. In an oligopolistic market, producers with market power can constrain supply to a level below the unrestricted equilibrium, allowing them to capture more of the subsidy in profit rather than passing along the cost savings to consumers. In the long run, though, even that scenario often will result in greater output, since eventually entrepreneurs will recognize the superior profits to be had in the industry and, assuming the oligopolists cannot easily keep them out, they will compete away the higher profits. For a detailed discussion of the effect of subsidies in oligopolistic markets, see Klaus Conrad & Jianmin Wang, *The Effect of Emission Taxes and Abatement Subsidies on Market Structure*, 11 *INT’L J. INDUS. ORG.* 499, 500-18 (1993).

65. In some situations, such as when components of the taxed good can be divided up and thereby escape a portion of the tax, taxes may actually decrease the price of the original

Output effects, like income effects, can undermine or reinforce the intended substitution effect of a carrot or stick. Suppose that the good producing externalities is not the end product, but instead one of its inputs. Then the total amount of that input in the economy is the mathematical product of the amount used in each widget times the number of widgets sold.⁶⁶ Government policies might increase one while reducing the other. As Baumol and Oates have shown, subsidies for clean energy can actually result in more pollution, since the extra cash flowing to a subsidized industry may attract so much new investment that it creates a net increase in output.⁶⁷ If that increase in output outweighs the greening of the industry's production process, pollution increases overall. The reverse is true of sticks: by reducing output, a stick would complement the pollution-reducing incentives of changing the marginal price for the firm's polluting inputs.

A second key difference between carrots and sticks is revenues.⁶⁸ If the government is dispensing carrots and wielding sticks, those policies affect the treasury. Carrots require new expenditures relative to the existing baseline, while sticks can bring in revenue. This matters because public revenues are themselves costly to raise. Obviously the tax system is costly to administer.⁶⁹ In addition, taxes change people's behavior, as anyone who has seen the narrow houses of Amsterdam or the thrilling opening of *Beverly Hills Cop* can attest.⁷⁰ In most instances, these changes in behavior simply reduce the taxpayer's welfare without producing much new revenue for the government—an outcome economists refer to as “deadweight loss.”⁷¹ But in the case of a tax stick, the change in behavior is itself a desirable outcome. Carrots and sticks may also vary in their administrative costs, which might either contribute to or mitigate the revenue differential between the two.⁷²

(now unbundled) good. See Henry E. Smith, *Ambiguous Quality Changes from Taxes and Legal Rules*, 67 U. CHI. L. REV. 647, 649-50 (2000).

66. See STERNER, *supra* note 7, at 167-68.

67. See BAUMOL & OATES, *supra* note 7, at 217-30.

68. See Wiener, *supra* note 7, at 727.

69. See, e.g., William G. Gale & Janet Holtzblatt, *The Role of Administrative Issues in Tax Reform: Simplicity, Compliance, and Administration*, in UNITED STATES TAX REFORM IN THE 21ST CENTURY 179, 179-80 (George R. Zodrow & Peter Mieszkowski eds., 2002); Joel Slemrod & Nikki Sorum, *The Compliance Cost of the U.S. Individual Income Tax System*, 37 NAT'L TAX J. 461, 462-74 (1985).

70. On Amsterdam's skinny homes, see HARVEY S. ROSEN & TED GAYER, PUBLIC FINANCE 371 (8th ed. 2008). To watch Axel Foley wreck most of downtown Detroit in his pursuit of untaxed cigarettes, see BEVERLY HILLS COP (Paramount Pictures 1984).

71. GRUBER, *supra* note 11, at 578-79.

72. The classic analysis of the differing transaction costs between the two is Wittman, *supra* note 7, at 62-65. Wittman asserts that it is more efficient to choose the rule affecting fewer actors—for example, punishing theft instead of paying for non-theft, if most people comply with the law. *Id.* at 64-65. It should already be clear that this analysis is seriously incomplete. For one, in the case where Wittman would prescribe paying, his analysis fails to

Another way that sticks and carrots may vary is in their distributional effects. This aspect has been fairly well explored in the property law literature.⁷³ Carrots transfer money from taxpayers to those who produce externalities, while sticks obviously do the opposite (except in the unlikely event that the stick is so effective that no one pays any penalty). To the extent that the class of those who pay does not align perfectly with the class of those who benefit from changes in externality-creating behavior, we may be enriching some groups at the expense of others. Usually we think these transfers make society better off when they flow from rich to poor, and worse off when they flow in the opposite direction.⁷⁴ Furthermore, as property scholars have recognized at least since Calabresi and Melamed, our decision of who pays to achieve efficient outcomes can have significant effects on social perceptions of whether a policy is just.⁷⁵

Finally, the two instruments induce very different incentives for regulated parties over time. As Coase and the long line of those who have discussed his theories have recognized, paying an actor to stop creating negative externalities may simply encourage others to produce those same externalities, in the hopes of being bribed themselves.⁷⁶ On the other hand, the possibility of a future stick might discourage risk- or uncertainty-averse actors from investing in projects that could be subject to later penalties.⁷⁷ Whether that is a desirable result depends on whether society is trying to prevent negative externalities or to induce positive ones, as I will play out in the next two Parts.

Information is another important aspect of the choice between policy instruments over time.⁷⁸ Whether it employs a carrot or a stick, the government needs detailed information about the harm or benefit resulting from the externality. The producers often are in a position to gather information about the externality more effectively than the government.⁷⁹ For example, producers may get honest feedback from their customers, rivals, or business partners, while those who provide information to the government may be trying self-servingly

account for the deadweight loss involved in raising revenues for payoffs. This loss might exceed any administrative savings achieved by reducing the number of affected actors.

73. See Calabresi & Melamed, *supra* note 21, at 1121.

74. See GRUBER, *supra* note 11, at 53.

75. See Calabresi & Melamed, *supra* note 21, at 1102-03.

76. See, e.g., David A. Koplow & Philip G. Schrag, *Carrying a Big Carrot: Linking Multilateral Disarmament and Development Assistance*, 91 COLUM. L. REV. 993, 1026-42 (1991); Smith, *supra* note 65, at 698; Wiener, *supra* note 7, at 726.

77. See William A. Fischel & Perry Shapiro, *Takings, Insurance, and Michelman: Comments on Economic Interpretations of "Just Compensation" Law*, 17 J. LEGAL STUD. 269, 290-91 & n.48 (1988) (suggesting that failure to compensate for takings may discourage investment).

78. See Kaplow & Shavell, *supra* note 42, at 4, 9.

79. See *id.* at 7.

to induce the government to deliver benefits to them.⁸⁰ Likewise, in some settings, the optimal marginal cost to set using either instrument depends not only on the costs or benefits for others but also on the price of avoiding the harm or producing the good for the producer.⁸¹ Producers usually have better information about their own cost structure than the government does.⁸²

In addition to affecting the decision to produce the externality-creating good, carrots and sticks also influence parties' incentives to develop and reveal information. If carrots are on the table, producers should want to develop information that shows a large marginal social loss from nonoptimal production of the good, and perhaps data that demonstrates how costly and difficult it is for them to move in the direction the government wants.⁸³ The larger externalities are, or the pricier change is for producers, the bigger the subsidy they can credibly claim to need.⁸⁴ Once more, the opposite is true for sticks, in that if producers reveal that change is vital or very expensive, the government would set a very high tax.⁸⁵ If producers can't convincingly argue that their costs are low, their incentives may be to withhold information altogether, in the hopes that uncertainty and low political salience might slow new policies.

III. CONTROLLING NEGATIVE EXTERNALITIES

Putting these analytic tools together, it becomes clear that sticks usually dominate carrots for the control of negative externalities. Sticks are cheaper, more effective, accord better with our moral intuitions, and avoid unwanted incentives to create new harms. On the other hand, at times the distributive consequences of sticks are overly harsh, and using sticks exclusively can discour-

80. See Louis Kaplow, *A Note on Subsidizing Gifts*, 58 J. PUB. ECON. 469, 472 (1995) (noting that if subsidy amounts vary inversely with donors' observed willingness to give, some donors may give less in order to extract greater subsidies).

81. See Kaplow & Shavell, *supra* note 42, at 5-6 (claiming this is only the case when the government is constrained to use a linear tax schedule); Smith, *supra* note 65, at 683-96 (suggesting this is also the case when producers can effectively conceal a portion of the harm they produce). In some instances, the added difficulty of measuring producer costs may end up being an argument for abandoning Pigouvian pricing altogether and using some other instrument, such as a quantity rule. See *id.* at 685.

82. See Paul J. Ferraro, *Asymmetric Information and Contract Design for Payments for Environmental Services*, 65 ECOLOGICAL ECON. 810, 811 (2008); Roldan Muradian et al., *Reconciling Theory and Practice: An Alternative Conceptual Framework for Understanding Payments for Environmental Services*, 69 ECOLOGICAL ECON. 1202, 1204 (2010).

83. Ferraro, *supra* note 82, at 811.

84. *Id.*

85. See STERNER, *supra* note 7, at 153; Sunstein, *supra* note 21, at 546-47. Hanson and Logue argue that the government can reduce opportunities for producers to conceal information by imposing sticks ex post, rather than setting a price ex ante. Hanson & Logue, *supra* note 61, at 1273-74. While they may be right that measuring is easier than predicting, it is unclear why an ex post system would reduce producer incentives to conceal harms as they are happening.

age mitigation or choke off the supply of privately held information. But these possibilities can perhaps be handled with narrow carve-outs from a general rule favoring sticks, as I discuss in Part III.B.

A. *General Analysis*

1. *Revenues*

The cost advantage of sticks is a familiar point to those who study the carbon tax. Because they require new revenues, carrots add to society's total deadweight loss from taxation (or, alternatively, require cuts to other government programs), while sticks lessen the deadweight loss.⁸⁶ That is a central argument pressed by advocates of the carbon tax, many of whom suggest that its revenues create a "double dividend" by both discouraging carbon and also potentially reducing other, more distorting taxes.⁸⁷ Often, though, proponents suggest targeting the revenues derived from the carbon tax for particular purposes, such as an income tax rebate for poorer households.⁸⁸ To the extent that earmarking new revenues in this way constrains the government from spending money on the projects that would create the greatest welfare, stick-related revenues may not be as useful as the money they displace.⁸⁹

Even if sticks did require revenues, they might still be more cost-effective because in many situations a single stick will serve in place of many carrots.⁹⁰

86. For empirical evidence of this theory, see Charles L. Ballard & Steven G. Medema, *The Marginal Efficiency Effects of Taxes and Subsidies in the Presence of Externalities: A Computational General Equilibrium Approach*, 52 J. PUB. ECON. 199 (1993).

87. *E.g.*, Wiener, *supra* note 7, at 730.

88. *E.g.*, Metcalf & Weisbach, *supra* note 5, at 513-14 & n.66; Gilbert E. Metcalf, *A Distributional Analysis of Green Tax Reforms*, 52 NAT'L TAX J. 655, 663 (1999). The climate change bill that passed the U.S. House of Representatives also had this feature. American Clean Energy and Security Act of 2009, H.R. 2454, 111th Cong. § 431 (2009).

89. STERNER, *supra* note 7, at 175. Additionally, most economists would claim that a consumption tax cannot be more efficient than an income tax, because both ultimately reduce the amount of after-tax goods that workers can consume, and therefore both equally distort the decision of how hard to work. Thus, if carbon-tax revenues simply replace income tax revenues, there is no net gain in efficiency. My own view is that there is some reason to doubt that consumption taxes are as distortive of labor/leisure decisions as income taxes, because workers may not be as aware of the cumulative burden of consumption taxes. See Brian Galle, *Hidden Taxes*, 87 WASH. U. L. REV. 59, 77-81 (2009) (describing possible welfare effects of unnoticed taxation). Because they do not tax savings, consumption taxes also might avoid the income tax's impact on personal savings decisions, which may be efficient in some situations. See Daniel Shaviro, *Beyond the Pro-Consumption Tax Consensus*, 60 STAN. L. REV. 745, 783-88 (2007). In any event, switching to a consumption-tax stick can be efficient if it replaces taxes other than the individual income tax, such as by reducing the corporate income tax.

90. One form of stick that might require revenue expenditures is criminal fines. To make the stick credible, the government must have enforcement officers, judges, fine-collectors, and so on.

As Dari-Mattiacci and De Geest have recently shown, if a stick is a significant enough deterrent, it might need to be used only very rarely, while carrots must be paid to every actor who is to be influenced.⁹¹ Their key example is a dictator threatening a restive populace: the dictator need not shoot everyone, or even anyone, as long as all believe the expected cost of being shot exceeds their personal gains from revolution.⁹² As those two authors acknowledge, though, this mechanism only works if the group that is threatened cannot easily coordinate amongst themselves.⁹³ Sticks might not be cost-effective in this way, therefore, when used against a small, coherent group.⁹⁴

In a separate working paper, De Geest and Dari-Mattiacci also extend their analysis to the relative administrative costs of carrots and sticks. As some economists have argued, we might expect sticks to be costlier to enforce, because those subject to sticks will conceal their activities and resist sticks more vigorously, necessitating an expensive detection and litigation system.⁹⁵ On the other hand, if society offers carrots, there will be some false positives. For example, by one estimate, many claimants of a recent credit for first-time home buyers were not, in fact, first-time home buyers; some hadn't even bought a home, and a good number were in prison.⁹⁶ Since the marginal cost of avoiding or claiming the incentive is the same, we should expect risk-neutral actors to pursue either strategy with comparable vigor, resulting in similar need for government effort.⁹⁷

De Geest and Dari-Mattiacci point out that the volume, if not the individual cost, of claims may differ between the two price instruments.⁹⁸ Most potential carrot claimants, and many impostors, will come forward. But many of those who might have been subject to a stick will simply curb their behavior. Others might invest more energy in concealment, but the government can add addi-

91. Dari-Mattiacci & De Geest, *Multiplication Effect*, *supra* note 7, at 369-76; *see also* AYRES, *supra* note 18, at 50 (calling this a "pretty obvious point").

92. Dari-Mattiacci & De Geest, *Multiplication Effect*, *supra* note 7, at 366.

93. *See id.* at 368.

94. *Cf. id.* at 376 (noting that the advantage of sticks is smaller when agents act cooperatively to resist).

95. *See* Engel et al., *supra* note 7, at 669.

96. *See* TREASURY INSPECTOR GEN. FOR TAX ADMIN., ADDITIONAL STEPS ARE NEEDED TO PREVENT AND RECOVER ERRONEOUS CLAIMS FOR THE FIRST-TIME HOMEBUYER CREDIT 4-11 (2010), *available at* <http://www.treasury.gov/tigta/auditreports/2010reports/201041069fr.pdf>. On the opportunistic behavior of carrot recipients, *see* Ferraro, *supra* note 82, at 811.

97. *Cf.* Thomas W. Merrill, *Explaining Market Mechanisms*, 2000 U. ILL. L. REV. 275, 287 ("[T]here is little basis for thinking that the management costs associated with one type of market mechanism . . . are materially lower than those associated with other types . . .").

Of course, actors may not expend the same effort to pursue gain as to avoid loss if they are more averse to losses than they are attracted to gains. But firms, at least, are typically held by a diversified group of shareholders and so are risk-neutral. *See* John C. Coffee, Jr., *Shareholders Versus Managers: The Strain in the Corporate Web*, 85 MICH. L. REV. 1, 19 (1986).

98. *See* De Geest & Dari-Mattiacci, *Carrots Versus Sticks*, *supra* note 7, at 17, 22.

tional penalties for that.⁹⁹ So a stick regime will have fewer actors “in the system,” which, all else being equal, should lower administrative costs. On the other hand, De Geest and Dari-Mattiacci argue, sticks may be costlier under some assumptions, so that it is possible carrots carry lower costs overall.¹⁰⁰

One final way in which sticks can be more cost-effective than carrots is in their propensity to trigger loss aversion. Again, many studies have found that people are particularly attached to what they perceive as their existing baseline, and they fear changes that are framed as “losses” more acutely than they desire “gains.”¹⁰¹ I put both terms in quotation marks because, again, the perception of a policy as a carrot or stick can be subjective. The psychologically important baseline is not always the present state of the world; it may instead be determined by some other prominent event, such as purchase price. Wall Street traders, for example, have been found willing to take far bigger risks to avoid falling below the price they paid for an asset than they are willing to take in order to turn a profit.¹⁰² As a result, the threat of a stick can change behavior considerably more than a carrot of equivalent size. It is worth emphasizing, though, that because loss aversion depends on the subjective framing of the policy instrument, its benefits can be transitory.

So far, then, sticks look like a bargain compared to carrots. They cost less, and often produce a larger effect per dollar.

2. *Income and output effects*

As for income effects, in most cases it seems clear that using carrots will undermine efforts to curtail negative externalities. If the externality-producing good is a normal good, paying consumers of the good not to produce it will increase their demand for it via the income effect, even as the substitution effect drives demand down.¹⁰³ If you pay me not to pollute (say, by selling my clunker), I’m richer. But energy consumption is a normal good, and now I have more money for a nice big new air conditioner. So a carrot wasn’t the best choice; if you had fined me instead, both the income and substitution effects would have worked in the same direction. As I’ve already described, output ef-

99. Cf. POSNER, *supra* note 48, at 282 (arguing that efficient criminal law adds punishment for efforts to conceal crime).

100. De Geest & Dari-Mattiacci, *Carrots Versus Sticks*, *supra* note 7, at 23-24. Some of the potential costs include not only pure administrative losses, but also unwanted redistribution from those who cannot easily comply with a penalty regime to those who can. *Id.*

On the other hand, as Henry Smith explains, multi-attribute goods are especially expensive to monitor when we use subsidies, because of the added possibility that producers will manipulate quantity or quality to extract more subsidies per unit of the subsidized good. See Smith, *supra* note 65, at 698-700.

101. See *supra* text accompanying notes 50-54.

102. See Hersh Shefrin & Meir Statman, *The Disposition to Sell Winners Too Early and Ride Losers Too Long: Theory and Evidence*, 40 J. FIN. 777, 782 (1985).

103. See STERNER, *supra* note 7, at 167.

fects for firms function similarly, with the reduction in output from a stick aligning with its substitution effects to drive down production of the externality.¹⁰⁴

In the rare case of an “inferior” good—a good we want less as our income increases—income effects make carrots more appealing. For example, researchers have found that “pirated” software is an inferior good.¹⁰⁵ That suggests that penalizing users of pirated intellectual property may be an inefficient enforcement choice. Giving poor families (or, often, students) bonuses if they switch to licensed products could be more effective. By enriching the knockoff-using household the policy would also increase its demand for the “legal” product. Further, because these households have few resources, even small changes in price can add up to enough to make for significant income effects.

3. *Distributive considerations*

Turning to the third of our analytic tools, sticks also seem to better reflect moral intuitions about the fair distribution of the costs of preventing negative externalities. We can pay banks that brought down our economy to take smaller systemic risks in the future, but there is something distasteful about rewarding the folks who damaged their neighbors in the first place.¹⁰⁶ Indeed, proponents of some punishment systems, such as tort law, explicitly defend those systems on the basis that society needs a mechanism for expressing its disapproval.¹⁰⁷ These theorists claim either that expressing disapproval of “wrong” behavior is morally required, or that in the absence of formal disapproval we would see illegitimate and even violent self-help efforts.¹⁰⁸ Admittedly, though, the moral intuitions point may be redundant. Some intuitions might themselves rely on the underlying efficiency considerations that make up my other arguments.

Another important aspect of the distributive question is that sticks may be undesirable when they fall on households that are poorer than average.¹⁰⁹

104. See *supra* text accompanying notes 66-67.

105. See Trisha L. Bezmen & Craig A. Depken II, *Influences on Software Piracy: Evidence from the Various United States*, 90 ECON. LETTERS 356, 359 (2006).

106. See R. Glenn Hubbard et al., *Banks Need Fewer Carrots and More Sticks*, WALL ST. J., May 6, 2009, at A15. For the history of the development of a similar norm in the environmental context, see Jonathan Remy Nash, *Too Much Market? Conflict Between Tradable Pollution Allowances and the “Polluter Pays” Principle*, 24 HARV. ENVTL. L. REV. 465, 467-78 (2000).

107. See, e.g., John C.P. Goldberg, *The Constitutional Status of Tort Law: Due Process and the Right to a Law for the Redress of Wrongs*, 115 YALE L.J. 524, 532-58 (2005); Jason M. Solomon, *Equal Accountability Through Tort Law*, 103 NW. U. L. REV. 1765, 1784-1811 (2009); see also Benjamin C. Zipursky, *Rights, Wrongs, and Recourse in the Law of Torts*, 51 VAND. L. REV. 1, 6 (1998).

108. See Goldberg, *supra* note 107, at 602-03.

109. Or, more generally, when a stick program combined with dedicated spending from the stick-generated revenues is on net regressive.

Whether as a matter of efficiency or some other basis of social justice, we tend to want government programs to transfer wealth overall from those with more to those with less.¹¹⁰ When the opposite happens, the social benefits from curbing negative externalities stand in tension with our preference for distributive fairness.¹¹¹ Poorer households may also lack access to ready means of saving, borrowing, or planning their budgets, making them especially vulnerable to temporary changes in prices.¹¹² These regressivity complaints are a common source of criticism of taxes on alcohol and cigarettes.¹¹³

Using sticks against poor households can also lead to over- or underdeterrence. Kaplow and Shavell argue that a household so poor as to be judgment-proof cannot be adequately deterred, leading to underdeterrence.¹¹⁴ This argument appears to overlook the possibility that small changes in wealth for the indigent translate into large changes in utility. If poorer households are more sensitive than average to any given price change, sticks priced based on the assumption that the average payee is of average wealth may actually turn

Imperfect enforcement can also lead to redistribution, when carrots or sticks are applied to only a subset of the producer population. But under realistic assumptions, this effect appears no more likely under carrots than under sticks. See De Geest & Dari-Mattiacci, *Carrots Versus Sticks*, *supra* note 7, at 18, 22-23.

110. The efficiency case for redistribution in favor of the poor is based on the diminishing marginal utility of wealth. That is, the richer people already are, the less each additional dollar gained or lost is worth in utility terms. For example, if Josephine has \$1000 and loses \$500, she is in serious trouble, and may face hunger or eviction. If she has \$1 million and loses \$500, she is a little bummed.

111. There remains a lively debate over whether designers of legal rules should be concerned about distributional effects, or whether instead all distributive considerations should simply be taken care of in the income tax system. Compare Louis Kaplow & Steven Shavell, *Why the Legal System Is Less Efficient than the Income Tax in Redistributing Income*, 23 J. LEGAL STUD. 667, 669 (1994), and David A. Weisbach, *Should Legal Rules Be Used to Redistribute Income?*, 70 U. CHI. L. REV. 439, 446-53 (2003), with Richard S. Markovits, *Why Kaplow and Shavell's "Double-Distortion Argument" Articles Are Wrong*, 13 GEO. MASON L. REV. 511, 550-55 (2005), Brett H. McDonnell, *The Economists' New Arguments*, 88 MINN. L. REV. 86, 111 (2003), and Chris William Sanchirico, *Deconstructing the New Efficiency Rationale*, 86 CORNELL L. REV. 1003, 1006-11 (2001). I tend to agree with those who argue that legal rules should account for distributive considerations, for reasons including those I have explained elsewhere. Brian Galle, *Is Local Consumer Protection Law a Better Redistributive Mechanism than the Tax System?*, 65 N.Y.U. ANN. SURV. AM. L. 525, 530-40 (2010).

112. For a survey of the evidence on these points, see Galle & Utset, *supra* note 62, at 48-60, 78-82.

113. See Andrew J. Haile, *Sin Taxes: When the State Becomes the Sinner*, 82 TEMP. L. REV. 1041, 1050 (2009) (summarizing these arguments). It is not entirely clear that the criticism is cogent. The consumer, or at least her future self, suffers a large portion of the harm from tobacco and alcohol, but may simply lack the willpower to stop. These harms can be thought of as "internalities." If the diminishing marginal utility of wealth makes the sin tax's bite sharper, it is the consumer herself who benefits more.

114. Kaplow & Shavell, *supra* note 45, at 739-40.

out to inefficiently overdeter poorer payees.¹¹⁵ But Kaplow and Shavell are likely right that at some point, as wealth approaches zero or the limits of available credit or insurance, households can no longer be deterred further. So there is a somewhat unpredictable, inverted U-shaped deterrence curve as producer wealth declines.

As a result, carrots are more defensible when used to reduce negative externalities produced by the indigent.¹¹⁶ Many proponents of carbon pricing have in essence adopted this path. A variety of plans now on the table would rebate to poor consumers the increase in the national average annual cost of goods purchased resulting from carbon abatement by producers.¹¹⁷ Although nominally still a stick, this approach has many of the features of a carrot. Poorer households still face higher marginal costs from carbon-intensive goods, but families that consume less carbon than average will get richer on net.¹¹⁸ The rebate also saps much of the revenue gain from implementing a carbon tax, and could even reduce government revenues overall under some assumptions.¹¹⁹

Is this an improvement over a straight carbon tax? Maybe—if the social gains from redistribution exceed the revenue-raising costs and the impact of the income effect, which will be especially noticeable in these poor households. Another potential downside is that an explicit government policy to grant carrots to poor producers might lead markets inefficiently to shift externality-producing assets to lower-wealth buyers. But given the small buying power of the poorest households, this is not likely to produce large distortions.

In the opposite case, carrots are particularly difficult to defend when they will be collected mostly by those who are wealthier than the average taxpayer. Many critics of tax expenditures make this point, since the structure of most tax subsidies is such that they are more valuable to households with the highest

115. See Muradian et al., *supra* note 82, at 1204; A. Mitchell Polinsky & Steven Shavell, *Punitive Damages: An Economic Analysis*, 111 HARV. L. REV. 869, 913 (1998). Presumably, carrots also are disproportionately tempting for poorer households. But this can be an advantage for policymakers, since it allows the government to achieve the desired marginal effects with a smaller outlay.

116. See Engel et al., *supra* note 7, at 672 (suggesting that subsidies can help to alleviate poverty).

117. See American Clean Energy and Security Act of 2009, H.R. 2454, 111th Cong. § 431 (2009); Metcalf & Weisbach, *supra* note 5, at 513-14 & n.66; Metcalf, *supra* note 88, at 664.

118. See Md Rumi Shammin & Clark W. Bullard, *Impact of Cap-and-Trade Policies for Reducing Greenhouse Gas Emissions on U.S. Households*, 68 ECOLOGICAL ECON. 2432, 2437 (2009).

119. Cf. Terry Dinan & Diane Lim Rogers, *Distributional Effects of Carbon Allowance Trading: How Government Decisions Determine Winners and Losers*, 55 NAT'L TAX J. 199, 206 (2002) (modeling revenue effects of rebate proposals). Basically, the rebate would cost more than the tax if the tax were very effective at getting producers to reduce carbon in ways that resulted in no tax paid but were still expensive for the producers, and the producers passed these costs on to customers.

marginal tax rates.¹²⁰ Under a progressive tax, that means the subsidy is most valuable to the richest taxpayers.¹²¹

4. *Repeated-game incentives*

Finally, other commentators have argued that once we consider the incentive effects of a policy instrument as a repeated game over time, carrots emerge as a relatively disastrous choice for containing negative externalities. But as I will show, the argument is more nuanced than prior writers have assumed. As I mentioned earlier, Coase recognized that the possibility of obtaining carrots can tempt new entrants into the externality-producing market so that they can then be paid to stop.¹²² Similarly, scholars have noted that carrots “crowd out” voluntary reduction efforts: existing producers will not voluntarily invest in curtailing externalities, because they know that any reductions they make on their own will not be compensated.¹²³ To the extent producers are “inframarginal” in this way—that is, they would have reduced negative externalities on their own (or never produced them in the first place)—the funds spent on carrots are wasted.¹²⁴

Even the expectation that carrots might be forthcoming can cause crowd-out.¹²⁵ For example, suppose a business can make an improvement in its production line that both increases the line’s capacity and also would make it cheaper to reduce its carbon emissions. But suppose in addition that the government is considering offering a tax incentive for emission reductions. If the firm waits until after introduction of the credit to make its change, the govern-

120. *E.g.*, STANLEY S. SURREY, *PATHWAYS TO TAX REFORM* 136 (1973).

121. *Id.*

122. *See supra* text accompanying note 76.

123. *E.g.*, Dari-Mattiacci, *supra* note 21, at 25; Engel et al., *supra* note 7, at 670.

124. *See* Engel et al., *supra* note 7, at 670. There are a number of reasons producers might mitigate negative externalities in the absence of a subsidy. Some changes in business processes can both benefit the firm and also reduce externalities (think of switching from an outmoded coal power plant to a modernized hydrothermal one). Absent government action, private actors subject to the externality might bargain directly with the producer. Finally, the producer might altruistically avoid harming its neighbors. Although few firms likely act out of feelings of altruism held by their principals, being perceived as “eco-friendly” or “dolphin-safe” also has branding benefits.

De Geest and Dari-Mattiacci appear to argue that inframarginality, or what they call “overpayment,” can be reduced by tailoring the amount of the carrot to an individual producer’s cost of production. De Geest & Dari-Mattiacci, *Carrots Versus Sticks*, *supra* note 7, at 20. But, as they acknowledge, this works only when the government has perfect information. *Id.* at 21-24. Considering that producers can manipulate the information available to the government, and that if carrots vary with their effort cost then producers would have a strong incentive to engage in manipulation, that is a large assumption. But it may not be implausible. For a discussion of how the government can elicit information producers would prefer to keep concealed, see the text accompanying notes 142-43 below.

125. *See* BAUMOL & OATES, *supra* note 7, at 212.

ment funds the alteration; if the firm acts now, it must pay itself. In all likelihood, the firm waits. Thus, hoping for carrots could not only slow mitigation of the externality but also inefficiently distort production processes.

A related problem, as the literature on legal transitions teaches, is that carrot-like rules create moral hazard, encouraging overinvestment in externality-producing activities by actors who have better information than the government.¹²⁶ If the government has pledged to compensate those who lose when it changes its rules, actors who know before the government does that they are producing negative externalities have no incentive to curb their production.¹²⁷ Consider mortgage lenders who held a large portfolio of risky loans. It's a familiar point that these firms had little reason to concern themselves about the dangers widespread failure might pose to the housing and credit markets.¹²⁸ Because they expected to be "bailed out" in the event of a sharp decline in revenues, though, they were also indifferent to risk of a different kind. It was reasonable for those firms to expect that, if a significant number of their loans went bad, governments would toughen protections for homeowners to prevent a downward spiral in real estate markets.¹²⁹ But lenders seem to have taken few steps to ensure that their portfolios could stand up to the closer government scrutiny a housing crisis would bring.¹³⁰

Sticks look superior in all three of these scenarios. Sticks do not attract new investment to a regulated industry. More importantly, the prospect of a guaranteed stick motivates producers to anticipate potential government responses and reduce investment in negative externality-producing activities in advance of the penalty itself.¹³¹ In effect, the government gets some reduction for free, because reduction begins before enforcement efforts are paid for. It also gets reductions sooner than it might otherwise, which can be especially valuable for "stock" pollutants that build up over time. Moreover, since producers often have better information than the government about their own processes, a producer that can predict its activities might be subject to sticks may change its

126. Wiener, *supra* note 7, at 726.

127. See Louis Kaplow, *An Economic Analysis of Legal Transitions*, 99 HARV. L. REV. 509, 529-31 (1986); see also Lawrence Blume & Daniel L. Rubinfeld, *Compensation for Takings: An Economic Analysis*, 72 CALIF. L. REV. 569, 590-92 (1984) (pointing out that guaranteed compensation for government takings induces overinvestment in property likely to be subject to regulation).

128. Cf. Steven L. Schwarcz, *Systemic Risk*, 97 GEO. L.J. 193, 206 (2008) (describing how externalities contributed to the financial crisis).

129. Foreclosures produce downward spirals because homeowners are more likely to default when the value of their home is less than their outstanding mortgage. Since foreclosures in a neighborhood drive down prices of neighboring homes (the negative externality that motivates government intervention), a few foreclosures can trigger a cascade. See Anna Gelpern & Adam J. Levitin, *Rewriting Frankenstein Contracts: Workout Prohibitions in Residential Mortgage-Backed Securities*, 82 S. CAL. L. REV. 1075, 1125-26 (2009).

130. See *id.* at 1102-03, 1127 (noting deliberate use of inflexible mortgage securitization contracts by lenders).

131. POSNER, *supra* note 48, at 68-69.

behavior even before the government has identified the harm.¹³² There is evidence, though, that punishments can sometimes “crowd out” altruistic behavior, just as carrots can.¹³³

Carrots are perhaps more palatable in the case of unanticipated new dangers. If producers cannot anticipate the coming carrot, there is no moral hazard.¹³⁴ Some scholars go so far as to argue that imposing sticks on activities that producers could not have known would be later deemed harmful will reduce investment in productive activities overall.¹³⁵ Risk- or uncertainty-averse investors might be reluctant to sink money into ventures with unknowable risk, especially since by definition an unforetold event cannot easily be insured against.¹³⁶ It’s unclear, though, whether any hazards are really unforeseeable in this way.¹³⁷ In any event, this argument for carrots at best applies to preexisting investments; carrots or compensation can be offered to holders of sunk investments, while sticks remain the better choice for those who create the new perils going forward.

Another reason to consider carrots in some contexts is their effect on the incentives of producers to reveal their private information. Both carrots and sticks give producers incentives to invest in learning about potential negative externalities in advance of government regulation.¹³⁸ The producer will want to avoid investments that might subject it to sticks, while shifting toward invest-

132. See Saul Levmore, *Changes, Anticipations, and Reparations*, 99 COLUM. L. REV. 1657, 1663 (1999).

133. See Edward L. Deci et al., *A Meta-Analytic Review of Experiments Examining the Effects of Extrinsic Rewards on Intrinsic Motivation*, 125 PSYCHOL. BULL. 627, 658-59 (1999) (summarizing their meta-analysis of other studies); Ernst Fehr & Simon Gächter, *Do Incentive Contracts Undermine Voluntary Cooperation?*, 30-31 (Inst. for Empirical Research in Econ., Univ. of Zurich, Working Paper No. 34, 2002) (finding larger crowding-out effect for penalties than for bonuses), available at <http://www.iew.uzh.ch/wp/iewwp034.pdf>.

134. See Kaplow, *supra* note 127, at 551-52.

135. See, e.g., Fischel & Shapiro, *supra* note 77, at 269.

136. In effect, the carrot substitutes for unavailable private insurance. Promising to use a carrot takes the cost of the risk of newly discovered dangers off of producers, and distributes it to society as a whole. This risk-spreading is efficient because of the diminishing marginal utility of wealth: when everyone in society suffers a small loss, the total social utility lost is less than if one person suffered a loss of the same total size. GUIDO CALABRESI, *THE COSTS OF ACCIDENTS* 39 (1970). Typically, moral hazard is a serious concern with these forms of implied government bailouts. Daryl J. Levinson, *Making Government Pay: Markets, Politics, and the Allocation of Constitutional Costs*, 67 U. CHI. L. REV. 345, 390 (2000). But by assumption, we have no moral hazard in the unforeseeable-risk scenario.

The analysis is similar if we shift from wholly unforeseeable to nearly unforeseeable events. Low-probability outcomes remain difficult to privately insure against because the transaction costs of insurance will eat up any risk-spreading gains. Kaplow, *supra* note 127, at 594. While moral hazard will not be zero, it will still be very small. Thus, we do not need to distinguish much between different degrees of near unforeseeability.

137. Even if hazards were unforeseeable, it might be argued that the expected change in behavior from outcomes that cannot be predicted would be small, since the cost of far-future events would be heavily discounted. POSNER, *supra* note 48, at 69.

138. See Levmore, *supra* note 132, at 1663.

ments that might result in carrots. If regulation is expected to take the form of a stick, though, the producer is likely to conceal its information in order to stave off regulation.¹³⁹ Tobacco companies hiding health research and energy producers fighting over climate change science are only two among many prominent examples here. Producers expecting carrots, on the other hand, have every reason to share information about the extent of the harms they are producing; the larger the harms, the larger the carrot.¹⁴⁰ Of course, this also raises the danger that the producer will exaggerate the size of the harm; but on the theory that some information is better than none, the government may find this outcome preferable.¹⁴¹

If revealing private information is important, the policy prescription looks similar to the recommendation of transitions theory. “Incumbent” or existing producers might be offered some degree of carrot to encourage them to reveal information.¹⁴² Given the generally dire incentive effects of widespread carrots, though, rewards for information should be narrow and carefully tailored.¹⁴³ For instance, governments might offer a “whistleblower” reward to the first firm to come forward with significant new data. The reward would give each producer a strong incentive to defect from any cartel of silence, while leaving the overall ex ante expected likelihood of a stick for each individual producer fairly high. If, as would typically be the case, a whistleblower does not internalize the impact of the information she reveals on others in her industry, then the carrot offered to the defector can be much smaller than the carrot that would have to be offered to the whole of the cartel.

139. *Cf. id.* at 1665 (noting that parties who anticipate regulation that disadvantages them may work to delay its implementation). Probably the more complete way of stating this point is that producers will choose among strategies involving mixes of concealment, lobbying, and real change. If change is cheaper than concealment and lobbying, the producer may simply change. But given the government’s difficulty in gathering private information, it seems plausible that concealment will often be a low-cost strategy—unless the government penalizes it. More on that in a moment.

140. *See* Ferraro, *supra* note 82, at 811.

141. *Cf.* Chang, *supra* note 18, at 310-24 (arguing that nations offered carrots by other nations will overestimate the costs of environmental mitigation, while sticks will not have this effect); Hanson & Logue, *supra* note 61, at 1274 n.458 (arguing that the government should probably not ignore information from producers, even if it is suspected to be false, because producers have more information).

142. *See* STERNER, *supra* note 7, at 159 (offering bottle deposits as an example of an information-revealing carrot); Ferraro, *supra* note 82, at 812 (suggesting separating equilibrium contracts or auctions to screen out exaggerators).

143. Even if carrots are available to all incumbents, at some point new information is only marginally useful, and so latecomers should get sticks. To eliminate competitive advantages for incumbents, policy can shift so that every producer faces sticks over time. Incumbents may rationally predict that eventually the government will transition to sticks. Assuming any degree of time discounting on their part, though, the fact that sticks arrive rather later than carrots should make them more amenable to revealing their private information.

The literature on repeated games, then, strongly counsels against carrots, with the possible exception of narrowly targeted incentives for disclosure. As I'll now explain, however, the repeated-game story isn't yet complete.

5. *Repeated games and mitigation*

One final aspect of strategic behavior other commentators have neglected is that carrots might also lead to more efficient behavior on the part of those who suffer from negative externalities, although in many cases the pro-efficiency effects will be small. The impact of many negative externalities can be mitigated if the victims change their own behavior,¹⁴⁴ as in the classic case in which farmers can set their crops back farther from passing trains.¹⁴⁵ When that is the case, the most efficient legal rule is typically one that incentivizes *both* parties to minimize the net social cost of avoiding the harm, sometimes called "double liability at the margins."

Carrots can motivate victims to mitigate, and it is possible that they do so more than a comparable stick would. Carrots must be paid for, of course, often through taxes or fees imposed on victims. Since the size of the carrot will usually be determined at least in part by the marginal social cost of each unit of externality produced, each taxpayer must pay more as the costs of the externality increase.¹⁴⁶ If a taxpayer can take actions to reduce the damage from that externality, she can thereby reduce her tax bill, thus giving her incentives to mitigate.¹⁴⁷ It is easy to see, though, why this effect would typically be small, since a large portion of the mitigation effort undertaken by any one taxpayer would itself be a positive externality for her fellow citizens.

In some situations the mitigation incentives of carrots could be larger. Suppose, for instance, that a given carrot is funded from a small pool of victims directly subject to the externality, such as might be true in the case of local gov-

144. Kaplow & Shavell, *supra* note 45, at 738.

145. See POSNER, *supra* note 48, at 63-67 (discussing the train example).

146. Cf. Blume & Rubinfeld, *supra* note 127, at 590-91 (observing that tax payments to fund compensated takings are the equivalent of insurance premiums).

147. For instance, suppose five farmers live near a railroad track. The railroad does \$100 in damage to each farmer's crops by using a cheap, spark-prone engine. To discourage the railroad from operating in that risky manner, the farmers each pay a tax of \$100 to the government, which then pays the railroad to cease. Now, suppose that each farmer can move his crops far enough from the tracks to avoid any damage. If any one farmer mitigates, total damage drops to \$400, making the per-farmer tax only \$80.

This point is similar to the argument sometimes made in favor of requiring the government to pay when its regulations reduce the value of a regulated party's property: if the government must internalize the budget costs of both sides of the externality ledger, it will only regulate when regulation increases total welfare. Blume & Rubinfeld, *supra* note 127, at 620-22.

Kaplow and Shavell hint at a similar idea, stating in passing that "property rule protection of injurers' right to cause harm" would give victims "strong incentives to avoid exposure." Kaplow & Shavell, *supra* note 45, at 739.

ernment regulation. Or suppose that the tax system is highly progressive and falls heavily on just a few taxpayers. In those cases, the fiscal externality from mitigation is relatively smaller, and so we might expect to see a fair amount of mitigation, especially if the payers can use social norms or other institutions to coordinate their efforts to produce positive fiscal externalities for one another.¹⁴⁸ Alternatively, if the cost of mitigation is low enough that it is less than a victim's proportional tax savings, she may mitigate irrespective of the benefit to others.¹⁴⁹

Existing literature assumes that sticks designed properly can also produce double liability at the margins, but these analyses overlook some situations in which the standard prescription doesn't work. The familiar analysis assumes that compensation paid directly to the victim would undermine incentives to mitigate.¹⁵⁰ To avoid this, economists recommend that victims not receive the proceeds from sticks themselves—for example, by requiring that the proceeds be paid to the government as a fine—giving victims an incentive to mitigate when mitigation is less costly than the damage done by the externality.¹⁵¹

148. For a discussion of the role of group cohesion and social institutions in coordinating for the production of public goods, see ELINOR OSTROM, *GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION* 26-54, 185-214 (1990); Robert C. Ellickson, *New Institutions for Old Neighborhoods*, 48 *DUKE L.J.* 75, 78-90 (1998); and Wolfgang Stroebe & Bruno S. Frey, *Self-Interest and Collective Action: The Economics and Psychology of Public Goods*, 21 *BRIT. J. SOC. PSYCHOL.* 121, 131-35 (1982).

149. More precisely, and putting aside any game-theory-inspired interactions with the incentives of other victims, an individual victim mitigates where mitigation costs are less than the damage per victim divided by the number of taxpayer-victims. That situation is probably unusual, since if mitigation is cheaper than voters' proportional share of the tax, they presumably would mitigate rather than vote for the tax. But there might be some heterogeneity in mitigation expenses or tax burden. Returning to our farmer example, suppose it costs only \$15 for one of the farmers to move crops away from the fiery tracks. Since that farmer can now pay \$15 to achieve a \$20 tax savings, she will do so (unless she believes that by not mitigating she can induce other farmers to mitigate). Note, though, that if there were ten farmers, the total tax would be \$1000, and mitigation by one farmer would still save \$100. Each farmer's individual mitigation efforts therefore reduce each tax bill by only \$10, meaning that mitigation would no longer be cost-effective, even for the low-cost farmer. Again, then, mitigation incentives depend on the size of the group of taxpayer-victims.

150. *E.g.*, BAUMOL & OATES, *supra* note 7, at 230-31; *see* Wittman, *supra* note 7, at 67-68 (examining this point in the tort context).

151. *E.g.*, Wittman, *supra* note 7, at 67-68. To see this, consider a house husband who is hanging his laundry outside to dry. Suppose that it costs him \$1 in quarters and wasted time to dry them at the laundromat instead. Suppose also that factory smoke causes \$2 in damage to shirts left outside. What if the husband is not compensated for his damaged shirts, but instead the factory pays a fine? Then he will dry them at the laundromat, because each damaged shirt leaves him out \$2, which is more than the cost of quarters. But what if he is compensated by the factory? Then he leaves the shirts outside and collects the money. In that scenario, the husband loses \$2 and gains \$2, for a net of zero per shirt, while laundering represents a loss of \$1 per shirt. This could be a socially inefficient result—for example, if it would cost the factory more than \$1 per shirt to avoid the damage, and \$1 has the same utility value for factory investors and shirt washers.

This analysis appears to neglect the likelihood that fines are not simply wasted, but instead enter the government treasury. Fines paid to the government in effect are therefore shared by all taxpayers, so that if taxpayers and victims overlap, victims still get some payment. If each victim's share of the tax windfall equals or exceeds the marginal damage they suffer, their incentives to mitigate diminish, because in effect they are being compensated directly by the externality producer.¹⁵² Indeed, if there were no transaction costs, then wherever marginal damage and tax gains are each distributed equally, fines are mathematically indistinguishable from direct compensation of the victim.¹⁵³ The same is true for any individual whose proportionate shares of the marginal damage and of the tax base are identical.

Sticks are also less than optimally effective at encouraging mitigation when victims recognize that their own behavior provides information to the government. If victims mitigate, then the efficient stick amount will decline, reflecting a lower marginal social cost.¹⁵⁴ Once victims reveal that they can mitigate, society will reduce the stick menacing producers, resulting in greater production of the externality and hence more cost to victims, whether in damage or mitigation costs. Victims may be willing to absorb some of the cost of not mitigating to avoid this shifting of costs.¹⁵⁵

152. Consider the Federal Deposit Insurance Corporation (FDIC), an insurance pool for banks funded by banks. Suppose we have ten banks contributing to the pool and that total operating costs are \$100 million annually. Say also that if any one bank defaults it jeopardizes the operations of other banks, for instance by worrying depositors and causing withdrawals and even runs, costing each other bank \$5 million. So let us now say that the FDIC imposes a fine of \$45 million ($9 \times \5 million) on a bank that defaults, payable to the funding pool. In effect, then, a default by one bank fully compensates each other bank by reducing their individual shares of the annual operating costs of the pool from \$10 million to \$5 million. If banks can, at some cost, reduce their exposure to damage from a competitor's default, this is an inefficient result, because banks will have no incentive to invest in mitigation.

153. To illustrate, imagine a \$100 million fine on a water polluter, shared equally among 100 million taxpayers nationwide. Presumably the fine is set at this level because the marginal damage is also \$100 million. If each taxpayer experiences an equal amount of that harm, their net cost or benefit from the pollution and fine is zero (\$1 in tax saved less \$1 in damage). If the mitigation is at all costly—say, the price of a Brita filter—then no taxpayer has any incentive to mitigate.

A more likely scenario is that some households, such as those with children, are more vulnerable. Households bearing a disproportionate share of the marginal damage may suffer a net loss as a result of the combined pollution and fine, and therefore conceivably have some incentives to mitigate. But other portions of the population still would not.

Transaction costs somewhat weaken the equivalence, because they presumably would reduce the amount of net revenue benefits from imposing a fine. But on the other hand if fines permit lower tax rates then society experiences less deadweight tax loss.

154. Cf. Giuseppe Dari-Mattiacci & Nuno Garoupa, *Least-Cost Avoidance: The Tragedy of Common Safety*, 25 J.L. ECON. & ORG. 235, 258 (2007) (noting that victims' failure to mitigate is itself a negative fiscal externality imposed on producers).

155. I should acknowledge that carrots can also encourage victims to conceal their ability to mitigate. However, once we recognize that victims help to fund carrots, it is evident

Of course, this scenario assumes a level of foresight and cohesion that may be seldom encountered in the real world. One reason such cohesion is scarce is that when victims' ability to mitigate is relatively similar, then any one victim's decision to mitigate imposes a new negative externality on all the other victims. That is, once the government knows mitigation is possible for anyone, it might assume that it's equally possible for everyone. When the size of this informational externality is substantial, such as when the product of the cost of mitigation and the number of potential victims is large, then we should expect to see a fair amount of overmitigation from the perspective of the group of victims.

But victims might be able to coordinate to conceal their mitigation potential. Cooperation within a group is more likely when one group is competing against another group.¹⁵⁶ That arguably is the case when sticks are applied, since victims and producers are competing to see who can force the government to impose costs on the other.

Given that victims may sometimes successfully conceal information about their ability to mitigate, we should probably consider tools for discouraging concealment. Information about mitigation closely resembles the scenarios I described earlier involving data held by externality producers. So here as there, policymakers may want to examine policies for encouraging whistleblowers.

Summing up the mitigation analysis, it looks as though there is an argument that carrots might actually be preferable to sticks on this front, especially when the group of victims is small. For the several reasons I mentioned, a relatively small group of victims makes it more plausible that the revenue cost of paying out carrots will motivate the victims to mitigate. On the stick side, small groups reduce the size of the externality imposed on the group when one of the victims mitigates, and make it easier for the group to coordinate their cartel of silence. In other words, a small group of victims in a stick regime is more likely to hold together and pretend that they cannot easily mitigate. So the comparative advantage of carrots is at its apex when the circle of victims is drawn in tight, because then carrots are most likely to give incentives to mitigate while sticks are least likely to do so.

that the problem is more significant for sticks. Since victims bear a portion of the cost of the carrot, they internalize at least some of society's total cost of mitigating the externality, making them more likely to prefer the most efficient result. For example, if victims fully internalize the cost, they will always prefer to assign mitigation to the least-cost avoider. They therefore would have no economic interest in concealing their costs of mitigation.

156. See Gary Bornstein & Meyrav Ben-Yossef, *Cooperation in Intergroup and Single-Group Social Dilemmas*, 30 J. EXPERIMENTAL SOC. PSYCHOL. 52, 63 (1994). In part this is because in that setting groups use greater intragroup incentives to force cooperation, *id.*, and in part it may result from psychological pressure to conform, *id.* at 64.

B. *Examples*

Now that we have assembled these basic policy tools, it becomes clear that a large number of existing subsidies are misguided. As the environmental law literature recognizes, price supports for energy conservation or efficiency, ranging from renewable energy tax credits to loan guarantees for nuclear power and price supports for corn farmers, can and should all be replaced with pollution pricing.¹⁵⁷ More controversially, if excessive spending on politics creates negative externalities, such as by coarsening public debate and crowding out the voices of the poorer and less powerful, then taxes on campaign contributions or expenditures would likely be a more efficient alternative to the public financing or free television time offered in some places.¹⁵⁸ Exacting a special premium from homeowners who build in flood and hurricane zones would be wiser than the current policy of offering them subsidized disaster insurance.¹⁵⁹ In all of these cases, sticks would economize on federal revenues, leverage income effects to reduce externality production, and encourage behavioral changes in advance of the policy's implementation.

Another policy worth discussing, if only because of its vast size, is the retirement system. The federal government annually gives up more than \$100 billion in revenues in order to encourage workers to save for retirement, a massive carrot larger than almost any other.¹⁶⁰ Yet the case for retirement carrots is hardly clear cut. Retirement savings arguably avoid the fiscal externality that would result if society had to care for those who could not afford to care for themselves.¹⁶¹ So the activity that produces the negative externality is the

157. For consideration of whether subsidies might be defensible because they are more politically achievable, see text accompanying notes 260-66 below.

158. On the question of whether price regulation would be better in this context than command-and-control regulation, such as caps on spending, see David S. Gamage, Note, *Taxing Political Donations: The Case for Corrective Taxes in Campaign Finance*, 113 YALE L.J. 1283, 1296-321 (2004). Whether such a policy would be constitutional is a different question, which I leave for others.

159. For a description of the National Flood Insurance Program and its struggles with moral hazard, see JUSTIN R. PIDOT, *COASTAL DISASTER INSURANCE IN THE ERA OF GLOBAL WARMING* 12-17 (2007).

160. STAFF OF J. COMM. ON TAXATION, 111TH CONG., *ESTIMATES OF FEDERAL TAX EXPENDITURES FOR FISCAL YEARS 2010-2014*, at 49 (Comm. Print 2010). Some commentators would argue that the benefits for retirement savings are not subsidies, but instead should be viewed as a step towards a normatively correct tax system in which all savings are untaxed. Compare Bruce Wolk, *Discrimination Rules for Qualified Retirement Plans: Good Intentions Confront Economic Reality*, 70 VA. L. REV. 419, 421-22 (1984) (concluding the current tax treatment of qualified pension plans is a subsidy), with Edward A. Zelinsky, *The Tax Treatment of Qualified Plans: A Classic Defense of the Status Quo*, 66 N.C. L. REV. 315, 315-16 (1988) (concluding the current tax treatment of qualified pension plans is not a tax expenditure). This illustrates again the normative instability of any given baseline. My point here is only that retirement preferences depart from the current baseline in which most saving is taxed.

161. See POSNER, *supra* note 48, at 638-39 (noting burdens of poverty on altruists).

household's decision to consume its income immediately rather than save it. But consumption is typically a normal good. As a result, offering carrots to those who do not consume is inefficient, as the income effect of the carrot works against the substitution effect of the incentive.¹⁶² A better alternative, then, would be taxing consumption. A number of tax scholars have called for the United States to move to taxing *only* consumption,¹⁶³ but relative to the current policy that would be a fairly ineffective way of increasing overall savings: it's just an even bigger carrot. To unambiguously increase savings relative to today, these proposals would have to either retain the income tax and add a consumption tax on top, or ramp up their tax rates to ensure that today's consumers (who pay an income tax) will face a higher total tax tomorrow (when they pay only a consumption tax).

Turning back to the carbon tax, opponents argue that it is unfairly regressive, but the recent example of the Affordable Care Act (ACA)¹⁶⁴ offers a lesson on how to reconcile policy preferences for sticks with distributive justice concerns. The ACA is an incredibly complex piece of legislation with many moving parts.¹⁶⁵ One of its key goals, though, is curbing a fiscal externality: the costs of caring for the uninsured or underinsured.¹⁶⁶ As readers surely know, the statute does that by imposing a tax on moderate- and high-earners who fail to purchase qualifying insurance, and by granting a subsidy to poorer households to help them do so.¹⁶⁷

Although it has been the incentive to purchase insurance that has drawn political fire and lawsuits, the ACA's bigger innovation was the decision to hybridize two different policy instruments. In effect, the ACA offers a combination of two policy instruments for one common problem, with poor households getting a carrot while everyone else faces a stick. For most of the population, the stick was a better policy choice: it corrects a difficult policy problem without significant net expenditures of public funds. And, assuming that we define the problem as the overconsumption of health care services, the income effect

162. GRUBER, *supra* note 11, at 650.

163. *E.g.*, Joseph Bankman & David Weisbach, *The Superiority of an Ideal Consumption Tax over an Ideal Income Tax*, 58 STAN. L. REV. 1413, 1455 (2006).

164. Patient Protection and Affordable Care Act, Pub. L. No. 111-148, 124 Stat. 119 (2010) (codified as amended in scattered sections of the U.S. Code), *amended by* Health Care and Education Reconciliation Act of 2010, Pub. L. No. 111-152, 124 Stat. 1029.

165. For an accessible summary, see HENRY J. KAISER FAMILY FOUND., SUMMARY OF NEW HEALTH REFORM LAW (2011), *available at* <http://www.kff.org/healthreform/upload/8061.pdf>.

166. *See* SENATE DEMOCRATIC POLICY COMM., THE PATIENT PROTECTION AND AFFORDABLE CARE ACT DETAILED SUMMARY 1 (2009), *available at* <http://dpc.senate.gov/healthreformbill/healthbill04.pdf>.

167. The legislation expands Medicaid eligibility to all non-Medicare qualified adults earning less than 133% of the federal poverty limit, and offers subsidies toward private insurance for households between 133% and 400% of the federal poverty limit. HENRY J. KAISER FAMILY FOUND., *supra* note 165, at 1-2.

of a subsidy would have exacerbated the problem.¹⁶⁸ For poorer families, though, a stick would have been a difficult and perhaps unenforceable (or at least uncollectible) burden. And any ethical arguments about “free riding” seem rather thin for workers already struggling to pay their bills without health care benefits. Rather than simply convert the entire program to a carrot, though, the legislation used carrots only to the extent that they were justified by distributive considerations. That structure gets the best of both instruments, avoiding the waste of giving carrots to those who can fairly be saddled with the cost of reducing externalities.

Using limited and means-tested carrots together with a larger stick program also can resolve some distributive concerns over other major policies now on the table. As I’ve mentioned, carbon-tax proponents suggest a similar transfer of new tax funds to the poorest households.¹⁶⁹ Other economists recommend combining a possible sugar or fat tax with subsidies to help poor families buy produce.¹⁷⁰

The lessons of the ACA and my prior analysis also help to shed some light on the problem of traffic.¹⁷¹ Some localities have tried to overcome traffic by using carrots: not, to return to *Beverly Hills Cop*, by jamming them in tailpipes,¹⁷² but instead by offering discounts on tolls for commuters who car-pool.¹⁷³ Commentators and mayors have also suggested the alternative of “congestion pricing,” or charging drivers extra to travel during peak hours.¹⁷⁴ As with the ACA’s mandate, congestion pricing would have a disproportionate burden on workers with low incomes and inflexible schedules.¹⁷⁵ But, rather than abandoning congestion pricing altogether, we could mitigate this unwanted

168. Another aspect of underinsurance, of course, is that being even partially uninsured is harmful for one’s health and peace of mind. Amy Finkelstein et al., *The Oregon Health Insurance Experiment: Evidence from the First Year* 4 (Nat’l Bureau of Econ. Research, Working Paper No. 17,190, 2011), available at <http://www.nber.org/papers/w17190.pdf>. Arguably, it should be possible to alleviate those concerns without encouraging overconsumption of health care.

169. See *supra* text accompanying note 88.

170. Gideon Yaniv et al., *Junk-Food, Home Cooking, Physical Activity and Obesity: The Effect of the Fat Tax and the Thin Subsidy*, 93 J. PUB. ECON. 823, 824 (2009).

171. For an explanation of why traffic is the result of negative externalities, see Jonathan Remy Nash, *Economic Efficiency Versus Public Choice: The Case of Property Rights in Road Traffic Management*, 49 B.C. L. REV. 673, 687-94 (2008).

172. Of course, Axel used bananas. See BEVERLY HILLS COP, *supra* note 70.

173. See e.g., U.S. DEP’T OF TRANSP., CONGESTION PRICING: A PRIMER 2-3 (2006), available at <http://www.ops.fhwa.dot.gov/publications/congestionpricing/congestionpricing.pdf> (describing San Diego’s policy of granting free access to express lanes for vehicles with multiple passengers); Nash, *supra* note 171, at 704 n.200 (describing subsidy programs in Maryland and Washington, D.C.).

174. E.g., Richard Arnott, *Pricing Urban Transportation*, in PUBLIC ECONOMICS: SELECTED PAPERS BY WILLIAM VICKREY 271, 271-75 (Richard Arnott et al. eds., 1994) (describing Vickrey’s efforts in support of congestion pricing); Nash, *supra* note 171, at 676.

175. Nash, *supra* note 171, at 713 n.256, 727.

ed distributive effect by granting poorer drivers a means-tested carrot. One possibility would be a partial discount against the usual price, with the discounted price set at the point where the deterrent effect of the charge for average poorer households is comparable to the effects observed for the median household overall.¹⁷⁶

Mixing carrots with sticks isn't a panacea, though. At a minimum, as is well known, offering carrots to households below an income threshold creates incentives to lower real or reported income below that threshold.¹⁷⁷ That is not to say that we should never blend carrots with sticks, but only that when we do we should keep in mind we're trading distributive fairness for revenue and incentives as well as cost and income effects.

Finally, to take a smaller-scale but widespread problem, there is the relationship between bars or restaurants and their neighbors. A lively watering hole spills its patrons into the neighboring streets after other businesses have closed shop and residents have gone to bed. At evening's end the bars' patrons are, shall we say, less inhibited than in their daily lives. Here there are two solutions: window bars, car alarms, and soundproofing for the neighbors, or earlier hours and more judicious dispensing of beverages for the entertainment venues. This is a case in which it is less clear that sticks dominate carrots. It may be that the neighbors, not the bars, are the least-cost avoiders; the most efficient way of mitigating the externality might be neighborly precautions, not early bar closings. But in a small community or business improvement district, each neighbor might realize a fairly large fraction of the revenues from a stick, reducing their incentives to mitigate.¹⁷⁸ Restaurants and bars, then, might be compensated for their lost business in exchange for an agreement to close earlier. But, of course, that does raise the danger that the restaurateurs will have incentives to be even more troublesome in the hopes of securing further carrots, not to mention the government's additional revenue costs. This isn't a clear instance where carrots prevail, but it is at least a closer question.

IV. ENCOURAGING POSITIVE EXTERNALITIES

The tools I've described and applied so far all have their roots in a literature devoted to the study of negative externalities. But there is no obvious rea-

176. For other suggestions, see Lior Jacob Strahilevitz, *How Changes in Property Regimes Influence Social Norms: Commodifying California's Carpool Lanes*, 75 *IND. L.J.* 1231, 1246-47 (2000).

177. For reviews, see Jonathan Gruber, *Medicaid*, in *MEANS-TESTED TRANSFER PROGRAMS IN THE UNITED STATES* 15, 68-72 (Robert A. Moffitt ed., 2003); Robert A. Moffitt, *The Temporary Assistance for Needy Families Program*, in *MEANS-TESTED TRANSFER PROGRAMS IN THE UNITED STATES*, *supra*, at 291, 317-20.

178. For more on business improvement districts, see Richard Briffault, *A Government for Our Time? Business Improvement Districts and Urban Governance*, 99 *COLUM. L. REV.* 365, 377-414 (1999).

son the carrot-and-stick framework must be limited to harmful spillovers; zero is just a number and the difference between positive and negative externalities just a sign. Scholars who study positive externalities have already applied the basic elements of Pigouvian taxes and other price instruments. For example, it is a common argument that subsidies allow producers to internalize the benefit others derive from their actions, as in the case of the tax subsidy for contributions to charity.¹⁷⁹ But scholars have not yet extended the more sophisticated theoretical apparatus of the negative externalities literature to positive externalities. For example, I am not aware of any comprehensive consideration anywhere of whether penalties for failure to produce positive externalities would be as effective as, or better than, a subsidy. I aim to remedy that oversight in this Part.

Overall, the case for carrots is stronger when our goal is the production of positive externalities, but not overwhelmingly so. Once a subsidy program is in place, the income and output effects of the carrot reinforce its substitution effects. But expected future carrots depress current production of the externality, and carrots are highly wasteful compared to sticks in several other respects.

A. *General Analysis*

Income and output effects are the key difference between the negative and positive externality cases, and the difference is fairly straightforward. For normal goods, enriching purchasers with a carrot increases demand through both income and substitution effects, while sticks would undermine the intended substitution toward the externality-producing good. When the stick is applied to firms, we should expect the converse of the Baumol and Oates result: a stick should cause the firm to substitute toward the desired good, but at a lower level of output, so that theoretically the stick could actually reduce overall supply of the good. For instance, private foundations are subject to an annual tax if they fail to distribute at least five percent of their net assets,¹⁸⁰ a provision intended as a prod to encourage them to fund more charitable projects. Foundations likely donate more as a result,¹⁸¹ but those that trigger the tax also have fewer funds to give. If this second effect is large enough, it could swamp the positive benefits of the first, reducing foundations' charitable giving on net.

179. *E.g.*, John D. Colombo, *The Marketing of Philanthropy and the Charitable Contributions Deduction: Integrating Theories for the Deduction and Tax Exemption*, 36 WAKE FOREST L. REV. 657, 698 (2001); Mark P. Gergen, *The Case for a Charitable Contributions Deduction*, 74 VA. L. REV. 1393, 1397-98 (1988).

180. 26 U.S.C. § 4942 (2006 & Supp. I 2007). The text above considerably simplifies the workings of the tax, but the details are not of interest here.

181. For a review of the available evidence on foundation giving patterns, see Richard Sansing, *Distribution Policies of Private Foundations*, in HANDBOOK OF RESEARCH ON NONPROFIT ECONOMICS AND MANAGEMENT 42, 44-51 (Bruce A. Seaman & Dennis R. Young eds., 2010).

Inferior goods are again an interesting exception to the general rule. Sticks, not carrots, are the best choice to exploit income effects in the production of inferior goods with positive externalities. A possible example here is government spending. Some commentators have suggested that at least some public goods produced by the government are inferior, in that households with enough wealth can and often prefer to buy their own private substitute.¹⁸² The wealthy drive while poorer families ride the bus; rich enclaves have private security and need not rely on police departments.¹⁸³ In the United States, the federal government offers its taxpayers a discount on the amount of funds they spend on their state and local government services.¹⁸⁴ If it's true that many of these services are inferior goods—and it should be mentioned that I and a coauthor, among others, have found evidence to the contrary—then this subsidy may be a mistake.¹⁸⁵ By enriching the taxpayers, the federal government reduces their demand for the inferior government-provided goods. If the goal is to encourage state and local government, a stick of some kind would do better, since then both the income and substitution effects of the stick would encourage such purchases.

As for cost-effectiveness, using carrots to encourage positive externalities burdens the treasury just as heavily as when they are dangled to deter negative externalities, and it adds some further inefficiencies as well. Wittman argues that carrots are preferable for the production of positive externalities because altruistic behavior is rare, and so the transaction costs of rewarding the few givers is lower than the costs of punishing the many nongivers.¹⁸⁶ As we saw earlier, though, transaction costs do not clearly favor carrots.¹⁸⁷

A more important factor is that inframarginality looms larger in the positive externality context. Recall that funds spent on carrots are wasted to the extent that some actors would have been willing to change their behavior without any incentive.¹⁸⁸ In the case of positive externalities, scholars have suggested that people often voluntarily create public goods in return for “warm glow,” that is, feelings of social approbation and approval, self-worth, or satisfaction

182. See BURTON A. WEISBROD, *THE VOLUNTARY NONPROFIT SECTOR: AN ECONOMIC ANALYSIS* 69 (1977).

183. See *id.* at 69-70.

184. 26 U.S.C. § 164 (2006 & Supp. IV 2010).

185. See Brian Galle & Jonathan Klick, *Recessions and the Social Safety Net: The Alternative Minimum Tax as a Countercyclical Fiscal Stabilizer*, 63 *STAN. L. REV.* 187, 226-35 (2010); Daniel Hewitt, *Demand for National Public Goods: Estimates from Surveys*, 23 *ECON. INQUIRY* 487, 503 (1985).

186. Wittman, *supra* note 7, at 71, 79.

187. See *supra* text accompanying notes 90-100.

188. Engel et al., *supra* note 7, at 670; see also William M. Landes & Richard A. Posner, *Salvors, Finders, Good Samaritans, and Other Rescuers: An Economic Study of Law and Altruism*, 7 *J. LEGAL STUD.* 83, 99 (1978) (showing that paid rescue crowds out altruistic rescue).

of their own human urge to serve mankind or create something new.¹⁸⁹ There is little corresponding evidence that humans get much warm glow from announcing that they have ceased harming others: proclaiming that one has just now stopped doing terrible deeds is something of a mixed signal.¹⁹⁰ In the case of donations to charity and inventions, some have contended that society could obtain close to an optimal amount of charity and innovation with no government encouragement at all,¹⁹¹ while no one would contend that pollution can be abated simply by relying on our collective good will. And payments could actually reduce warm glow by confusing the social rewards of being an altruist.¹⁹²

Distributive justice might favor carrots slightly, though. As I mentioned before, most existing carrots have the unfortunate effect of redistributing upwards, although probably no more so in the case of positive externalities. But the symbolic and moral valence of carrots makes more sense when we are rewarding folks for good behavior, rather than just paying them to stop doing wrong by their neighbors.¹⁹³ Government rewards may even help to encourage the development of social norms of altruism.¹⁹⁴ That is no small thing, but I describe its benefits as minor because it is unclear whether it is unique to carrots. Would sticks for those who fail to be altruistic serve as well? That is unsettled in the psychological literature.¹⁹⁵ Carrots could also potentially undermine altruistic behavior. As Sunstein argues, one possible symbolic implication of pay-

189. *E.g.*, Amihai Glazer & Kai A. Konrad, *A Signaling Explanation for Charity*, 86 AM. ECON. REV. 1019, 1019-21 (1996); Susan Rose-Ackerman, *Altruism, Nonprofits, and Economic Theory*, 34 J. ECON. LIT. 701, 717 (1996).

190. Obviously, this is a generalization. For example, there is a market in carbon offsets. KATHERINE HAMILTON ET AL., ECOSYSTEM MARKETPLACE & NEW CARBON FIN., FORGING A FRONTIER: STATE OF THE VOLUNTARY CARBON MARKETS 2008, at 33 (2008), available at http://www.ecosystemmarketplace.com/documents/cms_documents/2008_StateofVoluntaryCarbonMarket2.pdf.

191. *See, e.g.*, Bruce R. Kingma & Robert McClelland, *Public Radio Stations Are Really, Really Not Public Goods: Charitable Contributions and Impure Altruism*, 66 ANNALS PUB. & COOPERATIVE ECON. 65, 66-67, 73-74 (1995) (identifying several reasons donors may contribute to charity, and reporting evidence that these motives are indeed important to observed giving).

192. *See* Landes & Posner, *supra* note 188, at 99; *see also* Brian Galle, *Keep Charity Charitable*, 88 TEX. L. REV. 1213, 1224-25, 1233 (2010) (making this point about the charitable contribution deduction).

193. *Cf.* Scott Hershovitz, *Two Models of Tort (and Takings)*, 92 VA. L. REV. 1147, 1175-78 (2006) (arguing that tort law does not require compensation for gratuitous benefits because there is no moral duty to do so).

194. Rob Atkinson, *Altruism in Nonprofit Organizations*, 31 B.C. L. REV. 501, 629 (1990).

195. *Compare* Bruno S. Frey & Reto Jegen, *Motivation Crowding Theory*, 15 J. ECON. SURVS. 589, 599-600 (2001) (reporting a handful of studies that find penalties crowd out altruistic behavior), with Yuval Feldman & Orly Lobel, *The Incentives Matrix: The Comparative Effectiveness of Rewards, Liabilities, Duties, and Protections for Reporting Illegality*, 88 TEX. L. REV. 1151, 1205-06 (2010) (finding no crowd-out from penalties).

ing actors to do good is that the “expected” or default state is that they have no such obligations.¹⁹⁶ Psychological studies bear this intuition out to some degree, finding that explicit rewards sometimes crowd out “intrinsic” motivations to help others.¹⁹⁷

But pointing back in the direction of sticks, the greater inframarginality of carrots to encourage positive externalities compounds the problems of anticipatory and strategic crowd-out we saw earlier. As in the negative externality-context, when actors anticipate the possibility of carrots, they have an incentive to delay changing their conduct in order to collect more of the carrot.¹⁹⁸ For example, during the financial crisis, the Treasury Department made known that it was considering offering payments to banks to encourage them to lend.¹⁹⁹ Commentators urged the Treasury either to implement the policy immediately or to rule it out absolutely; knowing that subsidies *might* be available, firms would not lend at all until the subsidy was put in place, compounding the credit freeze.²⁰⁰ This delay also had a strategic lobbying component: by lending less, the firms deepened the crisis, likely increasing the odds that the Treasury would have to grant them the carrot. This same phenomenon can occur for investments to mitigate negative externalities.²⁰¹ But because there is much more voluntary creation of positive externalities than there is reduction of negative, there is a proportionately greater amount of delaying and strategic behavior.

For similar reasons, the repeated-game dynamics of sticks are more clearly superior to carrots in the positive externalities setting. At the risk of overgeneralization, the regulation of negative externalities typically involves curtailing ongoing harmful activity, while regulation of positive externalities involves encouraging new beneficial activity. In the case of negative externalities, there was an argument that sticks might deter investment in all kinds of economic

196. Sunstein, *supra* note 21, at 546; *see also* Nash, *supra* note 106, at 479 (arguing that assigning the obligation to pay to those who are responsible for producing negative externalities encourages personal responsibility and trust in government).

197. *E.g.*, Frey & Jegen, *supra* note 195, at 598-607; Mark R. Lepper et al., *Undermining Children's Intrinsic Interest with Extrinsic Reward: A Test of the "Overjustification" Hypothesis*, 28 J. PERSONALITY & SOC. PSYCHOL. 129 (1973). There is a small but developing literature aimed at studying how to provide Pigouvian pricing without also crowding out intrinsic motivations. *See* Muradian et al., *supra* note 82, at 1205-07 (describing some recent suggestions and case studies).

198. *See* Sunstein, *supra* note 21, at 546-47 (describing incentive effects of paying broadcasters to produce public interest programming).

199. Kevin G. Hall, *Treasury Shifts Target of Wall Street Rescue Plan*, KNIGHT RIDDER, Nov. 13, 2008, *available at* 2008 WLNR 21699361.

200. *See* John H. Cochrane & Luigi Zingales, *Lehman and the Financial Crisis*, WALL ST. J., Sept. 15, 2009, at A21.

201. For example, imminent expiration of temporary tax subsidies accelerates the subsidized activity. Alan J. Auerbach & Kevin A. Hassett, *Fiscal Policy and Uncertainty*, 5 INT'L FIN. 229, 231-36 (2002); Christopher L. House & Matthew D. Shapiro, *Temporary Investment Tax Incentives: Theory with Evidence from Bonus Depreciation*, 98 AM. ECON. REV. 737, 762-63 (2008).

activity, because of investors' fear of unanticipated recognition of new externalities to punish.²⁰² That is, sticks might prevent investors from beginning new activities for fear they will have to stop. But in the positive externality context, it is unclear how sticks could lead anyone to stop *not* doing the (unpredictable) things the government will in the future want them to do.²⁰³ Even if investors wanted to avoid being punished for inertia, by definition they couldn't know which things to start doing. So, viewed at this high level of generality, it looks as though sticks to encourage positive externalities typically have even fewer *ex ante* distortive effects than in the negative externality context. Of course, this argument has less traction if some kinds of activities are known to be likely to be the source of positive externalities in certain situations, such as manufacturing during wartime.²⁰⁴

Positive externalities also do not seem to present situations in which "victim" behavior is likely to be important. Recall that in the negative externality context, there were some plausible situations in which carrots might better encourage victims to undertake efficient efforts to avoid the impact of the externality. Dari-Mattiacci argues that something similar could be true of positive externalities, although the only example he offers is that technology manufacturers could change their product to make better use of a new patent.²⁰⁵ While coordination could certainly increase the gainful impact of positive externalities, it's not obvious that it would be efficient to encourage coordinated behavior. Beneficiaries may have better investments than the time and resources they would have to devote to searching for and cooperating with benefactors. In any event, Dari-Mattiacci himself argues for a more limited role for mitigation-type behavior for positive externalities, largely because the greater cost of carrots makes it more difficult to fully incentivize both sides.²⁰⁶

A potential argument against sticks is that in some cases they are prohibitively difficult to implement. Lazear, in his work on incentives in employment contracts, explains that carrots are easier to implement if the employer (or, in our discussion, the regulator) doesn't have good information about the upper limit on how much of an output it wants.²⁰⁷ Take copyright law. Copyright law looks a lot like a carrot: it rewards those who generate positive externalities

202. See *supra* text accompanying notes 134-37.

203. In more technical terms, what is happening in the positive externality context is the intrusion of a zero lower bound on the degree of crowd-out. Anticipated sticks might crowd out productive activities when those activities are already under way. But if there are no regulable activities in progress, there is nothing to crowd out.

204. Cf. Levmore, *supra* note 132, at 1678 (noting that the government should want to compensate manufacturers of goods useful during crises, in order to avoid discouraging investments in producing those goods); Wittman, *supra* note 7, at 70 n.37 (suggesting that a duty to rescue might discourage people from entering areas where others may be likely to need rescuing).

205. Dari-Mattiacci, *supra* note 21, at 33-40, 54.

206. *Id.* at 38.

207. EDWARD P. LAZEAR, PERSONNEL ECONOMICS 65-69 (1995).

(authors) at the cost of the public (in the form of royalties) and some societal deadweight loss (from monopoly rents).²⁰⁸ We know we want to reward innovation and creativity, but we're not sure whether there is a point at which the gains from additional creations diminish.²⁰⁹ Although in theory we could encourage creativity by punishing dullards, slackers, and boring derivative hackery, it's not clear how to price the punishment, or really even whom to punish.²¹⁰

This isn't a particularly devastating argument in favor of carrots. Among other problems, the measurability argument can be turned against carrots as well.²¹¹ Clearly, carrots have social costs, implying that excessive production potentially creates as much or more social loss as inadequate production.²¹² If we don't know the marginal gain from another unit of production, or even a ballpark level for the ideal amount of the good, then paying to spur more of it may well be worse than not paying.²¹³ Consider the Sonny Bono Copyright Term Extension Act, which extended the duration of certain rights of copyright holders.²¹⁴ Did this extension—which was essentially a carrot for the creation of protected property—increase social welfare? No one seems to know, largely because we don't know the optimal amount of incentives for creativity.²¹⁵ We could say much the same for the rule of *cy pres* in charitable trust law: locking

208. See POSNER, *supra* note 48, at 52-53.

209. See *id.* at 202.

210. Cf. Wittman, *supra* note 7, at 71 (arguing that it may be difficult to employ sticks to produce positive externalities because of difficulty in identifying whom to punish).

211. Cf. BAUMOL & OATES, *supra* note 7, at 214 (noting that subsidies require the government to specify the benchmark amount of goods to be produced); Sunstein, *supra* note 21, at 545 (noting the difficulty of designing a price instrument that captures the uncertain marginal value of another unit of public interest television); Wittman, *supra* note 7, at 68-69 (pointing out that it may be difficult to find and pay all potential producers).

212. See LOUIS KAPLOW, *THE THEORY OF TAXATION AND PUBLIC ECONOMICS* 253-54, 271-72 (2008) (noting that even subsidies for charity should be optimized, not maximized).

213. *But see* Robert Cooter, *Prices and Sanctions*, 84 COLUM. L. REV. 1523, 1533-34 (1984) (arguing that policymakers can determine the correct level of production of a good by observing social consensus, even if marginal costs are not observable). A problem with Cooter's argument is that community behavior may be distorted by biases and fixed in place by path dependence, such as the happenstance of prior law and institutional arrangements. Also, as he acknowledges, long-held standards simply do not exist for new policy choices, such as the extension of copyright in my example.

Admittedly, even if society does not know the precise marginal social benefit of a good, if society knows the general slopes of the supply and demand curves for the good, then the regulator could make reasonable predictions about whether overproduction or underproduction is the greater danger. If we expect that the social benefit curve is relatively steep, then the risk of underproduction is worse, assuming equal chances of under- and overproduction. Reciprocally, the risk of overproduction is worse if the curve is relatively flat.

214. Pub. L. No. 105-298, § 102, 112 Stat. 287 (1998) (codified as amended at 17 U.S.C. §§ 301-304 (2006 & Supp. IV 2010)).

215. See Joseph P. Liu, *Copyright and Time: A Proposal*, 101 MICH. L. REV. 409, 413-22 (2002). One thing that does seem clear is that granting the extension *retroactively* did not spur any new creations by dead artists.

up charitable assets to comply with the wishes of the donor has social costs, and it is unclear whether there are any resulting gains.²¹⁶ Scholars often argue for repeal or reform of cy pres on this basis.²¹⁷ So major uncertainty of marginal gains seems to cut against *both* carrots and sticks.

Further, there are many instances in which it would be easy to know whom to punish for failure to do good for others. For example, as Calabresi showed, efficient penalties are imposed on the actors who can avoid harm—or, here, create good—at the lowest cost.²¹⁸ In most instances there is a limited group of producers who are in a position to provide positive externalities at the lowest cost. Universities, for example, are probably in the best position to use education as a tool of equal opportunity, because they have the infrastructure for providing education and need only add need-based financial aid to achieve the social-justice objective. Penalizing traditional redistributive organizations, such as soup kitchens, for failing also to provide education wouldn't make sense because their cost of doing so would be orders of magnitude larger. Wittman seems to claim that identifiable producers are poor candidates for sticks, since in this situation penalties can be anticipated and so might discourage new investors from entering the regulated industry.²¹⁹ But that is just another version of the output-effect argument.

Overall, then, sticks do not dominate carrots as clearly in the case of positive externalities as they did in the case of negative externalities. Income effects tend to favor carrots, and distributive justice arguably does as well. On the other hand, the repeated-game story may more clearly argue for sticks here than it did in the negative externality setting. Which factors are most important likely will vary between different kinds of goods.

B. *More Examples*

As with price mechanisms for negative externalities, my analysis of price mechanisms for positive externalities raises hard questions for many current government subsidy programs. U.S. firms get a number of different tax breaks to encourage them to invest in research and development, in purchases of new capital equipment, and in the sale of equipment manufactured in the United States.²²⁰ Other subsidies reward firms for such diverse activities as operating

216. See Rob Atkinson, *Reforming Cy Pres Reform*, 44 HASTINGS L.J. 1111, 1123 & n.38 (1993).

217. See, e.g., POSNER, *supra* note 48, at 697; Alex M. Johnson, Jr., *Limiting Dead Hand Control of Charitable Trusts: Expanding the Use of the Cy Pres Doctrine*, 21 U. HAW. L. REV. 353, 379-91 (1999).

218. See CALABRESI, *supra* note 136, at 150-52; see also Saul Levmore, *Explaining Restitution*, 71 VA. L. REV. 65, 73 (1985) (extending least-cost avoider analysis to those who provide benefits to others).

219. See Wittman, *supra* note 7, at 71.

220. 26 U.S.C. §§ 167-199 (2006 & Supp. IV 2010).

airports in rural areas or building affordable housing.²²¹ In all these cases, the carrots do arguably encourage positive externalities, but at the cost of revenue dollars, many of which are likely to be inframarginal, and strategic behavior on the part of the firms.

What differs in the positive externality case, again, is that output effects make carrots more plausible. Shifting to sticks could lower the overall output of the firm. For instance, if we charged a higher tax on firms that fail to invest in capital equipment, firms would shift toward capital investment, but each firm would shrink, so that the net effect could be lower capital investment overall. On the other hand, if we have correctly estimated the value to society of the firm's externalities, the substitution toward capital would make the whole economy more efficient. The more vibrant customer base should in turn offset some of the reduction in output from the stick.

In any event, my argument is not that all existing carrots for positive externalities are obviously misguided, only that they are undertheorized and understudied. At present, no one is asking whether the net output effect of using carrots is worth the investment of revenues we're devoting to these programs. More empirical research into that question is needed before we can say with confidence whether we've made the right choices.

Similar questions confront proponents of other new carrots, such as David Schizer's recent outline of the arguments in favor of making news providers eligible for the charitable contribution deduction.²²² The deduction operates as a matching grant for donors, and so is effectively a carrot to encourage them to "purchase," through their donations, the charity of their choice.²²³ Schizer compellingly lays out the social benefits of quality news organizations, and explains why these benefits are positive externalities the modern market fails to deliver.²²⁴

Schizer doesn't consider, though, whether the carrot of the charitable contribution deduction would be preferable to a stick alternative. As Sunstein has argued, in theory we could impose a tax or other damages assessment against news organizations that merely serve up tabloid gossip and information-free political horse-race coverage.²²⁵ Alternately, we could revert to a regulatory regime, such as the old FCC requirement that organizations demonstrate that

221. Office of Aviation Analysis, *Essential Air Service Program*, U.S. DEP'T TRANSP., http://ostpxweb.dot.gov/aviation/x-50%20role_files/essentialairservice.htm (last visited Apr. 13, 2012); *HOME and Low Income Housing Tax Credits (LIHTC)*, U.S. DEP'T HOUSING & URB. DEV., <http://www.hud.gov/offices/cpd/affordablehousing/training/web/lihtc> (last visited Apr. 13, 2012).

222. See David M. Schizer, *Subsidizing the Press*, 3 J. LEGAL ANALYSIS 1 (2011).

223. See Harold M. Hochman & James D. Rodgers, *The Optimal Tax Treatment of Charitable Contributions*, in *THE ECONOMICS OF NONPROFIT INSTITUTIONS: STUDIES IN STRUCTURE AND POLICY* 224, 228-32 (Susan Rose-Ackerman ed., 1986).

224. Schizer, *supra* note 222, at 5-16.

225. Sunstein, *supra* note 21, at 539-42.

they broadcast “in the public interest.” Such regimes in effect impose the costs of real newsgathering on the news firm.²²⁶ Again, it is possible that by reducing the profitability of news as a business field, these sticks would drive away some organizations, somewhat reducing the amount of news overall.²²⁷ But the question is whether avoiding that danger is worth the other costs of converting to carrots instead.

V. THE POLITICAL ECONOMY OF INCENTIVE DESIGN

So far I have argued that in most situations sticks are a better policy tool than carrots. Still, as my many examples have shown, carrots are commonplace—and more are, shall we say, sprouting up all the time.²²⁸ In this Part, I explain the overgrowth of carrots, argue that carrots should be unacceptable even for very important projects, and consider some potential tools for trimming them back.

A. *The Tragedy of the Carrots*

Carrots have a number of contributing causes, some relatively obvious and some less so. Now that I have made clear the distributive and revenue differences between carrots and sticks, the basic political economy of carrots is straightforward. Public choice theory predicts that the political interests of a small concentrated group will usually win out over those of the general public.²²⁹ Producers of a given externality are typically a small, discrete group, at least relative to the population as a whole. Redistribution to producers drains the treasury or increases the deadweight loss of taxation, but these are costs borne by the whole population.²³⁰ Though producers, too, bear some of the cost, their individual gains are much bigger, so that consumption of the shared

226. *See id.* at 544.

227. *Cf.* STERNER, *supra* note 7, at 171 (noting that subsidies affect output by attracting new investment in the regulated field).

228. *See, e.g.,* Frans L. Leeuw, *The Carrot: Subsidies as a Tool of Government—Theory and Practice*, in *CARROTS, STICKS, AND SERMONS: POLICY INSTRUMENTS AND THEIR EVALUATION* 77, 77 (Marie-Louise Bemelmans-Videc et al. eds., 2007) (reporting that major European countries spend between twenty and thirty-five percent of their GDP on grants and subsidies); *cf.* Calabresi & Melamed, *supra* note 21, at 1117 (noting that a rule under which victims compensate polluters for limiting their right to pollute “may well be the most frequent device employed”).

229. For overviews, see JAMES M. BUCHANAN & GORDON TULLOCK, *THE CALCULUS OF CONSENT* (1962); DANIEL A. FARBER & PHILIP P. FRICKEY, *LAW AND PUBLIC CHOICE: A CRITICAL INTRODUCTION* (1991).

230. *See* Chulho Jung et al., *The Coase Theorem in a Rent-Seeking Society*, 15 *INT’L REV. L. & ECON.* 259, 261 (1995) (noting that dispersed interests are less likely to be able to defend an efficient choice of policy instrument that favors them); Merrill, *supra* note 97, at 287-89 (arguing that public choice theory explains successful political opposition to a carbon tax).

treasury dollars is a classic tragedy of the commons.²³¹ Furthermore, loss aversion makes those who might be subject to sticks lobby with particular vigor against them. And recipients of existing carrots become richer, and so have more resources to attract entrepreneurs who will help them defend their carrots, entrenching government mistakes.²³²

A particularly ironic implication of the public choice analysis is that carrots will be underproduced in exactly the situations when they might be defensible. Recall that carrots might make sense in the case where mitigating behavior by victims of negative externalities is important, and where the group of such victims and carrot-payers is small and cohesive.²³³ But a small, cohesive group of victims is likely to have the political power to resist paying for carrots, and push for sticks instead. Carrots might also be justifiable when the externality producer is especially poor, but poor producers may lack the political resources to win the carrot's passage.²³⁴

To be sure, these are overgeneralizations. Concentrated interests sometimes lose out to a highly activated populace or very motivated policy entrepreneurs.²³⁵ My claim is not that we *always* get carrots, only that the political system inefficiently overproduces carrots when they are undesirable and yet may also underproduce them in the unusual cases when they're sensible.

Less obviously, some aspects of U.S. law may compound social overproduction of carrots. For one thing, the basic structure of our federalist system of government encourages carrots. It is a familiar point that, because of inter-jurisdictional competition, subnational governments cannot easily redistribute

231. See Daniel A. Farber, *Public Choice and Just Compensation*, 9 CONST. COMMENT. 279, 292-93 (1992) (arguing that requiring compensation for takings increases takings because the costs of compensation are not paid for by direct beneficiaries but instead come from the federal treasury); Nathaniel O. Keohane et al., *The Choice of Regulatory Instruments in Environmental Policy*, 22 HARV. ENVTL. L. REV. 313, 347-48 (1998) (explaining that firms may oppose efficient regulations when redistribution from the firm exceeds the firm's share of social welfare gains). But see DANIEL SHAVIRO, WHEN RULES CHANGE: AN ECONOMIC AND POLITICAL ANALYSIS OF TRANSITION RELIEF AND RETROACTIVITY 77-78 (2000) (suggesting that narrow interest groups may be disadvantaged in some regulatory settings). For a description of the commons problem, see Lee Anne Fennell, *Common Interest Tragedies*, 98 NW. U. L. REV. 907, 913-25 (2004).

232. See JACOB S. HACKER & PAUL PIERSON, WINNER-TAKE-ALL POLITICS 41-73 (2010).

233. See *supra* text accompanying notes 145-56.

234. See Stephen Loffredo, *Poverty, Democracy, and Constitutional Law*, 141 U. PA. L. REV. 1277, 1327-28 (1993). If the group of beneficiaries is relatively easy to organize, however, an initial lack of resources may be unimportant. Entrepreneurs might be willing to organize and advocate for the beneficiaries in exchange for their political support, or for a portion of the other expected proceeds of their victory. See Elizabeth Garrett, *Harnessing Politics: The Dynamics of Offset Requirements in the Tax Legislative Process*, 65 U. CHI. L. REV. 501, 518-19 (1998).

235. See Christopher H. Schroeder, *Rational Choice Versus Republican Moment—Explanations for Environmental Laws, 1969-73*, 9 DUKE ENVTL. L. & POL'Y F. 29, 49-56 (1998).

away from mobile businesses or citizens.²³⁶ As I've explained, sticks amount to redistribution from the externality producer to the general public. It follows that, if states want to regulate relatively mobile producers, they will face heavy pressure to use carrots. If the welfare losses from choosing carrots over sticks are large enough, my analysis here amounts to a new reason to keep some policies at the national level. Similarly, since exit pressures are especially acute at the local level,²³⁷ the carrot/stick choice may be a reason to retain policy at the state level rather than devolving it to local governments. Where victim mitigation is important, though, local use of carrots might actually be efficient, since local government may come close to embodying the situation in which the group of victims and carrot-payers is small and can easily coordinate.

Judge-made federalism doctrine compounds the basic structural preference for carrots. For example, in order to win their competition with their neighbors, state and local governments routinely give away hundreds of millions of dollars in tax breaks and other incentives to retain large employers (professional sports teams, most famously).²³⁸ Under my carrot/stick analysis, the better policy would be simply to impose fines on those who leave.²³⁹ Yet the Supreme Court has clearly condemned state efforts to punish departures, while implicitly blessing the grant of tax incentives to stay.²⁴⁰ From the perspective of federalism theory, it isn't obvious we should permit either one, as free competition can also have some healthy effects.²⁴¹ But if the Supreme Court is going to allow states to tilt the market for interstate capital in their own favor, it might be

236. The basic problem is that if the state persists in redistribution efforts, those who are burdened in excess of their local benefits will leave, threatening local prosperity and local officials' electoral prospects.

237. See WILLIAM A. FISCHER, *THE HOMEVOTER HYPOTHESIS* 39-71 (2001).

238. See Charles C. Brown & Wallace E. Oates, *Assistance to the Poor in a Federal System*, 32 J. PUB. ECON. 307, 328 (1987); William F. Fox & John A. Swain, *The Federal Role in State Taxation: A Normative Approach*, 60 NAT'L TAX J. 611, 614-15 (2007).

239. This tactic is not unheard of. For example, the Charlotte Bobcats reportedly signed a contract with the City of Charlotte agreeing to pay a \$200 million termination fee if they break the lease on their arena and move to another city. *A Look at Potential NBA Relocation Candidates*, SEATTLE TIMES (July 13, 2008, 12:00 AM), http://seattletimes.nwsources.com/html/nba/2008048569_sonichart13.html.

240. See, e.g., *Am. Trucking Ass'ns v. Scheiner*, 483 U.S. 266, 284 (1987) (holding that states cannot "plac[e] a financial barrier" at their borders). On the Court's willingness to abide incentives for entry, see *New Energy Co. of Ind. v. Limbach*, 486 U.S. 269, 278 (1988) (dictum); and *Allied Stores of Ohio, Inc. v. Bowers*, 358 U.S. 522, 532-33 (1959) (Brennan, J., concurring) (suggesting that the Court's equal protection decisions could be reconciled on the grounds that states can reward newcomers but not punish them). *But see Cuno v. DaimlerChrysler, Inc.*, 386 F.3d 738, 742-48 (6th Cir. 2004) (holding that selective state tax benefit for in-state manufacturer violated the dormant Commerce Clause), *rev'd on other grounds*, 547 U.S. 332 (2006).

241. See Peter D. Enrich, *Saving the States from Themselves: Commerce Clause Constraints on State Tax Incentives for Business*, 110 HARV. L. REV. 377, 382-405, 440-48 (1996) (arguing against state-level relocation incentives).

worth considering whether it should at least allow states to use the most efficient tool for doing so.

At the federal level, judge-made rules defining when private plaintiffs have standing or a “right of action” to sue to enforce federal law also affect the choice between carrots and sticks.²⁴² When a political coalition presses the government for a solution to its problems, one factor it must consider is whether it will be able to ensure that the government continues to uphold its agreements in the future.²⁴³ Obviously, if the coalition is at all far-sighted, it will prefer that its goals actually continue to be met over time.²⁴⁴ And, recognizing this, legislators and other policy entrepreneurs will demand larger rents for durable legislation, giving both sides of the bargaining table an incentive to prefer such structures.²⁴⁵

In their archetypical forms, carrots offer greater long-term assurances to the pro-regulation coalition than do sticks.²⁴⁶ Private litigants generally lack standing to force the government to act to impose a penalty, and modern courts’ narrow construction of statutes authorizing private suits usually prevents third parties from suing under federal law to compel government action, even when that action would benefit them directly.²⁴⁷ Beneficiaries of government largesse, on the other hand, usually have a due process right to challenge any individualized denial or curtailment of their benefits.²⁴⁸ While this due process right does not typically extend to interested third parties, coalitions can expect that carrot recipients will want to protect their carrot entitlement, and they can fund lawsuits to help the recipients do so. Thus, current law encourages coalitions

242. For overviews of the doctrines, see RICHARD H. FALLON, JR. ET AL., *THE FEDERAL COURTS AND THE FEDERAL SYSTEM* 101-39 (6th ed. 2009).

243. See ROBERT D. COOTER, *THE STRATEGIC CONSTITUTION* 62-63 (2000).

244. See *id.*; see also Saul Levmore, *Precommitment Politics*, 82 VA. L. REV. 567, 571-72, 581 (1996).

245. See Richard L. Doernberg & Fred S. McChesney, *On the Accelerating Rate and Decreasing Durability of Tax Reform*, 71 MINN. L. REV. 913, 946 (1987).

246. I say “in their archetypical forms” here because my framework also defines a stick as any painful departure from the status quo. So a stick may simply be a reduction in a preexisting carrot program, in which case the sharp ease-of-monitoring distinction between the two instruments fades.

247. For a cogent summary of the law on suits to force government action, see Lisa Schultz Bressman, *Judicial Review of Agency Inaction: An Arbitrariness Approach*, 79 N.Y.U. L. REV. 1657, 1664-74 (2004). On the questionable status of private suits by third-party beneficiaries, see Samuel R. Bagenstos, *Spending Clause Litigation in the Roberts Court*, 58 DUKE L.J. 345, 385-93 (2008); and Daniel P. Tokaji, *Public Rights and Private Rights of Action: The Enforcement of Federal Election Laws*, 44 IND. L. REV. 113, 125-37 (2010).

248. See Rebecca E. Zietlow, *Two Wrongs Don’t Add Up to Rights: The Importance of Preserving Due Process in Light of Recent Welfare Reform Measures*, 45 AM. U. L. REV. 1111, 1121-26, 1137-39 (1996) (explaining the right to challenge an individualized denial and summarizing case law distinguishing that right from the opportunity to challenge general government policy shifts).

tions to prefer carrots if they want greater guarantees that a regulatory tool will be enforceable by the public if the regulator fails to use it with sufficient vigor.

Yet another doctrine that favors carrots over sticks at both the state and federal levels is the law of unconstitutional conditions. The Supreme Court has said that governments are generally under no obligation to provide subsidies to activities that they disfavor.²⁴⁹ As a result, it has held that Congress can permissibly refuse to fund pornography in libraries,²⁵⁰ lobbying by charities,²⁵¹ or medical advice on whether a patient should get an abortion.²⁵² Congress cannot, though, impose a “penalty” on these kinds of expressive activities.²⁵³ The constitutionality of the government’s action depends almost entirely on whether a program can be characterized as a penalty or a subsidy.²⁵⁴ Again, there may be some wisdom in this distinction, but we should also recognize that it contributes to government preferences for carrots over sticks.

A final potential body of law feeding the carrot frenzy is congressional budgeting rules. A number of commentators suggest that Congress’s method of calculating the cost of tax expenditures lowers the political salience of those expenditures, making them easier to enact than a more direct spending program would be.²⁵⁵ As my examples have illustrated, many modern carrots take the form of tax expenditures. Could the solution to the carrot problem be as simple as merely better disclosing and emphasizing to the public the true cost of carrots?

I am skeptical that the solution is quite so easy. Increased transparency is effectively a subsidy to facilitate citizen lobbying. Even if citizens respond to this subsidy, though, their work might be offset by the reaction of better-informed, “sophisticated” citizens who were already lobbying before the increased carrot disclosure.²⁵⁶ Prior to the increased disclosure, the sophisticate assumed that her fellow citizens would not lobby. That left her unable to free ride on others’ efforts, so she herself lobbied.²⁵⁷ As she observes increased transparency, however, she will expect that the average voter will become more attentive, allowing her to reduce her own effort as long as the new lobbyists

249. *E.g.*, *Regan v. Taxation with Representation of Wash.*, 461 U.S. 540, 544 (1983).

250. *United States v. Am. Library Ass’n*, 539 U.S. 194, 212 (2003) (Rehnquist, C.J.) (plurality opinion).

251. *Regan*, 461 U.S. at 544.

252. *Rust v. Sullivan*, 500 U.S. 173, 193 (1991).

253. *Citizens United v. FEC*, 130 S. Ct. 876, 896-97 (2010).

254. *See* Miriam Galston, *Lobbying and the Public Interest: Rethinking the Internal Revenue Code’s Treatment of Legislative Activities*, 71 *TEX. L. REV.* 1269, 1282-1314 (1993).

255. *E.g.*, Mary L. Heen, *Congress, Public Values, and the Financing of Public Choice*, 65 *OHIO ST. L.J.* 853, 898-910 (2004); Kleinbard, *supra* note 9, at 18-20.

256. *See* Galle & Klick, *supra* note 185, at 237-38.

257. *See id.*

share her own interests.²⁵⁸ Greater disclosure can thus lower total lobbying overall, depending on whether this crowd-out effect is greater than the increase in lobbying among those who weren't lobbying before.²⁵⁹

B. *Carrots for Key Programs?*

Having said all this about our political hunger for carrots, is it possible that carrot-demand is no tragedy at all, but instead a useful tool? Environmental economists argue that political opposition to sticks is a reason to favor carrots as policy tools.²⁶⁰ Similarly, in teaching my course on the law and economics of the public sector, I often encounter an argument from students that runs something like this: “The carbon tax is dead. Cap and trade isn't happening. Why not try giving people subsidies to reduce global warming?” In effect, they ask: if a regulatory goal is important enough, and its political prospects are sufficiently tenuous, isn't it worthwhile to pay the extra social cost of the carrot to buy a better chance of passage?

Perhaps, but consider the effect of that decision on the incentives of other externality producers. Recall that when carrots are on the table, private actors have incentives to increase their production of negative externalities and cut their production of positive ones, and either way to exaggerate the cost of achieving the government's goal.²⁶¹ By shifting toward inefficient behavior, and selectively disclosing the information they hold, producers can increase the size of the government carrot they will collect.²⁶²

Now suppose, as my students might propose, that the amount of inefficiency the government observes determines not only the amount of the carrot, but also the *probability* of receiving a carrot rather than a stick. That, after all, is the implication of the idea that when social costs are high enough, it becomes worthwhile to pay more for a carrot. What happens if producers can observe that the bigger the problem looks, and the more difficult passing a solution appears, the more likely a carrot? Because exaggeration now increases both the size of reward and also the likelihood of receiving it, producers' incentives to

258. Of course, in many cases sophisticates may be at odds with the interests of the general public. *See, e.g.*, Keohane et al., *supra* note 231, at 359 (claiming that hidden costs facilitate enactment of environmental regulations that disfavor the general public). In that situation, transparency would presumably increase lobbying by both the public and also the sophisticates who must attempt to outweigh them.

259. For additional skepticism that tax-expenditure opacity can be cured simply by disclosure, and the comment that many other forms of government transfers are just as hidden, see Roin, *supra* note 31, at 624.

260. *E.g.*, STERNER, *supra* note 7, at 196; Engel et al., *supra* note 7, at 669; Mestelman, *supra* note 7, at 187; *see also* Levmore, *supra* note 132, at 1665-66 (suggesting that a commitment against occasional payoffs to “losers” of new regulatory policy would reduce the amount of good new policy overall).

261. *See supra* text accompanying notes 122-30, 141, and 198-201.

262. *Id.*

inflate the problem, either through bad behavior or selective reporting, increase astronomically.

In fact, the best policy is likely the opposite of “carrots for big problems”: the government should commit credibly to using carrots only for small, unimportant problems. Or, equivalently, it can promise that the more serious an existing social problem, the more likely it will use a stick. If producers believe this promise, then they will have stronger incentives to voluntarily reduce the losses from their activities (or omissions) in advance of regulation, since that is their only path to a carrot. This political incentive may partially or even wholly offset their incentive to exaggerate in order to increase the size of the carrot. Of course, if successful, this policy would also encourage producers of negative externalities to conceal any private information they hold. But as I mentioned before, there are ways to design around this informational problem, such as by offering a bounty to whistleblowers.

A possible compromise approach for “big problems” would be to try to reframe sticks as carrots. If policymakers can successfully shift externality producers’ subjective baseline, they would diminish loss aversion among the producers, and thereby somewhat ease the passage of their controversial new policy.²⁶³ Something of this sort seems to be behind political efforts to prop up a cap-and-trade regime by emphasizing to polluters the potential gains for those who would get free permits or could cut costs very efficiently,²⁶⁴ and also behind efforts of opponents to frame cap and trade as a new tax.²⁶⁵ Reframing is a compromise position because if it’s successful, it diminishes the cost-effectiveness of the policy once it’s put into place, as enforcers will then have lost the additional deterrent effects that loss aversion creates.²⁶⁶ Reframing thus allows policymakers to sacrifice some efficiency in order to edge high-stakes controversial rules closer to passage, but without presenting the dangerous incentive effects of switching wholly to carrots.

263. Cf. Robert W. Hahn, *Jobs and Environmental Quality: Some Implications for Instrument Choice*, 20 POL’Y SCI. 289, 299 (1987) (reporting that voters respond to the perceived, rather than actual, impact of costs and benefits); Mathew D. McCubbins & Terry Sullivan, *Constituency Influences on Legislative Policy Choice*, 18 QUALITY & QUANTITY 299, 301-02 (1984) (same).

264. See Lisa Heinzerling, *Selling Pollution, Forcing Democracy*, 14 STAN. ENVTL. L.J. 300, 330 (1995) (describing grandfathering of permits as a tool for winning political support from polluters); Stavins, *supra* note 8, at 351 (describing the political advantage of cap and trade as avoiding a “focus” on higher costs).

265. See, e.g., George F. Will, Editorial, *Carbon’s Power Brokers*, WASH. POST, June 1, 2008, at B7. For evidence on the importance of framing on public perception of energy taxes, see Shi-Ling Hsu et al., *Pollution Tax Heuristics: An Empirical Study of Willingness to Pay Higher Gasoline Taxes*, 36 ENERGY POL’Y 3612, 3617-18 (2008).

266. I am grateful to Darien Shanske for this point.

C. Committing to the Carrot-Free Diet

As I've emphasized repeatedly, my analysis implies a fairly urgent need for governments to be able to commit themselves not to give away carrots. There is now a small but growing literature on the problem of government self-commitments, driven mostly by the dangers of moral hazard in government insurance programs.²⁶⁷ Since moral hazard arises when the insured's conduct imposes negative externalities on the insurer,²⁶⁸ we can see this moral hazard literature as a subset of the more general class of problems I have analyzed. Writers in that literature emphasize the difficulty that democratic governments have in pledging not to bail out insureds who have made bad decisions—in my parlance, governments can't credibly promise sticks rather than carrots.²⁶⁹ Among other reasons, giving out carrots is politically rewarding in the present, while sticks are better choices for the long run—when the politicians are all retired.²⁷⁰ Although the many pitfalls of government commitment are too complex for a serious treatment here, let me highlight three of the most promising options.

The time-tested solution is delegation to a relatively less political body.²⁷¹ Anyone who has attended an American law school since the middle of the past century can recite off-hand the strengths and weaknesses of that route, since it is in effect the path of constitutional entrenchment with enforcement by a long-tenured judiciary.²⁷² There are variations on the model, as with the delegation of monetary policy to the Federal Reserve, an independent agency.²⁷³ Probably the most persistent critique of both variants is the room they leave for slack be-

267. See, e.g., Cheryl D. Block, *Overt and Covert Bailouts: Developing a Public Bailout Policy*, 67 IND. L.J. 951, 968-72 (1992); Daryl J. Levinson, *Parchment and Politics: The Positive Puzzle of Constitutional Commitment*, 124 HARV. L. REV. 657, 672-97 (2011); Adam Levitin, *Bankrupt Politics and the Politics of Bankruptcy*, 97 CORNELL L. REV. (forthcoming 2012) (manuscript at 19-23); Jonathan R. Macey & James P. Holdcroft, Jr., *Failure Is an Option: An Ersatz-Antitrust Approach to Financial Regulation*, 120 YALE L.J. 1368, 1375-90 (2011).

268. Martin S. Feldstein, *The Welfare Loss of Excess Health Insurance*, 81 J. POL. ECON. 251 (1973).

269. E.g., Macey & Holdcroft, *supra* note 267, at 1370.

270. See Galle & Klick, *supra* note 185, at 200-02 (explaining causes of present bias among state and local policymakers).

271. See, e.g., Levinson, *supra* note 267, at 661-62, 672-81; Terry M. Moe, *The Politics of Structural Choice: Toward a Theory of Public Bureaucracy*, in ORGANIZATION THEORY: FROM CHESTER BARNARD TO THE PRESENT AND BEYOND 116, 137 (Oliver E. Williamson ed., 1990); Kenneth A. Shepsle, *Bureaucratic Drift, Coalitional Drift, and Time Consistency: A Comment on Macey*, 8 J.L. ECON. & ORG. 111, 114 (1992).

272. See William M. Landes & Richard A. Posner, *The Independent Judiciary in an Interest-Group Perspective*, 18 J.L. & ECON. 875 (1975).

273. Rachel E. Barkow, *Insulating Agencies: Avoiding Capture Through Institutional Design*, 89 TEX. L. REV. 15, 21 (2010); Lisa Schultz Bressman & Robert B. Thompson, *The Future of Agency Independence*, 63 VAND. L. REV. 599, 613-14 (2010).

tween current popular preferences and the value choices of the politically remote officials.²⁷⁴

With sixty-plus years of unending debate having so far failed to resolve the political-insulation question, it is worth mentioning two other avenues. Both basically involve contracting with third parties, although in different ways. One option is to contract out the task of regulation to other politically accountable bodies, but subject to rules that those other bodies cannot easily influence. So, for example, the federal government can assign the task of setting environmental policy to states or to federal agencies, and expressly prohibit those other decisionmakers from using carrots except in certain limited circumstances. Of course, it will always be possible for lobbyists to go directly to Congress for relief from the carrot limits, or for direct preemption of the stick enacted by the delegated regulator. But the delay and cost of these additional steps, and the loss of other benefits of the chosen institutional form, combined with the possibility that the delegated regulator will fight to retain its authority, will at least diminish the expected likelihood and cost-effectiveness of carrots.²⁷⁵ So, for example, Kirk Stark and I have proposed a system of federal-state agreements to enable states to commit to saving when their short-term political preferences are for spending and borrowing.²⁷⁶

Another contracting direction is for the government to hire others, not to make the decisions for it, but instead simply to enforce its promises. Here the cutting-edge work is by Michael Abramowicz and Ian Ayres, who suggest that governments can promise contractually to pay outsiders if they fail to keep their promises—in essence, selling “commitment bonds.”²⁷⁷ The advantage of this approach over constitutionalism or delegation to the Federal Reserve (as well as its vulnerability) is that political actors retain ultimate decisional authority; if they think breaking a promise is important enough to the public to be worth the price, they can.²⁷⁸ It is, in essence, a meta-stick: a stick for sticks.

CONCLUSION

Price instruments are often presented as the best choice for coping with the problem of externalities, but as I’ve shown, they face serious issues of their

274. E.g., POSNER, *supra* note 48, at 868-69, 871.

275. Cf. Brian Galle, *Designing Interstate Institutions: The Example of the Streamlined Sales and Use Tax Agreement (“SSUTA”)*, 40 U.C. DAVIS L. REV. 1381, 1414 (2007) (explaining entrenchment of appointed personnel as deriving from the value that the appointer assigns to the delegate’s connections within and knowledge of their institution); Levinson, *supra* note 267, at 694-97 (suggesting that political institutions achieve insulation from politics in part because they are structured to favor certain outcomes).

276. Brian Galle & Kirk J. Stark, *Beyond Bailouts: Federal Tools for Preventing State Budget Crises*, 87 IND. L.J. 599, 619-41 (2012).

277. Michael Abramowicz & Ian Ayres, *Commitment Bonds*, 100 GEO. L.J. 605, 622-44 (2012).

278. *Id.* at 33.

own. Sticks are typically the better of the two price tools—albeit not as clearly superior as prior literature suggests—while law and politics push us strongly toward carrots. That dilemma reverberates across many areas of law. For example, the most basic problem with tax expenditures is not, as critics until now have complained, that they are part of the tax code, but rather that they are expenditures.

Though I believe these points are important ones, they obviously are only a small piece of what there is to be said about carrots and sticks. With a problem of this size, it is one thing to point it out, and another thing to solve it. I don't claim to have easy answers. As I've implied, there are a number of legal rules that could be reformed to ease somewhat the demand for carrots. Efforts to correct externalities could be funded more extensively by the federal government, which faces less pressure to avoid redistribution. And we could strive to reframe policies so that they seem to be gains for everyone instead of losses for externality producers. All of these routes themselves offer trade-offs and obstacles. Similarly, the flaws of price instruments might make other regulatory choices, such as command and control, quantity regulation, or just sharing information, more appealing.²⁷⁹ But similar questions of redistribution and incentives likely also arise there, although I leave that work for another time.

Another aspect of carrots and sticks, and one which might offer some solutions to the dilemma they present, is that the two can be combined to solve any given social problem. I've already mentioned briefly two such combinations: carrots can be offered to a select portion of the population, to overcome distributive problems or reluctance to disclose information, while the rest of the population faces a stick. With the basic framework I've drawn in place, it should become easier to identify and evaluate opportunities for useful combinations.²⁸⁰

Lastly, my analysis here has largely assumed that externality producers respond to incentives. But there are a number of ways in which that assumption could be questioned. Individuals might be relatively inattentive to or unaware of some forms of policy instrument. Furthermore, firms are controlled by humans, who may have motivations differing from the firm's economic interests.²⁸¹ Likewise, my analysis here is likely different when the target of one government's efforts is another government: in addition to the possibility of

279. For an example of a skilled combined analysis of several of these factors together, see Victor Fleischer, *A Theory of Taxing Sovereign Wealth*, 84 N.Y.U. L. REV. 440, 494-503 (2009). On the use of information as a regulatory tool, see Bradley C. Karkkainen, *Information as Environmental Regulation: TRI and Performance Benchmarking, Precursor to a New Paradigm?*, 89 GEO. L.J. 257, 286-345 (2001); Evert Vedung & Frans C.J. van der Doelen, *The Sermon: Information Programs in the Public Policy Process—Choice, Effects, and Evaluation*, in *CARROTS, STICKS, AND SERMONS: POLICY INSTRUMENTS AND THEIR EVALUATION*, *supra* note 228, at 103.

280. For some prior discussions of carrot/stick combinations, see Engel et al., *supra* note 7, at 669; Smith, *supra* note 65, at 695-96.

281. See Eugene F. Fama & Michael C. Jensen, *Separation of Ownership and Control*, 26 J.L. & ECON. 301, 302-11 (1983).

agency costs,²⁸² there is also the question of whether such factors as income and output effects can be translated coherently to a government producer. But that must wait for future work.

282. Levinson, *supra* note 136, at 356-57.