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Toward a Pigovian State

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Abstract. Most economists believe that the government should impose Pigovian taxes on firms that produce negative externalities like pollution, yet regulatory agencies hardly ever use their authority to create Pigovian taxes. Instead, they issue command-and-control regulations. Our major point is that, contrary to the conventional wisdom, regulators typically have legal authority to create Pigovian taxes—they just do not use it. While regulators may hesitate to impose Pigovian taxes for a range of political and symbolic reasons, we argue that these reasons do not justify this massive failure of regulatory efficiency. It is time for the regulatory state to take a Pigovian turn.

Introduction

According to most economists, the optimal form of regulation of firms that produce negative externalities is a tax known as a Pigovian tax, named for the English economist, Arthur Pigou.[1] A Pigovian tax is a tax equal to the harm that the firm imposes on third parties. For example, if a manufacturer pollutes, and the pollution causes a harm of $100 per unit of pollution to people who live in the area, then the firm should pay a tax of $100 per unit of pollution. This ensures that the manufacturer pollutes only if the value of the pollution-generating activities exceed the harm, and thus the social value of those activities is positive.

Other forms of regulation are inferior to the Pigovian tax. Consider command-and-control regulation, in which a regulator forces a firm to take a particular action, such as installing a pollution-reducing scrubber.[2] Under this form of regulation, the regulator may conduct a cost-benefit analysis to determine whether the benefit of alleviating the pollution for the firm's neighbors is greater or less than the cost to the firm of having to install the scrubbers or take other precautions.[3] If scrubbers pass a cost-benefit analysis, then the regulator orders the firm to install them. If they do not, the regulator allows the firm to continue its activity unabated. While a perfectly conducted cost-benefit analysis should produce efficient results, just like a Pigovian

[1] *See generally*, Agnar Sandmo, *Direct Versus Indirect Pigovian Taxation*, 7 EUR. ECON. REV. 337 (1976).
[2] *See* WIKIPEDIA, *Scrubber*, http://en.wikipedia.org/wiki/Scrubber (as of Jan. 11, 2015).
[3] Exec. Order. No. 12,291, 3 C.F.R. § 127 (1982); Exec. Order 12,866, 3 C.F.R. § 638 (1993).

tax, in a world of administrative costs command-and-control regulation will be inferior. The reason is that in order to determine the correct command-and-control rule, the regulator must know both the value of the benefit of the activities and the cost.[4] In order to determine the correct Pigovian tax, the regulator must know only the cost of the activity. It is not necessary to know the benefit. Thus, as long as regulators make errors (as they unavoidably do), a Pigovian tax is superior to command-and-control regulation.

It would be an understatement to say that economists endorse Pigovian taxes over command-and-control regulation. They are constantly advocated by economists who seek to influence public policy.[5] Greg Mankiw, a prominent Harvard economist and chairman of the Council of Economic Advisers under President George W. Bush, invited numerous public figures to join his "Pigou Club," which advocates a Pigovian tax on gasoline.[6] Membership includes Nobel laureates with diverse views—including Gary Becker and Paul Krugman—and other prominent journalists, scientists, and politicians.[7]

Yet, when one turns one's eyes from the scholarly literature to government practice, one discovers that Pigovian taxes are used rarely by Congress and almost never by regulators, at least in a self-conscious way.[8] There is no political support for a Pigovian tax on gasoline.[9] And while gasoline taxes do exist, they do not appear to be based on Pigovian theory.[10] They are not calculated on the basis of an assessment of the social costs of gasoline-powered driving, and they are much too low.[11] As far as we have been able to discover, the Environmental Protection Agency has never ordered a Pigovian tax. Nor has any other agency. We have been able to find only a few isolated examples of a pure Pigovian tax in U.S. law.[12]

There are laws and regulations that could possibly be rationalized on Pigovian grounds, and that probably reflect some of the economic theory that underlies the Pigovian tax. As we noted, gasoline taxes do exist, and while they are not Pigovian in the sense of being equated to

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[4] Brief of Economists Thomas C. Schelling, Vernon L. Smith, and Robert W. Hahn as Amici Curiae in Support of Petitioners at 15, Chamber of Commerce US, v. EPA, 134 S. Ct. 1051 (2014) (No. 12-1272).

[5] *See*, *e.g.*, Steven Shavell, *Corrective Taxation Versus Liability as a Solution to the Problem of Harmful Externalities*, 54 J. L. & ECON. S249 (2011)("The corrective tax has long been viewed by most economists as a, or the, theoretically preferred remedy for the problem of harmful externalities."). However, Shavell himself criticizes this view, as we discuss infra. *See also* N. Gregory Mankiw, *Smart Taxes: An Open Invitation to Join the Pigou Club*, 35 E. ECON. J. 14, 15 (2009).

[6] *See* WIKIPEDIA, *Pigou Club*, http://en.wikipedia.org/wiki/Pigou_Club (as of Jan. 11, 2015).

[7] Greg Mankiw, *Al Gore in the Pigou Club*, GREG MANKIW'S BLOG (June 24, 2006), http://gregmankiw.blogspot.com/2006/06/al-gore-in-pigou-club.html.

[8] *See, e.g.*, Robert N. Stavins, *Experience with Market-Based Environmental Policy Instruments*, *in* 1 HANDBOOK OF ENVIRONMENTAL ECONOMICS 355 (Karl Göran Mäler & Jeffrey R. Vincent eds., 2003); David B. Spence & Lekha Gopalakrishnan, *Bargaining Theory and Regulatory Reform: The Political Logic of Inefficient Regulation* 53 VAND. L. REV. 599, 603 (2000); Omri Ben-Shahar & Kyle D. Logue, *Outsourcing Regulation: How Insurance Reduces Moral Hazard*, 111 MICH. L. REV. 197, 232-34 (2012).

[9] Beckey Bright, *Many Americans are Trimming Travel, But Few Car Pool to Cut Fuel Use*, WALL ST. J.(July 7, 2007) http://www.wsj.com/articles/SB118304470725951593 (noting that "[o]nly 5 percent of [Americans] polled said they support creating a tax on driving").

[10] For a summary of the current US approach to gasoline taxes, see Evan N. Turgeon, *Triple-Dividends: Toward Pigovian Gasoline Taxation*, 30 J. LAND RESOURCES & ENVTL. L. 145, 146-49 (2010).

[11] *Id*.

[12] *See infra* Part I.B.

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the social cost of driving, they obviously do deter excessive driving on the margin. One can also find examples of usage fees, congestion pricing, and the like—but these are found in contractual settings that are distinguishable from the problem of negative externalities that Pigovian taxes seek to correct.[13] Tradable-permit regimes also reflect a kind of Pigovian thinking, and are superior to command-and-control regulation, but as we discuss in Part I, they are inferior to Pigovian taxation in the pure sense. Moreover, essentially all of the examples we have found of rules that resemble Pigovian taxes derive from legislation, rather than administrative regulation. So the existence of some laws and regulations that bear some family resemblance to Pigovian taxation, and reflect some of the economic thinking that motivates Pigovian taxation, reinforces rather than solves the puzzle of why regulators never, or very rarely, use Pigovian taxes.

In this paper, we attempt to solve the puzzle. We suggest that the principal reason regulators do not employ Pigovian taxes is that they do not believe they have the authority to do so under existing law. We then demonstrate that regulators' pessimism is misplaced. Across a variety of regulatory areas covering a vast swath of economic activity, existing regulatory statutes provide regulators with at least plausible authority to use Pigovian taxes in regulation. If we are correct, this would not be the first time that regulators have discovered such authority where conventional wisdom held that none existed. The Obama Administration's 2014 proposal that states regulate greenhouse gases using cap-and-trade was spurred in part by a Natural Resources Defense Council argument that EPA possessed such authority under § 111(d) of the Clean Air Act.[14] One objective of this paper is to map out similar arguments for Pigovian taxes across a range of regulatory areas and statutes.

Having concluded that administrative agencies likely have authority to regulate using Pigovian taxes, we next consider whether there is any compelling reason why they should not or will not be capable of doing so. We canvas five potential objections or hurdles. First, Pigovian taxes don't solve a significant information problem, which is how the regulator values the harm caused by economic activity. This problem is compounded by the second-best nature of regulation: gasoline taxes, for example, may be inefficient if cars are already over- or adequately regulated.

Second, Pigovian taxes may lack political support because they do not serve the interests of those with political power. Suppose that laws and regulations typically reflect interest-group bargains, and not the general interest of the public because it is too costly for the public to organize. If so, one would expect regulations that reflect the interests of those groups—industry, unions, and so on. Some types of regulation produce natural interest-group constituencies: the firms that will produce the scrubbers or other technologies that the regulation will mandate. Command-and-control regulation will also sometimes serve the interests of regulated parties by

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[13] *See, e.g.*, Laura Barron-Lopez & Keith Laing, *Momentum Builds in Congress for Raising the Federal Gas Tax*, THE HILL (Jan. 9, 2015) http://thehill.com/policy/energy-environment/228986-momentum-seen-in-push-for-gas-tax-hike; VA. DEP'T OF TRANSP. , CONGESTION PRICING, (as of Jan. 13, 2015 2:42 GMT) (listing examples of congestion pricing in five states); Michael H. Schuitema, Comment, *Road Pricing as a Solution to the Harms of Traffic Congestion*, 34 TRANSP. L. J. 81 (2007); Eben Albert-Knopp, *The California Gas Charge and Beyond: Taxes and Fees in a Changing Climate*, 32 VT. L. REV. 217 (2007).

[14] DANIEL A. LASHOF ET AL., NATURAL RES. DEF. COUNCIL, CLOSING THE POWER PLANT CARBON POLLUTION LOOPHOLE: SMART WAYS THE CLEAN AIR ACT CAN CLEAN UP AMERICA'S BIGGEST CLIMATE POLLUTERS, R: 12-11-A (Mar. 2013).

serving as a high barrier to new market entrants. Pigovian taxes possess neither of these features, or not to the same degree.

Third, Pigovian taxes have negative symbolic resonance. For the right, they are unattractive because they are "taxes," and people on the right oppose taxes. For the left, they are unattractive because they seem to put a price on intrinsically valuable goods like human life and the environment and because they seem to permit a firm to commit ongoing harm so long as it is willing to pay a fee. By contrast, tradable permits are more attractive to the right because they seem to create markets, while command-and-control regulation is more attractive to the left because it seems to avoid pricing intrinsically valuable goods and bans harmful activity outright.

Fourth, Pigovian taxes breach the divide between taxation and regulation, which is firmly entrenched in the institutional organization of the U.S. government. We suspect that in the minds of many government official, only Congress can tax—regulators cannot.

Fifth, risk-averse regulators whose personal interests diverge from the public interest might see no advantage to regulatory innovation. From their perspective, the gain from employing a more efficient system of Pigovian taxes may be outweighed by the risk of initiating regulatory action outside of the mainstream, which may provoke criticism by people suspicious of innovation.

These theories may, individually or in aggregate, help to explain why regulators have refused to create or even experiment with Pigovian tax systems. But from a normative perspective, none of them is a good reason for sticking to command-and-control regulation. We thus conclude that Congress and regulators *should* implement Pigovian taxes. And because Congress has already delegated vast discretionary power to regulators and today seems stymied by gridlock, we direct our argument to the executive branch. We argue that just as the executive branch, starting in 1981, ordered regulators to use cost-benefit analysis to evaluate regulations,[15] it can order regulators to implement Pigovian taxes. Indeed (as we explain below), Pigovian taxes are usually the most efficient means of regulation and so would be required by cost-benefit analysis. In a sense we are just urging the executive branch to carry through on its commitment to cost-benefit analysis by subjecting the mode of regulation, as well as the decision to regulate, to a cost-benefit test.

Our plan is as follows. In Part I, we discuss the theory of Pigovian taxation and explain why economists endorse it. In Part II, we survey the legal and regulatory landscape. We cannot, of course, cover all of it in the space we have. Instead, we focus on some of the most economically significant areas of regulation where Pigovian taxation is most clearly called for by economic theory. In Part III, we consider objections to implementing Pigovian taxes. The conclusion is a call to Pigovian arms.

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[15] Exec. Order. No. 12,291; Exec. Order 12,866 *supra* note 3.

I. Pigovian Taxes in Theory and Practice

A.   The Theory of Pigovian Taxes

The idea of the Pigovian tax is at the center of economic approaches to public policy. Government intervention in the market is generally assumed to be justified when the market fails. A common type of market failure is the negative externality—a cost imposed on third parties by the activity of an individual or firm. If people can engage in an activity that benefits themselves and harms others, without being liable for the harm to others, then they will engage in an excessive amount of that activity relative to the social optimum.[16] In order to deter people from engaging in excessive amounts of activity, they must be forced to bear the cost to others.[17]

Suppose a factory produces widgets. The factory also emits pollution into the atmosphere. The smoggy air depresses housing prices and harms the health of those who breathe it. If the factory is unregulated, it will produce too many widgets relative to the social optimum. The reason is that the factory seeks to maximize profits, and to maximize profits it will set the marginal cost (the cost of the last widget) equal to the marginal benefit (the price paid by buyers). As the factory produces more widgets, marginal costs normally increase and marginal benefits normally decline; the number of widgets it produces will be that at which the two curves cross. The factory will ignore the cost incurred by neighbors. By contrast, social welfare is maximized only if the marginal benefit of the widget is set equal to the social cost of production, which includes the harm to the neighbors. Because the social cost is higher than the factory's marginal cost, the factory will produce too many widgets.

The Pigovian tax is a tax just equal to the amount of money necessary to ensure that the firm produces the socially optimal number of widgets. If the factory must pay a tax equal to the harm that each unit of production causes to the neighbors, then the factory will be forced to take into account the social cost. The harm to the neighbors now plays a role in the factory's profit-maximization. To maximize profits, the firm produces up until the marginal benefit equals the marginal cost to the factory plus the social cost to the neighbors. Thus, the factory produces fewer widgets, the number equal to the socially optimal number.

Other instruments can also be used to ensure that the factory produces the socially optimal number of widgets. For example, if a regulator performs a cost-benefit analysis, it can in principle determine the optimal number of widgets and order the factory to produce just that number of widgets. Many commentators favor tradable permit schemes, under which firms are

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[16] For some recent, lucid accounts of the standard economic justification for Pigovian taxes, see David Weisbach, Instrument Choice is Instrument Design (Oct. 23, 2009) (unpublished manuscript), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1493312; Victor Fleischer, *Curb Your Enthusiasm for Pigouvian Taxes*, (San Diego Legal Studies Paper No. 14-151, 2014), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2413066 ; CASS R. SUNSTEIN, RISK AND REASON 270–71 (2002). For a classic statement, see WILLIAM J. BAUMOL & WALLACE E. OATES, ECONOMICS, ENVIRONMENTAL POLICY, AND THE QUALITY OF LIFE 230-45 (1979). For a textbook treatment, *see* TOM TIETENBERG, ENVIRONMENTAL ECONOMICS POLICY 253-54 (3d ed. 2001). *See also* Jonathan Wiener, *Mechanism Choice* (with Barak D. Richman), *in* RESEARCH HANDBOOK ON PUBLIC CHOICE AND PUBLIC LAW (Daniel A. Farber & Anne Joseph O'Connell, eds., 2010).
[17] *Id*.

given permits to pollute, which they can then sell (if they engage in low levels of production) or buy (if they engage in high levels of production). However, neither approach is superior to Pigovian taxes. The problem with cost-benefit analysis is that the regulator must know both the benefits and the costs of production.[18] By contrast, to set Pigovian taxes, the regulator need know only the costs. Thus, Pigovian taxation should produce fewer errors. In addition, Pigovian taxes are dynamic and technology-forcing in a way that command-and-control regulation, coupled with cost-benefit analysis, can rarely be. Regulators can only perform a cost-benefit analysis with respect to extant technology, materials, and processes—a regulator cannot estimate the cost of a technology that has not yet been invented. Proposed regulation might fail a cost-benefit test based on the state of existing technology, whereas a Pigovian tax could give firms incentives to develop new technologies that would control pollution or other externalities more cheaply.[19]

The inferiority of cap-and-trade schemes is more subtle. A cap-and-trade scheme is similar to a Pigovian tax; the difference is that the government sets the aggregate quantity of production rather than the price. To set the aggregate quantity of production, it needs the same information that it needs to set the tax: the social costs of the activity. However, cap-and-trade systems are more vulnerable to uncertainty about costs than Pigovian taxes are, and Pigovian taxes are often easier to design and implement.[20] For those reasons, most economists prefer Pigovian taxes under most conditions.[21] However, we do not take the position that Pigovian taxes are always superior to cap-and-trade; rather, we argue that Pigovian taxes are plausible regulatory instruments, and often likely to be superior, in a range of circumstances.

Another common alternative to Pigovian taxes is the liability system. Rather than require the factory to pay a Pigovian tax to the government, the government could simply make it liable in tort to the victims. If the tort system requires the factory to pay victims an amount equal to their ham, then the effect of the liability system is similar to that of a Pigovian tax. However, there is an important distinction: under a liability system the "tax" is paid to the victim, while a Pigovian tax is paid to the government. As is well known, the problem with using the liability system is that payment to the victims will create perverse incentives on the part of the victims to engage in excessive activity.[22] The liability system is also beset by numerous procedural and practical limitations, including the difficulty of aggregating many small claims when the activity imposes small losses on a large number of people. Perhaps for this reason, with limited exceptions, the liability system is not focused on activity-level issues, but instead on ensuring that people take care or use sufficient precautions.[23]

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[18] *See* Brief of Economists, *supra* note 4.

[19] Relatedly, cost-benefit analysis is often accused of overstating the costs of regulation because it fails to account for technological innovation.

[20] *See* Weisbach, *supra* note 16.

[21] *See id.*; Louis Kaplow & Steven Shavell, *On the Superiority of Corrective Taxes to Quantity Regulation*, 4 AM. L. ECON. REV. 1 (2002); Martin L. Weitzman, *Prices vs. Quantities*, 41 REV. OF ECON. STUD. __ (1974).

[22] *See*, *e.g.*, STEVEN SHAVELL, FOUNDATIONS OF ECONOMIC ANALYSIS OF LAW (2004).

[23] For these and related reasons, Shavell argues that the liability system is superior to Pigovian taxes for many activities traditionally governed by liability rules, such as operating heavy machinery, shoveling sidewalks, and so on. The liability system takes into account the level of care of the relevant parties, and may also lead to more accurate determinations of the harm caused by an activity. *See* Shavell, *supra* note 5, at S258-61.

Finally, a more foundational objection to Pigovian taxes comes from Ronald Coase's classic article, *The Problem of Social Cost*.[24] Coase attacked Pigovian taxes because Pigovian taxation does not take into account the possibility of bargaining.[25] Consider the example of the factory that pollutes and causes harm to neighboring residents. According to Coase, the neighbors could pay the factory to reduce pollution; if they do so, the socially optimal level of taxation is achieved without the necessity of government intervention in the form of a tax.[26] And if (as seems likely) the government may err in setting the tax, then the outcome will be inferior to one that is reached through bargaining.

While bargaining may produce better outcomes in certain settings, it is not a substitute for Pigovian taxes in the general regulatory settings that interest us. The Coasean solution would require thousands or even millions of people who are harmed by pollution to pay the factory if the factory is granted the entitlement. These people would need to coordinate with each other and act through an agent or bargain directly with the factory; neither is practical. If the entitlement were given to the property owners, they would need to bring lawsuits to defend their property rights, but normally that will be impossible as well because the cost of a lawsuit exceeds an individual's share of potential damages.

Coase also pointed out that Pigovian taxation abstracts away from the fundamentally reciprocal nature of social costs.[27] Consider again the factory and the residents. While it is possible that the optimal outcome is for the factory to shut down, install scrubbers, or take some other action to reduce pollution, it is also possible that the optimal outcome is for the factory to do nothing and for the residents to change their behavior—to move away, or to wear breathing masks, or some such thing. Thus, a Pigovian tax on the factory might produce an inefficient outcome.

But this argument is not so much an objection to Pigovian taxation per se, as it is another reason for preferring a bargaining solution when bargaining is possible. When bargaining is not possible, the government faces the choice between Pigovian taxation, command-and-control regulation, no regulation, and so on. There are various ways the government can account for Coase's point. For example, it could waive the obligation to pay the tax if a factory owner can prove that the residents can more cheaply minimize the social cost than the owner can. In many settings, the argument that the victims of the externality are cheaper cost-avoiders will be implausible. In any event, while the setting of Pigovian taxes will never be simple, it will, for the reasons we have given, be simpler and more reliable than the alternative of using command-and-control regulations.

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[24] Ronald Coase, *The Problem of Social Cost*, 3 J. LAW & ECON. 1 (1960).

[25] *Id*. at 39.

[26] *Id.* at 42.

[27] *Id.* at 2 ("We are dealing with a problem of a reciprocal nature. To avoid the harm to B would inflict harm on A. The real question that has to be decided is: should A be allowed to harm B or should B be allowed to harm A?").

B.	Existing Pigovian Taxes

The government does not use Pigovian taxes very often but they are not unheard of.[28] There are a number of instances in which a tax is addressed to an environmental harm of one form or another. Perhaps the best example of a Pigovian tax we have found is the Ozone Depleting Chemicals Tax (ODC), which was implemented by Congress in 1989 in order to comply with the Montreal Protocol.[29] The tax applies to the sale or use of ozone-depleting chemicals and is assessed at a rate proportional to their potential for depleting the ozone layer.[30] Similarly, in the wake of the Exxon Valdez oil spill in 1989, Congress created an oil pollution fund, called the Oil Spill Liability Trust Fund, to provide compensation to those who have suffered losses or damages due to an oil spill.[31] The Fund is primarily funded by a tax of 5 cents per barrel on oil produced and imported to the U.S. In addition, the Surface Mining Control and Reclamation Act, which was passed in order to mitigate the negative effects of coal mining on the environment, imposes a tax on the extraction of coal from domestic mines.[32] With respect to these latter two taxes, though the tax is meant to address the social cost of the taxed activity, we have been unable to find any indication that Congress actually calculated that social cost and set the tax equal to it. Accordingly, it is difficult to know whether to consider these to be true Pigovian taxes.

As this example illustrates, it is not always obvious whether a tax is Pigovian or not. Many taxes are used to raise revenue, not to deter socially undesirable conduct.[33] Some taxes both raise revenue and deter socially undesirable conduct. The government may impose a tax on activities that create negative externalities without trying to ensure that the tax equals the negative externality. So as we provide additional examples of Pigovian taxes, one should keep in mind that these examples, like the initial ones, provide only rough and limited evidence that governments think in Pigovian terms.

Various states have implemented waste disposal taxes that operate loosely as Pigovian taxes. North Carolina, for example, imposes an excise tax on the disposal of municipal solid waste or construction and demolition debris in any landfill.[34] A number of states, including California, Michigan, New York, and Washington have run similar "Pay As You Throw"

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[28] We limit our consideration to situations in which the government acts as a regulator, rather than a property owner. If the government leases a building it owns and charges rent, or if it requires that private citizens pay for parking at a parking meter, we do not count these as Pigovian taxes. The distinction is to some extent arbitrary but serves to highlight the degree to which state and federal regulators do not consider Pigovian taxes to be within their regulatory toolkits.

[29] Bruce Pasfield & Elise Paeffgen, *How to Enforce A Carbon Tax: Lessons from the Montreal Protocol and the U.S. Experience with the Ozone Depleting Chemicals Tax*, 14 VT. J. ENVTL. L. 389, 393 (2013).

[30] *Id.* at 395; Dana Clark & David Downes, *What Price Biodiversity? Economic Incentives and Biodiversity Conversion in the United States*, 11 J. ENVTL. L. & LITIG. 9, 35 (1996).

[31] George M. Chalos, *A Practical Guide to the Oil Spill Liability Trust Fund Claim Submission Procedures*, 3 U. Denv. WATER L. REV. 80 (1999); John M. Woods, *Going on Twenty Years-the Oil Pollution Act of 1990 and Claims Against The Oil Spill Liability Trust Fund*, 83 TUL. L. REV. 1323 (2009).

[32] Clark & Downes,, *supra* note 30.

[33] For a discussion of the functions of taxes as opposed to penalties, see Robert D. Cooter & Neil S. Siegel, *Not the Power to Destroy: An Effects Theory of the Tax Power*, 98 VA. L. REV. 1195 (2012).

[34] N.C. Gen. Stat. § 105-187.61.

programs for the past several decades.[35] These programs charge customers based on the amount of solid waste that they discard.[36] Some states and localities, including California and Washington, D.C., have also recently imposed surcharges on plastic bags from retailers based on the bags' propensity to end up as litter. These charges are akin to Pigovian taxes and are occasionally referred to as such.[37] For instance, Washington D.C. imposes a 5-cent charge on paper and plastic carryout bags at all food and liquor retailers.[38]

Deposit-refund systems function similarly. A deposit-refund system is one in which a consumer pays an upfront tax for a good and then receives a refund when that good is returned.[39] The 5 or 10-cent redemption value on beverage containers in many states is the canonical example of such a system.[40] Like a tax on plastic bags, deposit-refund systems are meant to control pollution from discarded goods such as plastic bottles and thus operate roughly as Pigovian taxes.[41]

In addition, state worker's compensation systems bear a family resemblance to Pigovian taxes, in that employers are forced to internalize the costs of accidents that occur in their workplaces.[42] In its most common form, worker's compensation functions as an alternative to the tort system for employees within the scope of their employment. If an employee is injured while on the job, she can collect damages from a state worker's compensation agency in lieu of suing her employer in tort. Worker's compensation is no-fault—the employee need not prove that the injury was due to an unsafe working condition—and compensation is determined based on a fixed schedule.[43] The system is funded by fees paid by employers, and those fees are determined by the amount of payments made to that employer's employees. The more unsafe the workplace, the more that employer will be forced to pay. A worker's compensation system thus mimics a Pigovian tax by forcing employers to internalize the harms they impose upon their workers. It does so more directly and effectively than the tort system because worker's compensation payments payouts are more certain and take place with respect to a higher percentage of injuries. Even small claims are typically asserted and processed because it is much less administratively costly to file and pursue a worker's compensation claim than a tort lawsuit.

At the same time, worker's compensation is only an imperfect proxy for a Pigovian tax because it is not fault-based. Worker's compensation measures the total amount of harm that befalls employees as a result of both unsafe conditions and their own negligence (or overly high

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[35] David H. Folz & Jacqueline N. Giles, *Municipal Experience with "Pay-as-You-Throw" Policies: Findings from a National Survey*, 34 ST. & LOC. GOV. REV.. 2, 105-115 (2002).

[36] *Id*.

[37] Jennie R. Romer & Shanna Foley, *A Wolf in Sheep's Clothing: The Plastics Industry's "Public Interest" Role in Legislation and Litigation of Plastic Bag Laws in California*, 5 GOLDEN GATE U. ENVTL. L. J. 377, 385 (2012).

[38] Annie Gowen, *D.C. Bags Wasteful Habit With Tax on Paper and Plastic*, WASH. POST (Jan. 2, 2010), http://www.washingtonpost.com/wp-dyn/content/article/2010/01/01/AR2010010101673.html.

[39] Margaret Wells, *Deposit-Refund Systems in Practice and Theory* (Resources for the Future Discussion Paper, 2011), http://www.rff.org/RFF/Documents/RFF-DP-11-47.pdf.

[40] *Id*.

[41] *Id*.

[42] ALA. CODE § 25:5 (2014); CONN. GEN. STAT. ANN. § 31:568 (West 2013); 820 ILL. COMP. STAT. ANN. 305/1 (2012); N.J. STAT. ANN. § 34:15 (West 2014).

[43] That is, each type of injury (or death) is assigned a fixed dollar amount, and employees who suffer that injury receive the fixed amount without reference to their individual conditions.

activity levels). It thus accounts for more than just the risk created by employers and visited upon employees, which is the "externality" that matters in the context of workplace safety. (This means that employees will not necessarily have incentives to take efficient precautions, unlike under a well-calibrated Pigovian tax.) At the same time, payouts from worker's compensation are generally lower than what an employee would receive in a tort lawsuit based on the same harm.[44] It is possible, then, that the overall payments made by employers in a worker's compensation system are roughly equivalent to what they would pay in optimal Pigovian taxes on the same workplace conditions. Payouts for accidents that are not the fault of the employer could be balanced by lower awards. If this is the case, however, it would be a matter of coincidence (and an unlikely one at that).[45]

More important, even if an employer paid an amount of money roughly equivalent to an optimal Pigovian tax on dangerous workplace conditions, worker's compensation does not create the same efficient incentives for employers as a Pigovian tax. Like a Pigovian tax, worker's compensation creates incentives for employers to reduce injuries by forcing them to internalize the costs of those injuries. But because worker's compensation applies to injuries caused by employees as well as employers, it creates incentives for employers to try to reduce their employees' negligence as much as their own. An employer might expend resources attempting to reduce the number of employee-generated accidents, even if the employer is not the lowest-cost avoider of such accidents. And if the employer has limited resources to spend on safety, expenditures on preventing employee-generated accidents could crowd out expenditures on reducing hazardous conditions of the employer's own making. These caveats should not obscure the fact that worker's compensation bears a relatively close resemblance to a Pigovian tax, even though it was not created for that reason.

Lastly, gas taxes have often been thought of as Pigovian, but as we described in the introduction they are much too low and bear little relation to the social cost of driving. Relatedly, in 1978 Congress enacted a "gas guzzler tax" on automobiles with fuel efficiencies below 22.5 miles per gallon.[46] There is a Pigovian element to this tax, as it is meant to target the types of cars that impose the greatest social costs. Yet the tax has relatively little correspondence to the actual amount of environmental harm that is being done. Someone who drives 20,000 miles per year in a fuel-efficient car imposes far greater environmental externalities than someone who drives 2,000 miles per year in an inefficient one. The fuel efficiency of the automobile is a weak proxy for the overall level of social harm.

The Pigovian taxes we have found are notable for their rarity: amidst thousands of regulatory actions, both administrative and legislative, few could be characterized as Pigovian taxes, and even fewer appear to be properly calibrated to match the social cost of the taxed activity. Moreover, all of these Pigovian taxes were created legislatively, rather than via regulation. This only deepens the puzzle as to why regulators have not employed Pigovian taxes with greater frequency. We address that issue in the next Part.

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[44] Worker's compensation involves a tradeoff for the worker between speed and certainty of payment, lower administrative costs, and no need to prove employer fault, against the higher reward amount she would receive from a successful tort lawsuit.

[45] *Cf.* Cass R. Sunstein, *Illusory Losses*, 37 J. LEGAL STUD. S2 (2008).

[46] Clark & Downes, *supra* note 30.

II. Agency Authority and the Absence of Pigovian Taxes

Over the past forty years, federal administrative agencies have become the locus of U.S. regulatory activity. They have promulgated thousands of regulations aimed at mitigating externalities. Yet as far as we are able to tell, not one of these regulations has taken the form of a Pigovian tax. Few prior scholars have considered why this might be, but the few to do so have generally concluded that agencies simply lack the authority to regulate by Pigovian tax.[47] Agencies are thought to have the power to require that firms meet certain standards, employ particular types of technology or business practices, obtain permits, submit to inspections or report information, train employees in particular ways, or engage in any number of other types of activities related to the nature of the business. But the imposition of Pigovian taxes, or anything that looks like a Pigovian tax, is not thought to be among this suite of powers.

In this section we will refute that conventional wisdom. Numerous agencies, operating under many different organic statutes, and regulating a wide swath of the economy, have the authority to implement Pigovian taxes. Because we do not have the space, resources, or patience to survey all agencies, we will examine a representative sample of important statutes that have led to significant regulations across several areas of economic activity. In each case, we will demonstrate that a plausible reading of the agency's controlling statute would permit the agency to enact regulation that functions as a Pigovian tax.

A.   The Clean Air Act

We begin with the Clean Air Act, a statute that has spawned a vast number of economically significant regulations.[48] The Clean Air Act provides the EPA with authority to regulate any type of air pollutant with the capacity to cause harm to human health or welfare.[49] The Clean Air Act is traditionally (and almost unanimously) understood to give the EPA the authority to set "technology standards"—in other words, to define what types of technology firms must use to control pollution. The legal standards most commonly associated with the Clean Air Act—firms must install the "best available control technology" ("BACT"), or "reasonably available control technology" ("RACT")— seem to invoke the idea that the statute empowers the agency to set technological standards. Indeed, this was the common public understanding regarding EPA regulation of greenhouse gases.[50] During President Obama's first

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[47] *E.g.*, Janet E. Milne, *Environmental Taxation in the United States: The Long View*, 15 LEWIS & CLARK L. REV. 417 (2011).

[48] Since the beginning of the Reagan administration, the EPA has produced a greater number of regulations than any other administrative agency (or cabinet department). *See* Anne Joseph O'Connell, *Political Cycles of Rulemaking: An Emprical Portrait of the Modern Administrative State*, 94 VA. L. REV. 889, 926 (2008).. The Clean Air Act is only one of several statutes under which the EPA regulates, but it is the primary one.

[49] 42 U.S.C. § 7401 et seq.

[50] Chris Lau, *Bottom Line on Regulating Greenhouse Gases Under The Clean Air Act*, WORLD RESOURCES INST. (May 2009), http://www.wri.org/publication/bottom-line-regulating-greenhouse-gases-under-clean-air-act; *Events Leading to Regulation of Greenhouse Gases Under the Clean Air Act*, CENTER FOR CLIMATE AND ENERGY SOLUTIONS (2012), http://www.c2es.org/publications/sequence-events-leading-regulation-greenhouse-gases-through-epa (noting that the EPA's new program will require power plants and manufacturing facilities to "implement 'best available control technologies' for pollution abatement"); Dallas Burtraw et al., *Greenhouse Gas*

term in office, when legislative action seemed possible, discussion of greenhouse gas regulation included consideration of cap-and-trade systems and even Pigovian taxes.[51] During President Obama's second term, when it became clear that regulation would occur through EPA action via the Clean Air Act, the public consensus was that the EPA would mandate that factories stay within particular greenhouse gas emissions limits.[52] This is known as "command-and-control regulation," and it is usually positioned as the default option, to which market-based regulations such as cap-and-trade or Pigovian taxes are alternatives.

The consensus understanding of the Clean Air Act is incorrect. The Clean Air Act actually provides the EPA with multiple different routes for establishing a type of Pigovian tax. We will survey the most important of these statutory options.

1.   National Ambient Air Quality Standards

First, the EPA has the authority under § 110 of the Clean Air Act to set National Ambient Air Quality Standards ("NAAQS"), which limit the quantity of a pollutant in the ambient air to the extent "requisite to protect the public health."[53] Consistent with their description, these air quality standards concern the quantity of a pollutant in the air or the extent to which individuals will be exposed to that pollutant, *not* a particular type of technology that must be used to control pollution.[54] They are ambient air standards, not technology standards.

Following the promulgation of a NAAQS, it is the states rather than the federal government that are charged with reducing pollution to the EPA's mandated levels. States are required to submit "state implementation plans" ("SIPs") that outline the measures the states will take to reach the mandated air quality levels.[55] If a state fails to create such a plan, if the plan is judged inadequate by the EPA, or if the plan fails to produce the requisite degree of reduction in pollution, the EPA may intercede and instead implement a "federal implementation plan" ("FIP") designed to meet the NAAQS.[56]

The Clean Air Act contains no limitations on the types of measures that state implementation plans (or federal ones) may employ. To the contrary, the Clean Air Act explicitly contemplates a wide range of regulatory modalities, including what appear to be Pigovian taxes and cap-and-trade systems. The Act states that "Each plan shall [] include enforceable emission limitations and other control measures, means, or techniques (including economic incentives

Regulation under the Clean Air Act, A Guide for Economists (Resources for the Future Paper Discussion Paper, 2011), http://www.rff.org/documents/RFF-DP-11-08.pdf.

[51] Matt Negrin, *Whatever Happened to Cap and Trade?*, ABC NEWS (July 17, 2012), http://abcnews.go.com/Politics/OTUS/environment-happened-cap-trade-global-warming/story?id=16790018.

[52] Robert Barnes, *Supreme Court: EPA Can Regulate Greenhouse Gas Emissions, with Some Limits*, WASH. POST (June 23, 2014), http://www.washingtonpost.com/politics/supreme-court-limits-epas-ability-to-regulate-greenhouse-gas-emissions/2014/06/23/c56fc194-f1b1-11e3-914c-1fbd0614e2d4_story.html; Coral Davenport, *Obama to Introduce Sweeping New Controls Aimed at Ozone*, N. Y. TIMES (Nov. 25, 2014), http://www.nytimes.com/2014/11/26/us/politics/obama-to-introduce-sweeping-new-controls-on-ozone-emissions.html?_r=0.

[53] 42 U.S.C. § 7409(a)(1)(A).

[54] 42 U.S.C. § 7410(b).

[55] 42 U.S.C. § 7410(a)(1).

[56] 42 U.S.C. § 7410(c).

such as fees, marketable permits, and auctions of emissions rights) . . . ."[57] The phrase, "other control measures, means, or techniques" clearly encompasses a tax system that had the effect of limiting emissions; the word "fee" in the parentheses reinforces this interpretation, as a tax is a kind of fee. Yet despite this plain language, neither the states nor the EPA have used Pigovian taxes.

2.   Regulation of Stationary Sources

The EPA also possesses separate authority to regulate "stationary sources"—factories and power plants, for the most part—contained in § 111 of the Clean Air Act.[58] This section of the Clean Air Act delegates to the EPA the authority to establish "standard[s] of performance" governing both new and existing stationary sources.[59] Here again the Clean Air Act is commonly thought to require technology-based command-and-control regulation, but that perception is misguided. The statute defines a "standard of performance" as:

> [A] standard for emissions of air pollutants which reflects the degree of emission limitation achievable through the application of the best system of emission reduction which (taking into account the cost of achieving such reduction and any nonair quality health and environmental impact and energy requirements) the Administrator determines has been adequately demonstrated.[60]

A standard of performance is thus an "emission limitation"—a limit on how much of a pollutant a given stationary source may release into the air. The EPA's emission limit must be feasible, or "adequately demonstrated" in the language of the statute. And it must be feasible in light of the best "system of emission reduction" that is currently available. But once the EPA has established such a limitation on pollution, there are no strictures on the type of regulatory mechanism the EPA or the states may use to meet the pollution standard. The EPA could employ Pigovian taxes, as well as cap-and-trade systems or any other type of pollution reduction plan. The Obama Administration's proposed regulation of greenhouse gases, with which we began this article, takes advantage of precisely this flexibility. The Administration proposes to regulate greenhouse gases under this provision of the statute—§ 111(d), to be precise—and has offered state regulators a menu of options regarding what type of regulation to employ, including the possibility of cap-and-trade systems. It is surprising that, to our knowledge, this is the first time that proposed regulation under § 111 of the Clean Air Act has involved anything other than purely technological command-and-control.[61]

3.   Hazardous Air Pollutants

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[57] 42 U.S.C. § 7410(a)(2)(A).

[58] 42 U.S.C. § 7411.

[59] 42 U.S.C. § 7411(b) & (d). This section is commonly thought to confer authority over new sources, § 111(b), but it also provides authority over existing sources, § 111(d), as the recent greenhouse gas regulations indicate.

[60] 42 U.S.C. § 7411(a)(1).

[61] There have of course been other non-command-and-control environmental measures, such as the cap-and-trade system for the SO_x and NO_x gases that cause acid rain. *See* 42 U.S.C. § 7651 et seq. But these measures, as well as the Pigovian taxes we described in Part I, have been implemented legislatively rather than through regulation.

The EPA has separate authority to regulate "hazardous air pollutants" directly under § 112 of the Clean Air Act.[62] That section of the Act contains a list of chemicals known to be dangerous to human health or to the environment and authorizes the EPA to add to the list any chemical it discovers to be similarly dangerous.[63] As with other sections of the Clean Air Act, the EPA is then delegated authority to make regulations setting "emissions standards" governing the emissions of those chemicals into the air. Similarly, these emissions standards are described not in technological terms but as limitations on the amount of the chemical that may be released:

> Emissions standards promulgated under this subsection and applicable to new or existing sources of hazardous air pollutants shall require the maximum degree of reduction in emissions of the hazardous air pollutants subject to this section (including a prohibition on such emissions, where achievable) that the Administrator . . . determines is achievable for new or existing sources . . . .[64]

Setting this standard requires the EPA to determine what is "achievable." The Clean Air Act describes in broad terms the regulatory methods that the EPA may use in making that determination. In determining what standards are achievable, EPA may consider

> measures, processes, methods, systems or techniques including, but not limited to, measures which—
>
> (A) reduce the volume of, or eliminate emissions of, such pollutants through process changes, substitution of materials or other modifications . . . .[65]

Of course, a Pigovian tax is precisely a system that leads to reductions in the volume of emissions through "process changes, substitution of materials or other modifications." If Congress had meant to preclude the use of such measures and force the EPA to regulate only with respect to certain technologies, it could easily have used much narrower language. This section of the Clean Air Act is thus best understood to contemplate that EPA may set an emissions standard with reference to the use of a Pigovian tax or similar measure.

4.   Regulating Through Taxation

The most significant legal hurdle in imposing a Pigovian tax under any of these three sections of the Clean Air Act concerns the manner in which the EPA would go about collecting a tax. The Act contains no bar to such a tax, no requirement that only technological standards may be used, and even seems specifically to contemplate the use of Pigovian taxes or similar measures. At the same time, the EPA does not have the authority to levy "taxes" by that name. Rather, the Clean Air Act affords the agency three remedial options against polluters: the EPA may refer a polluter to the Attorney General for criminal prosecution;[66] it may commence a civil

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[62] 42 U.S.C. § 7412.
[63] 42 U.S.C. § 7412(b).
[64] 42 U.S.C. § 7412(d)(2).
[65] 42 U.S.C. § 7412(d)(2)(A).
[66] 42 U.S.C. § 7413(a)(3)(D).

suit in federal district court;[67] or it may, after an administrative proceeding, assess fines.[68] The EPA's power to employ these remedies is triggered when a polluter exceeds an EPA emission standard or fails to comply with a State (or Federal) Implementation Plan.[69]

A court could view the language of the Clean Air Act as sufficiently capacious to permit the EPA to establish a Pigovian tax directly. This seems most plausible under § 110, the section setting National Ambient Air Quality Standards and requiring the states (or the EPA, if the states fail) to design implementation plans to meet them. Under § 110, a state or federal plan could simply be a Pigovian tax, and the state (or the EPA) could then operate and enforce that tax as it would any other type of plan. There is no barrier to this regulatory route, and as we noted above the Clean Air Act seemed to contemplate it explicitly. If the regulated polluters within a state failed to pay the tax, the EPA could enforce it via civil or criminal litigation.

The path to a Pigovian tax under § 111 (stationary source regulation) or § 112 (hazardous air pollutants) is more circuitous. Under the plain text of these sections, the EPA must regulate by limiting emissions to some achievable level. If a regulated entity exceeds that level, the EPA may assess administrative fines or initiate litigation.[70] When the EPA is using standard command-and-control regulation, the agency sets the emissions limitation at whatever quantity of the pollutant it believes a source should be allowed to emit. Accordingly, the EPA will only attempt to collect a fine (or worse) from the regulated entity if it does not comply with that limitation.

Under a system of Pigovian taxes, however, the idea would be for a polluter to pay a small amount of money for every incremental amount of a pollutant that it releases. For example, a coal-fired electrical plant that produced carbon dioxide might pay be forced to pay $25 per ton of CO_2 that it releases.[71] In order to implement a Pigovian tax under these sections of the Clean Air Act, the EPA would:

(1)   Set an emissions limitation at or near zero emissions;
(2)   Set the fine that scales with the amount of pollution in excess of the limitation, so that it is equal to the desired level of Pigovian tax; and
(3)   Initiate an administrative proceeding against every polluter in order collect the appropriate taxes (fines).

The third of these steps would be procedurally costly but nonetheless feasible. The only issue at such a proceeding would be the amount of a given pollutant being released into the ambient air, which is a quantity that should be readily knowable and relatively straightforward to establish.[72] The EPA could also design more abbreviated procedures for assessing and collecting

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[67] 42 U.S.C. § 7413(a)(1)(C).
[68] 42 U.S.C. § 7413(d).
[69] 42 U.S.C. § 7413(a).
[70] It is of course possible that a court would read § 110 of the Clean Air Act to require the same procedure, but for the reasons described above we believe that this would be a flawed reading of the statute.
[71] Jonathan Masur & Eric A. Posner, *Climate Regulation and the Limits of Cost-Benefit Analysis* 99 CAL. L. REV. 1557 (2011).
[72] One small wrinkle is that the Clean Air Act only permits the EPA to regulate polluters directly, rather than regulating the inputs to pollution. In general, in some cases it might be more efficient to regulate a source or input to

taxes that nonetheless afforded the necessary procedural protections to regulated entities and permitted them an opportunity to contest the EPA's findings before a neutral magistrate, which courts have required.[73]

The second of these steps would be straightforward and is even contemplated by the text of the Clean Air Act. The Act states that the EPA should set the fine for noncompliance with an emissions limitation at "no less than the economic value" of the excess pollution.[74] That "economic value" is precisely the level at which an optimal Pigovian tax should be set.

It is the first of these steps that may in some cases prove difficult. Whatever emissions limitation the EPA sets under § 111 or § 112 must be "achievable."[75] The EPA has typically interpreted this to mean that the limitation must be "economically feasible," in the sense that complying with the regulation would not lead to massive job loss or bankrupt the entire industry.[76] In earlier work we criticized the "feasibility" test and argued that the EPA and other agencies should employ cost-benefit analysis instead.[77] Nevertheless, it is quite clear that the EPA can regulate pursuant to a feasibility standard if it so wishes, and regulation along those lines has repeatedly been upheld in court.

Accordingly, the EPA could argue that the regulation it means to impose—which involves an emissions limitation of zero but a low penalty for noncompliance—passes the feasibility test because the agency does not intend that regulated firms will actually comply with the zero emissions limitation. Rather, the EPA anticipates that many firms will violate the limitation and pay manageable "fines" (taxes, really) in the appropriate amount. (The regulation would also pass a cost-benefit test, as all properly designed Pigovian taxes are meant to.) The regulation will not necessarily cause greater economic harm to the industry than a less stringent regulation with much higher penalties for noncompliance, which a court would bless as feasible.

This is a very practical reading of the Clean Air Act. The EPA would be entitled to *Chevron* deference were it to create such regulations,[78] and so we believe it is likely that a court would allow such a regulation.[79] But it is possible that an overly literalist court would interpret the Clean Air Act to require (unambiguously) that an emissions limitation be feasible if polluters were strictly to comply with it, rather than treating the limitation in context with its

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pollution that occurs up the production chain from the polluter itself. For instance, economists have suggested that the most efficient means of implementing a carbon tax would be to tax fossil fuels when they are extracted from the ground, rather than taxing the emitter of carbon dioxide. The tax would be applied to the lump of coal or the barrel of oil, rather than to the electrical power plant or the automobile. The reason is that points of extraction are generally larger in size and fewer in number, making it less costly to administer the tax. This might not be possible under the Clean Air Act. However, even with respect to such pollutants, even a non-ideal Pigouvian tax might be well superior to the EPA's best command-and-control alternative.

[73] *See* Tennessee Valley Authority v. Whitman, 336 F.3d 1236 (11th Cir. 2003).

[74] 42 U.S.C. 7420(d)(2)(A).

[75] 42 U.S.C. §§ 7411(a)(1) & 7412(d)(2).

[76] Jonathan Masur & Eric A. Posner, *Against Feasibility Analysis*, 77 U. CHI. L. REV. 657 (2010) [hereinafter Masur & Poser, *Against Feasibility*].

[77] *Id.*

[78] *See* Chevron USA, Inc. v. Natural Resources Defense Counsel, Inc., 467 U.S. 837 (1984).

[79] *Cf.* Utility Air Regulatory Group v. EPA, 134 S. Ct. 2427 (2014) (granting Chevron deference to the EPA's choice of remedial structure under the Clean Air Act).

accompanying penalty. If this were the case, then the EPA could only set an emissions limitation of zero when it would be possible for emitters of the pollutant in question actually to reduce their emissions to zero without causing massive unemployment or widespread bankruptcies within the affected industry. Such a dramatic reduction would be feasible with respect to a great number of pollutants. The EPA regularly considers total bans on certain types of pollutants[80] and has implemented complete bans with respect to some pollutants in the past.[81] Such a ban is even plausible with respect to the most currently salient pollutant, carbon dioxide, where carbon-free energy sources such as solar and wind have been adequately demonstrated.[82]

Where a complete ban is not economically feasible, and where a court decides to read the Clean Air Act in the most literal fashion possible, the EPA might be forced to opt for what might be described as a semi-Pigovian tax. The agency would set a baseline emissions limitation above zero, at the lowest level deemed feasible. The agency would then "tax" (fine) polluters for every unit of pollution released above this baseline.[83] In some cases such a system might permit inefficiently high levels of pollution and turn out to be inferior to standard command-and-control regulation; in other cases, where the baseline can be set quite low, it could function effectively if it creates appropriate incentives at the margin. The EPA could evaluate this on a pollutant-by-pollutant basis. The upshot is that Pigovian taxes may not be workable or advisable for some types of pollutants under some circumstances, if courts were to interpret particular provisions of the Clean Air Act in an especially literalist fashion. But these limited pockets in which the EPA could not properly implement Pigovian taxes do not explain the utter absence of any attempt by the EPA over the past four decades to regulate air quality using Pigovian taxes or any other type of economic mechanism.

Of course, because neither the EPA nor any state agency has ever attempted to regulate using a Pigovian tax, no court has ever adjudicated whether the statute is in fact capacious enough to permit one. Nonetheless, as we have explained here, the plain text and what precedents exist would seem to support such a reading.

There is one additional hurdle to Pigovian regulation of this type. A number of existing laws and regulations trigger additional penalties for any emitter found to be in violation of EPA regulations. For instance, any firm found in violation of the Clean Air Act is barred from contracting with the government.[84] Some states will refuse to issue permits for mining or other

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[80] *See* Masur & Posner, *Against Feasibility*, *supra* note 76, at 17(EPA exploring "total chlorine free" option).

[81] 42 U.S.C. § 7671i (prohibiting the sale or distribution of chlorofluorocarbons and hydrochlorofluorocarbons).

[82] *See* Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 79 Fed. Reg. 34,829 (proposed on June 14, 2014) (finding that solar and wind technologies are "adequately demonstrated.").

[83] The EPA may want to use a baseline above zero even for standard Pigouvian taxes in order to avoid the administrative hassles of collecting small taxes from small polluters. *Cf.* Utility Air Regulatory Group, at 17 (describing the costs involved in forcing every carbon dioxide emitter to obtain a permit). The EPA regularly establishes a threshold demarcating only de minimis emissions, below which it does not regulate. *See* 40 C.F.R. § 51.166(b)(2)(i); Alabama Power Co. v. Costle, 636 F.2d 323, 360 (D.C. Cir. 1979) (upholding EPA authority to elect to regulate only emissions that are more than de minimis).

[84] 42 U.S.C. § 7606; Federal Acquisition Regulations System, 48 C.F.R. § 9.402(a) (2010) ("Agencies shall solicit offers from, award contracts to, and consent to subcontracts with responsible contractors only."); Rena Steinzor & Anne Havemann, *Too Big to Obey: Why BP Should Be Debarred*, 36 WM. & MARY ENVTL. L. & POL'Y REV. 81 (2011).

environmentally sensitive activities to any firm in violation of environmental laws and regulations.[85] Private citizens could also independently bring suit against violators of the Clean Air Act and Clean Water Act, seeking damages above what the EPA would normally impose under a Pigovian tax.[86] If the EPA is forced to regulate such that any emission above zero is technically considered a violation, even an emitter that is properly paying its Pigovian taxes could run into these and other legal problems.

These are not trivial considerations, but they are not insurmountable. The federal government could alleviate problems related to contracting or other violations of federal law simply by declining to enforce those provisions as a matter of prosecutorial discretion. (In fact, it appears that the government already regularly declines to enforce these laws.[87]) State laws could be preempted by EPA regulations and overridden under the Supremacy Clause.[88] Citizen suits are a bit trickier, but the EPA could always argue to a court that it was "diligently prosecuting" the violation pursuant to its own regulatory policy, depriving private citizens of the right to bring suit.[89] Courts would likely defer to this policy choice under *Chevron*.[90]

B.   The Clean Water Act

The Clean Water Act provides the EPA with the authority to regulate the discharge of water-borne pollutants from a wide variety of sources, including industrial and municipal sources. Like the Clean Air Act, the Clean Water Act is widely viewed as authorizing "technology-based" regulation.[91] This characterization is slightly more appropriate as applied to the Clean Water Act than the Clean Air Act. Nevertheless, as we will demonstrate, the Clean Water Act similarly provides ample opportunity for regulators to use Pigovian taxes in lieu of standard command-and-control regulation.

Like the Clean Air Act, the Clean Water Act provides multiple mechanisms through which the EPA can regulate the discharge of water-borne pollutants. We will canvas the most important ones.

1.   Existing Point Sources

The Clean Water Act provides the EPA with blanket authority to regulate all water-borne pollutants that emanate from "point sources"—factories, residences, and even boats and other vehicles.[92] Similarly to the Clean Air Act, the EPA is charged with specifying "effluent limitations"—limits on the quantity of the pollutant that may be released into the water.[93] Importantly, however, the Clean Water Act states that in setting effluent limitations the EPA

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[85] *See, e.g.*, 225 ILL. COMP. STAT. ANN. 720/3.20, 2.07 -2.08; 62 ILL. ADM. CODE 1774.15(c)(1)(B).

[86] 42 U.S.C. § 7604.

[87] *See* Steinzor & Havemann, *supra* note 84, at 85.

[88] U.S. CONST. art. VI, cl. 2.

[89] 42 U.S.C. § 7604(b)(1)(B).

[90] *See* Chevron, *supra* note 84.

[91] *See, e.g.*, Daniel A. Farber, Jody Freeman, and Ann E. Carlson, CASES AND MATERIALS ON ENVIRONMENTAL LAW 579 (8th ed. 2010).

[92] 33 U.S.C. § 1311(b)(1)(A).

[93] *Id.*

"*shall require application* of the best available technology ["BAT"] economically achievable"[94] (or the "best practicable control technology" ("BPCT"),[95] depending upon the type of pollutant and the circumstance). This is in contrast to the Clean Air Act, which requires that the EPA set emissions limitations at a level "achievable through the application of the best system of emission reduction." There is a potentially significant distinction between the two statutes: while the Clean Air Act requires only that the emissions limitation be set at a level that could be achieved by application of a particular type of technology, the Clean Water Act appears to indicate that the EPA "shall require application" of the technology itself. To a greater degree than the Clean Air Act, the Clean Water Act may be understood by courts to require explicitly technology-based regulation.

This is not how the EPA has regulated in the past, however. Many EPA regulations are phrased in terms of effluent limitations—the quantity of the pollutant released—even though they are understood to refer to a particular type of technology.[96] Thus, the EPA might find that an effluent limitation of X parts per million is feasible based upon a particular existing technology. It would then mandate that polluters meet the standard of X parts per million but without requiring that they adopt that particular technology.[97] Courts have routinely upheld these regulations as permissible under the Clean Water Act.[98]

In order to establish a Pigovian tax, the EPA would—as with the Clean Air Act—set an emissions limitation at or near zero and then fine polluters who exceeded that level. In turn, this again raises the question of whether a court will view an emissions limitation of zero as meeting the statutory requirement that it involve the "best practicable control technology" or the "best available technology economically achievable." That is, will a limitation of zero be seen as too stringent? Courts have held that under these statutory frameworks the EPA must consider the costs of its regulations.[99] As we explained above, we think that a court would understand that a regulation imposing an effluent limitation of zero would be "practicable" and "economically achievable" in light of the low fines and the fact that the agency does not intend that all polluters will fully comply. In fact, when an agency has imperfect information about the BAT or BPCT, a Pigovian tax will often induce regulated entities to adopt effluent reduction technology that meets the statutory standard. Under these circumstances, a Pigovian tax will be more effective at producing the correct level of pollution reduction than standard command-and-control regulation. This is a good reason for courts to favor Pigovian taxes, or at least permit them. We believe as well that it is at least plausible that even a formalist court would approve an arrangement setting an effluent limitation at or near zero for certain chemicals where the EPA

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[94] 33 U.S.C. § 1311(b)(2)(A)(i) (emphasis added).

[95] 33 U.S.C. § 1311(b)(1)(A)(i).

[96] *See, e.g.*, Pulp and Paper Reg. Cluster Rule, 63 Fed. Reg. 18504-18751; 63 Fed. Reg. 42238-42240; Airport Deicing 40 C.F.R. pt. 449; Centralized Waste Treatment C.F.R. pt. 437.

[97] EPA seems to view it as somewhat unseemly for the government to mandate that private parties purchase a particular type of technology. Nonetheless, many regulations are promulgated with a particular technology in mind. We address the ramifications of this fact in Part III below.

[98] Am. Meat Inst. v. E.P.A., 526 F.2d 442 (7th Cir. 1975); Am. Petroleum Inst. v. E.P.A., 787 F.2d 965 (5th Cir. 1986).

[99] Weyerhaeuser Co. v. Costle, 590 F.2d 1011 (D.C. Cir. 1978); Rybachek v. EPA, 904 F.2d 1276 (9th Cir. 1990).

can demonstrate that feasible technology exists to eliminate all pollutant discharges. Courts have approved zero effluent limitations in the past.[100]

As with the Clean Air Act, there is one final issue: regulated parties would face additional penalties under current regulations if they fall out of compliance with governing EPA regulations under the Clean Water Act.[101] The EPA will have to take steps to ensure that Pigovian taxpayers in good standing are not penalized as if they were failing to abide by EPA rules.[102]

2.   New Sources

The EPA has separate authority to regulate water pollution emanating from "new sources" that have been constructed or brought on line since the passage of the Clean Water Act.[103] The Clean Water Act treats new sources more strictly than existing sources, which are governed by the provisions discussed immediately above. With respect to new sources, the EPA has the authority to set

> standard[s] for the control of the discharge of pollutants which reflects the greatest degree of effluent reduction which the Administrator determines to be achievable through application of the best available demonstrated control technology, processes, operating methods, or other alternatives, including, where practicable, a standard permitting no discharge of pollutants.[104]

This statutory section differs from the EPA's more general authority over existing sources of pollution in two important ways. First, it is not technology-focused in the same way. The statute references the best available technology but does not suggest that the EPA must mandate this technology as part of the standard. Rather, the "standard for the control of the discharge of pollutants" is tied to a "degree of effluent reduction." The result is ambiguity regarding whether the standard must be structured in terms of a type of technology or an effluent limitation.

Second, the statute permits more stringent regulation. A standard based upon the "best available demonstrated control technology" is stricter than one based upon the "best practicable control technology" "best available technology economically achievable," the standards governing existing sources.[105] The statute even explicitly contemplates an effluent limitation of zero pollution. This should facilitate the EPA imposing an effluent limitation of zero for purposes of creating a Pigovian tax.

3.   Toxic Pollutants

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[100] *E.g.*, Chemical Manufacturers Assoc. v. EPA, 870 F.2d 177 (1st Cir. 1989) (approving a zero discharge rule).
[101] *See supra* Part I.A.; 33 U.S.C. § 1368 (government contracting); 33 U.S.C. § 1365 (citizen suit provision).
[102] *See, e.g.*, 33 U.S.C. § 1365(b)(1)(B) (noting that no private citizen can bring suit against someone in violation of the Clean Water Act or regulations if the EPA is "diligently prosecuting" the violation itself).
[103] 33 U.S.C. § 1316.
[104] 33 U.S.C. § 1316(a)(1).
[105] Farber & Carlson, *supra* note 91, at 600 ("[N]ew sources are regulated more stringently than existing sources . . . .").

Finally, the EPA has separate authority to regulate pollutants that have been designated as toxic.[106] Under this section, each toxic pollutant "shall be subject to effluent limitations resulting from the application of the best available technology economically achievable . . . ."[107] Though this section of the Clean Water Act uses language that again differs slightly from other parts of the statute, in significant respects it resembles the statutory section governing existing sources. The effluent limitations chosen by the EPA are meant to "result[] from the application" of pollution-controlling technology, suggesting that regulation should specifically incorporate a mandate to install a particular type of technology. The "best available technology economically achievable" language is also identical to the language governing existing sources. Accordingly, the above analysis of Pigovian taxes for existing effluent sources should apply here as well.

All told, there would undoubtedly be hurdles to any EPA attempt to regulate certain types of pollutants and certain types of sources with Pigovian taxes. But these complications, which are neither insurmountable nor ubiquitous, can hardly explain the complete absence of any regulations styled as Pigovian taxes or, to our knowledge, any serious attempt to regulate using Pigovian taxes. For such an explanation we must look elsewhere.

C.   Financial Regulation

We next turn to financial regulation. Although commentators do not typically discuss financial regulation in terms of Pigovian taxation, Pigou's theory applies to financial regulation just as it does to environmental regulation.[108] Financial institutions, like factories, generate negative externalities, and will not reduce their activity to the socially optimal level unless forced to do so by regulators.

1.   Negative Externalities in Finance

a.   The Risk of a Panic

Banks and other financial institutions frequently fund themselves through very short-term debt, including debt that is due on demand. Commercial banks heavily rely on deposit accounts, where customers park funds for short periods in return for interest and checking services, and can withdraw those funds whenever they want. Commercial banks and other financial institutions—including investment banks—also fund themselves through the repo market. In this market, large institutions, like pension funds, make short-term (one- or two-day) collateralized loans that are routinely rolled over. "Withdrawing" effectively occurs when the lender refuses to roll over a loan because it prefers to invest those funds elsewhere.

Short-term debt creates a negative externality.[109] When a depositor or other short-term lender withdraws money, it increases the probability that the borrower will not have enough

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[106] 33 U.S.C. § 1317.

[107] 33 U.S.C. § 1317(a)(2).

[108] There are a number of exceptions. For a general discussion in Pigovian terms, see Douglas A. Shackelford et al., *Taxation and the Financial Sector* (2010), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1601330. We cite some other examples, infra.

[109] For a discussion with citations to the literature, see Eric A. Posner, *How do Bank Regulators Determine Capital Adequacy Requirements*, U. CHI. L. REV. (forthcoming 2015).

funds to pay other lenders when the loans are due or demanded. Those lenders will not be able to recover in full because of bankruptcy. To protect themselves, lenders may withdraw funds in response to other lenders withdrawing their funds, leading to a run. The firm may be forced to sell assets into a declining market, resulting in losses. If firms are shut down, then real value consisting of the firm's private information and contacts may be lost.[110] And if the collapse of one firm leads to the collapse of other firms, resulting in a full-blown contagion of the sort seen in 2008, the sudden massive withdrawal of credit from the economy can cause severe macroeconomic effects such as unemployment.

The government tries to deter runs by requiring banks to offer FDIC insurance to depositors and by acting as lender-of-last resort. The idea is that if short-term lenders know that they will be protected by the government, they are less likely to jump the gun and withdraw. But government insurance creates a new problem in the form of moral hazard. Because financial institutions expect to be rescued, they will take greater risk, enjoying the upside if the risk pays off and transferring the loss to the government if it does not. Moreover, even if deposit insurance were correctly priced, or creditors adequately monitored financial institutions, every institution would still create a negative externality from risk-taking behavior by increasing the probability of default, losses to other institutions, and hence a system-wide collapse with negative effects for the economy.

As John Cochrane has argued, the simplest response to this problem is a Pigovian tax.[111] Every time a bank borrows $100, there is a tiny increase in the risk of a run that results in a financial crisis. Although the risk is tiny, the losses associated with financial crisis are huge, so the tax itself may well be substantial. Cochrane suggests a tax of 5 percent—meaning that the bank would be required to pay $5 to the government for every $100 it borrows, with the precise amount depending on various factors, for example, the maturity of the debt.

With the Pigovian tax in place, the bank would borrow on the short-term debt market only when its private gains exceed the social costs—the private cost of paying interest to the creditor plus the expected social cost of a run. If the cost is too high, the bank will either lend less money, or raise money on the equity markets. Because equity investors have no right to payment, an equity investment does not raise the risk of a run. Cochrane believes that a Pigovian tax would reduce banks' reliance on short-term debt, which should create a safer banking system and a lower risk of financial crises.

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[110] Olivier Jeanne & Anton Korinek, *Managing Credit Booms and Busts: A Pigouvian Taxation Approach* (2010), http://www.nber.org/papers/w16377; John H. Cochrane, Toward a Run-Free Financial System 11-14 (2014) (unpublished manuscript), http://faculty.chicagobooth.edu/john.cochrane/research/papers/run_free.pdf; Mark Gertler & Nobu Kiyotaki, Financial Intermediation and Credit Policy in Business Cycle Analysis, *in* HANDBOOK OF MONETARY ECONOMICS (Ben Friedman & Michael Woodford, eds., 2011).

[111] Cochrane, *supra* note 110, at 19.

b.   Races to Information

A second example of the social cost of financial activity is the problem of "races," first identified by Jack Hirshleifer.[112] The value of an asset is a function of information about the various factors that affect the supply and demand of that asset. For example, the price of oil depends on information about the prospect of war in the Middle East or the likelihood of continued economic prosperity in China. When new information about events like these comes into existence, market participants will scramble to be the first to trade on the information.

To understand why, suppose that a barrel of oil currently trades at $100. A terrorist attack destroys a pipeline in an obscure part of the world and raises the possibility of additional disruption of the oil supply. When the market learns of the attack, the price of oil will rise to $105. Any person who learns about the terrorist attack first, can buy oil (or oil futures or other derivatives) at $100 and reap a quick profit of $5 per barrel by selling when the price rises.

The prospect of such profits will encourage investors to spend money to obtain information about events before others. Investors have spent vast sums to construct fiber-optic cables that increase the flow of information by nanoseconds. For example, Spread Networks, a high-speed trading firm, paid $300 million to build cables from New York to Chicago so that they could trade on the Chicago exchange using New York information microseconds before the market.[113] Investors have purchased and leased buildings close to exchanges for the same reason.[114]

This activity is socially wasteful.[115] To see why, consider first why it is valuable for information to spread at a relatively speedy rate. If terrorism is increasing, then oil will become more expensive because it will be harder to produce and ship. If the market learns this information quickly, then airlines, trucking companies, consumers, and others can quickly adjust by engaging in alternative activities—for example, relying more on electricity. However, the key point is that the broader market will not benefit at all if information about terrorism, as embodied in market prices, reaches them a nanosecond quicker than it otherwise does. Thus, high-speed investors incur expenses in a socially wasteful race.

This problem can be addressed with a Pigovian tax. The economist James Tobin famously advocated just such a tax, now known as a Tobin tax, on financial transactions.[116]

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[112] *See* Jack Hirshleifer, *The Private and Social Value of Information and the Reward to Inventive Activity*, 61 AM. ECON. REV. 561 (1971); Itzhak Gilboa et al., *Utilitarian Aggregation of Beliefs and Tastes*, 112 J. POL. ECON. 932 (2004).

[113] Nick Baumann, *Too Fast to Fail: Is High-Speed Trading the Next Wall Street Disaster?*, MOTHER JONES, (January/February 2013) http://www.motherjones.com/politics/2013/02/high-frequency-trading-danger-risk-wall-street; WIKIPEDIA, *Spread* Networks, http://en.wikipedia.org/wiki/Spread_Networks (as of Jan. 27, 2015, 3:01 GMT)

[114] *Id.*

[115] There is a large literature on this; see, e.g., Mao Ye, Chen Yao, & Jiading Gai, The Externalities of High Frequency Trading (2013), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2066839; Andrei A. Kirilenko et al., The Flash Crash: The Impact of High Frequency Trading on an Electronic Market (2014), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1686004; Peter Gomber et al., High-Frequency Trading (2011), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1858626.

[116] James Tobin, *A Proposal for International Monetary Reform*, 4 E. ECON. J. 153 (1978).

Because high-speed traders make tiny profits on numerous trades, a tax on each trade would deter them from much of their wasteful activity. But because the Tobin tax is low, it will not deter valuable financial transactions.

c.   Speculation on Asset Prices

A third social cost of financial activity is the problem of gambling or "speculation."[117] Financial transactions are different from transactions in the "real economy" because they involve a pure transfer of money instead of the exchange of money for goods or services. When one person buys an asset from another—say, a share of stock—the buyer gains at the seller's expense or the seller gains at the buyer's expense, depending on whether the price is less than or greater than the true value of the asset. A transfer of money does not generate social value unless it is part of a transaction that reduces risk or otherwise enables people to spread receipts of money across times or states of the world in a way that advances their interests.

Imagine, for example, that one person sells a Greek sovereign bond to another person. If the seller owns a huge amount of Greek assets while the buyer owns none, the transaction could very well reduce the amount of risk in both the seller's and buyer's portfolio (the seller's, by reducing her dependence on the value of Greek assets; the buyer's, by diversifying a portfolio that is loaded with assets in other countries). If it does, the transaction also decreases the total amount of risk in the economy. But if the seller and buyer are in opposite positions, the transaction will increase the risk. The seller and buyer are simply gambling about what will happen in Greece—the seller believes that Greece may default, while the buyer believes that Greece will not default. Their behavior is not any different from people betting on horses.

Some commentators see no problem with such gambling, but there are several reasons to be concerned about it, depending on why the people are involved in the transaction. First, if the buyer and seller are rational and risk-averse (as is usually assumed), the transaction can take place only if they are gambling with other people's money. One possibility is that each person represents an institution that is guaranteed by the government. Another possibility is that they are agents for funds whose investors do not carefully monitor their behavior, and who have contracts that give them payoffs if they make money while not forcing them to fully absorb losses.

Second, if the buyer and seller are risk-averse but poorly informed or boundedly rational, they may enter the transaction believing that each has special insight about the likely direction of the value of the asset when in fact they do not. In such a case, the transaction is just a wasteful transfer from one person to another, and there is no reason for society to tolerate it.

Third, if the buyer and seller are rational but not risk-averse—they enjoy gambling—then it is almost certainly better to direct them to casinos than to allow them to gamble using the financial system. Casinos are heavily regulated because governments recognize that people may

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[117] *See*, *e.g.*, Lynn A. Stout, *Are Stock Markets Costly Casinos? Disagreement, Market Failure, and Securities Regulation*, 81 VA. L. REV. 611 (1995); Timothy E. Lynch*, Gambling by Another Name: The Challenge of Purely Speculative Derivatives* (2012), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1788219; Gabrielle Gayer et al., *Pareto Efficiency with Different Beliefs*, 43 J. LEGAL STUD. S151 (2014). *See also* Eric Posner & E. Glen Weyl, An FDA for Financial Innovation, 107 NW. U. L. REV. 13-7 (2013)

become addicted and act against their interest. Casinos are also not vulnerable to financial panics and systemic risk. Financial institutions are. Accordingly, the government should discourage purely speculative activity that takes place in the financial system.

If financial instruments are used to gamble, then a Pigovian tax can be used to deter this behavior.[118] As before, the social problem is that the buyer and seller enter into a transaction without taking account of its effect on society. A Pigovian tax equal to the social harm caused by gambling would result in the optimal level of financial activity along this dimension.

2.   The Legal Regime

a.   Capital Regulation and Risks of Panic

Do financial regulators have the authority to impose Pigovian taxes in lieu of minimum capital requirements? Regulators' authority to regulate the capital levels of banks derives from several different statutes. Under the International Lending Act of 1983, regulators shall "cause banking institutions to achieve and maintain adequate capital by establishing minimum levels of capital for such banking institutions and by using such other methods as the appropriate Federal banking agency deems appropriate."[119] A subsequent provision states that each regulator shall have the authority to establish capital regulations that the regulator "in its discretion, deems to be necessary or appropriate in light of the particular circumstances of the banking institution."[120] Another section makes it clear that the regulator has discretion whether to declare a bank that falls short of capital requirements to be engaged in an unsafe and unsound practice warranting an enforcement action.[121] Thus, while the statue gives regulators the authority to issue capital requirements, it does not require them to do so.

In response to the Savings & Loan crisis of the 1980s, Congress passed the Federal Deposit Insurance Corporation Improvement Act of 1991. The Act was motivated in part by the perception that S&L regulators did not enforce regulations strictly enough, and created a "prompt corrective action" system that was supposed to encourage regulators to act with greater alacrity. But, like the ILA, the FDICIA gave the regulators a great deal of discretion. Regulators must determine adequate capital levels, but the precise levels were left to their judgment.[122] Indeed, the Act authorized regulators to rescind a "relevant capital measure … that is no longer an appropriate means for carrying out the purpose of this section."[123] So while regulators probably were required to establish capital levels, they could make them low enough to facilitate a Pigovian approach by allowing banks to keep even low levels of capital reserves so long as they were willing to pay the appropriate tax.

The Dodd-Frank Act of 2010 mainly took the system as it was, and focused on ensuring that it was applied generally, including to non-bank financial institutions, and with a minimum of

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[118] As advocated most prominently in the legal literature by Stout, *supra* note 117.
[119] 12 U.S.C. s. 3907(a)(1).
[120] 12 U.S.C. 3907(2).
[121] 12 U.S.C. 3907(b)(1).
[122] 12 U.S.C. 1831o(c)(2).
[123] 12 U.S.C. 1831o(c)(1)(B)(ii).

loopholes.[124] It also required increased capital requirements for financial institutions that pose systemic risk.[125]

It seems to us plausible that these laws authorize a Pigovian approach. The key statutory text is the previously quoted provision of the ILA, which requires regulators to "cause banking institutions to achieve and maintain adequate capital by establishing minimum levels of capital for such banking institutions and by using such other methods as the appropriate Federal banking agency deems appropriate."[126] While the statute requires regulators to create minimum capital levels, it does not specify their magnitude, while at the same time authorizing them to use "such other methods as [they deem] appropriate." Thus, a regulator could impose very low minimum capital requirements, while treating a Pigovian tax as the "other method," arguing that a Pigovian tax more effectively ensures bank safety and soundness than capital regulations do because the tax cannot as easily be arbitraged through the purchase of risky assets. "Such other methods as [they deem] appropriate" is very broad language. A regulator entitled to Chevron deference would have a great deal of leeway under such a provision to select its preferred mode of regulation.

A counterargument is that in all the provisions, Congress clearly sees minimum capital regulations as the main approach to ensuring capital adequacy. And the systemic risk provision of the Dodd-Frank Act seems to mandate capital requirements. But while the latter provision may rule out the Pigovian approach for systemically important financial institutions, mainly because Congress has piggybacked on existing capital regulations issued by regulators, the sections that apply to ordinary banks clearly give regulators vast discretion both to determine how to ensure an adequate capital-asset ratio and how to enforce the rules. Moreover, the effect of a Pigovian tax would be, in aggregate, to cause banks to increase capital so as to avoid paying the tax. The Pigovian tax is just a tax on debt; raising the cost of debt will cause banks to issue more equity. As in other contexts, the Pigovian tax is just an indirect but more efficient method of achieving the desired behavioral outcome—here, less borrowing by banks relative to the amounts they loan. Thus, Pigovian taxes would advance Congress' purpose. In sum, a system of Pigovian regulation would be consistent with both the spirit and, we think, the letter of the governing statutes.

b. Regulation of High-Speed Trading and Information Races

The SEC and the CFTC have in recent years initiated regulation of high-speed trading. In 2009, the SEC proposed a rule to ban "flash trading"—a type of high-speed trading that allows certain traders to see, and respond to, orders before other traders do. In 2010, the SEC and the CFTC issued a set of recommendations for addressing some of the pathologies of high-speed trading, including circuit-breakers that halt trading when price volatility exceed a certain threshold and screening of algorithms by regulators.[127] Under the latter proposal, algorithms that

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[124] 12 U.S.C. 5371(a) & (b).
[125] 12 U.S.C. 5371(b)(7).
[126] 12 U.S.C. s. 3907(a)(1).
[127] *See* JOINT CFTC-SEC ADVISORY COMMITTEE ON EMERGING REGULATORY ISSUES' REPORT, RECOMMENDATIONS REGARDING REGULATORY RESPONSES TO THE MARKET EVENTS OF MAY 6, 2010 (Feb. 18, 2011); Charles R. Korsmo, *High-Frequency Trading: A Regulatory Strategy*, 48 U. RICH. L. REV. 583–85 (2014) (describing recommendations).

appear likely to cause excessive volatility would simply be banned. All of these recommendations are classic command-and-control regulations that ban or restrict certain practices. Some have been implemented.[128] In the last year, the SEC and the CFTC have further developed initiatives to regulate high-speed trading. The SEC seeks to compel high-speed traders to register with it and disclose their algorithms; once it has this information, it will determine whether, and how, high-speed trading algorithms should be limited.[129] The CFTC has launched investigations to determine whether high-speed traders have violated its rules.[130]

The SEC's authority to regulate national securities markets is extremely broad. The Securities Exchange Act of 1934 directs the SEC "to use its authority under this chapter to facilitate the establishment of a national market system for securities."[131] The SEC is given the power "by rule or order, to authorize or require self-regulatory organizations to act jointly with respect to matters as to which they share authority under this chapter in planning, developing, operating, or regulating a national market system (or a subsystem thereof) or one or more facilities thereof."[132] The SEC is specifically given the authority to counter market manipulation.[133] But more broadly, its mandate is to pursue Congress' stated objectives, which include:

> (i) economically efficient execution of securities transactions; (ii) fair competition among brokers and dealers, among exchange markets, and between exchange markets and markets other than exchange markets; (iii) the availability to brokers, dealers, and investors of information with respect to quotations for and transactions in securities; (iv) the practicability of brokers executing investors' orders in the best market; and (v) an opportunity … for investors' orders to be executed without the participation of a dealer.[134]

The constraints on this authority are narrow. The SEC must act with "due regard for the public interest, the protection of investors, and the maintenance of fair and orderly markets."[135] And it must consider whether an "action will promote efficiency, competition, and capital formation."[136]

If the conventional economic wisdom on the negative externalities associated with high-speed trading is accurate, then the SEC can plainly regulate high-speed trading, as it (and the

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[128] *See* Korsmo, *supra* note 127, at 583.

[129] *See* High-Speed Trading Rules Coming From SEC, White Says, INVESTMENT NEWS, June 5, 2014, *available at* http://www.investmentnews.com/article/20140605/FREE/140609942/high-speed-trading-rules-coming-from-sec-white-says#;Elimination of Flash Order Exception from Rule 602 of Regulation NMS, 17 C.F.R. pt. 242 (proposed Sept. 18, 2009) *available at* http://www.sec.gov/rules/proposed/2009/34-60684.pdf.

[130] Douwe Miedema, *U.S. Futures Regulator CFTC Probing Speed* Traders, REUTERS (Apr. 3, 2014), http://www.reuters.com/article/2014/04/03/us-hedgefunds-speed-trading-cftc-idUSBREA321QU20140403.

[131] 15 U.S.C. 78k-1(a)(2).

[132] 15 U.S.C. 78k-1(a)(3)(B).

[133] 15 U.S.C. 78i; 78j.

[134] 15 U.S.C. § 78k-1(a)(1)(C) (2012); 78k-1(a)(2).

[135] *Id*.

[136] 15 U.S.C. 78c(f).

CFTC) have already started doing.[137] The question of present interest is whether the SEC could use Pigovian taxes to regulate high-speed trading. Clearly, the goal of the (Pigovian) Tobin tax is consistent with congressional objectives as embodied in the statue. A Tobin tax would promote economically efficient securities transaction, fair competition, and so on.

Does the SEC have the authority to impose a Pigovian tax? It is not clear that the market manipulation sections provide such authority; they speak in terms of prohibitions of certain practices like churning. However, the statute quoted above, which authorizes the SEC to regulate exchanges, provides one possible source of authority.[138] Another, overlapping provision gives the SEC broad authority to issue rules for exchanges that "the Commission deems necessary or appropriate to insure the fair administration, to conform its rules to requirements of this chapter and the rules and regulations thereunder applicable to such an organization, or otherwise in furtherance of the purposes of this chapter."[139] Under these sections, the SEC could issue a rule requiring exchanges to impose Pigovian taxes on members and turn over the revenues to the Treasury (or to pay a tax to the Treasury based on membership activity) if such a rule advanced the purposes of the chapter. If the purposes of the chapter include, as suggested above, economically efficient transaction and fair competition, then a Pigovian tax approach would seem lawful.

c.   Regulation of Financial Instruments in Order to Deter Speculation

Congress has long regarded speculation as socially costly behavior that should be regulated.[140] The most important source of authority for regulating speculation is Section 5c(c)(1) of the Commodity Exchange Act.[141] Under this statute, the CFTC may ban certain derivative contracts from exchanges if the contracts involve (among other things) "gaming" or "other similar activities determined by the Commission, by rule or regulation, to be contrary to the public interest."[142] Pursuant to this authority, the CFTC recently banned certain political events contracts—basically, bets on the outcomes of certain elections—from the North American Derivatives Exchange, which had sought to list them.[143]

This is a typical kind of command-and-control regulation. The regulator evaluates proposed derivatives contracts and either approves or bans them based on a loose cost-benefit analysis. While such an approach can eliminate the worst forms of speculative derivatives, it is fundamentally unable to address the problem of excessive speculation because parties can bet using all kinds of derivative contracts.[144]

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[137] *But see* David D. Gruberg, *Decent Exposure*, 65 U. MIAMI L. REV. 263 (2010) (arguing that the SEC lacks this authority because high-speed trading is efficient).

[138] 15 U.S.C. 78k-1(a)(3)(B).

[139] 15 U.S.C. 78-o(c).

[140] *See* 15 U.S.C. 78b(3) ("Frequently the prices of securities on such exchanges and markets are susceptible to manipulation and control, and the dissemination of such prices gives rise to excessive speculation"); 78b(4) ("National emergencies …. Are precipitated, intensified, and prolonged by … excessive speculation").

[141] 7 U.S.C. 7a-2.

[142] 7 U.S.C. 7a-2(c)(5)(C)(i)(V), (VI).

[143] *See* COMMODITY FUTURES TRADING COMMISSION, ORDER PROHIBITING THE LISTING OR TRADING OF POLITICAL EVENT CONTRACTS (2012) http://www.knowledgemosaic.com/gateway/cftc/general-press-releases/file_nadexorder.pdf.

[144] For a discussion, see Posner & Weyl, *supra* note 117.

Could the CFTC impose Pigovian taxes on all derivative contracts under existing authority? Unfortunately, the answer is probably not. The law authorizes the CFTC to approve or ban the listing of derivatives; there is little room for an argument that the CFTC could approve a listing conditional on the exchange (or seller of the contracts) paying Pigovian taxes. In theory, the CFTC could declare that all derivatives contracts violate the public interest and then "settle" with exchanges by permitting them to list contracts conditional on agreement to pay Pigovian taxes. But such an approach would be unlikely to survive a judicial challenge. The statute does not imply that all derivatives contracts violate the public interest or impose social costs—indeed, to the contrary, contracts are presumptively listed—and an effort to jury-rig a Pigovian system by threatening to block contracts unless payments are made may run afoul of the statute.

D.   The Occupational Safety and Health Act

Another very substantial source of regulation is the Occupational Safety and Health Act and the regulatory body it spawned, the Occupational Safety and Health Administration (OSHA). OSHA regulates the health and safety conditions to which workers are exposed in the workplace, including the machines they use, the types of chemicals they come into contact with, and the workplace environment itself.[145] OSHA has been responsible for a wide variety of economically significant regulations since its inception in 1971. Yet to our knowledge none of them has ever involved a Pigovian tax.

The Occupational Safety and Health Act gives OSHA broad authority to regulate workplace health and safety. The agency has jurisdiction over all "places of employment"[146] and has the authority to promulgate regulations as "reasonably necessary or appropriate to provide safe or healthful employment and places of employment."[147] OSHA regulations take the form of workplace standards, and the statute describes these standards in very broad terms: a standard must require "conditions, or the adoption or use of one or more practices, means, methods, operations, or processes . . . ."[148] In addition, the statute directs OSHA to promulgate stringent standards that are highly protective of worker health and safety. The agency

> shall set the standard which most adequately assures, to the extent feasible, on the basis of the best available evidence, that no employee will suffer material impairment of health or functional capacity even if such employee has regular exposure to the hazard dealt with by such standard for the period of his working life.[149]

Like the EPA, OSHA has typically employed feasibility analysis when deciding upon the appropriate regulatory strictness.[150] (Feasibility analysis draws its name from this section of the Occupational Safety and Health Act.) As we explained above, in practice this means that the agency can regulate up to the point at which regulation will generate massive job loss or

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[145] *See* 29 U.S.C. § 651 et seq.
[146] 29 U.S.C. § 652(8).
[147] 29 U.S.C. § 652(8).
[148] 29 U.S.C. § 652(8).
[149] 29 U.S.C. § 655(b)(5).
[150] Masur & Posner, *Against Feasibility* , *supra* note 76, at 662.

widespread bankruptcies within the industry. In many cases OSHA will stop well short of this level, but it is at least theoretically available to the agency.

OSHA's route to creating a Pigovian tax would largely mirror that of the EPA. OSHA would begin by setting a workplace standard that, if followed, would impose zero or negligible risk of injury on employees. That standard could take the form of a requirement that firms cease use of a particular hazardous chemical or dangerous machine, or that the firm install some type of protective mechanism that reduces the effective harm to zero. Any firm that violated this standard, thus imposing some level of risk (and expected harm), would be issued a citation[151] and then fined by OSHA.[152]

The Occupational Safety and Health Act gives OSHA broad authority to cite and then fine firms that violate its regulations. Even with respect to "minor" violations, OSHA can levy fines up to $7,000 per incident each time it issues a citation.[153] The statute gives OSHA complete discretion to set the amount of the fine up to this statutory cap. Thus, OSHA could characterize each instance of the use of a hazardous chemical, machine, or process as a violation, issue a citation, and then assess a fine in an amount equal to the expected harm from the workplace hazard—the optimal Pigovian tax. If a firm intended to create a particularly dangerous type of workplace condition such that the expected harm would exceed $7,000, OSHA could always pursue more a more substantial remedy in the form of a civil suit. Thus, OSHA's typical regulatory process—create a workplace standard, cite violators, and issue fines—could with minimal adjustments be made to mimic a system of Pigovian taxes.

Of course, as with Pigovian taxes under the Clean Air and Clean Water Acts, such a system could create both administrative and legal complications. OSHA, like the EPA, would need to collect taxes (fines, that is) from every employer that creates a meaningful workplace risk. This is as opposed to designing standards intended for compliance and citing only violators. This could be administratively costly, and the agency will need to have in place a mechanism for the timely issuance of these citations and their contestation, should employers object. In the context of the Clean Air and Water Acts we explained that we did not think this would be a significant hurdle, and the same is true here. It is worth noting, in addition, that any complications arising from such a system stem from the collection of a Pigovian tax in general, not from any problems particular to OSHA's use of Pigovian taxes in regulation. If Congress, rather than an agency, were to establish a system of Pigovian taxes, it would still have to provide for the collection of taxes from a multiplicity of affected parties. In addition, as a general matter any system of taxation must provide a mechanism for a taxpayer to challenge a tax assessment as incorrect or improperly levied. A legislatively created system of Pigovian taxes would need to surmount the same types of hurdles. These administrative issues are not a product of the agency context.

The principal legal issue is again whether OSHA would be permitted to impose regulations that effectively prohibit all harmful workplace conditions. As we described above with respect to the Clean Air and Water Acts, an overly formalist or literalist court might hold

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[151] 29 U.S.C. § 658(a).
[152] 29 U.S.C. § 666(c).
[153] 29 U.S.C. § 666(c).

that such a regulation is not economically "feasible" in the sense that full compliance would lead to widespread bankruptcies within an industry. A more pragmatic judge *should* understand that the entire regulatory scheme—extremely stringent standard, coupled with lower "fines" for noncompliance—is feasible and will not cause undue economic hardship. Indeed, it might turn out to be more lenient than existing workplace safety regulations. Even if a judge adopts a more formalist bent, however, Pigovian taxes should still be feasible with respect to a great number of workplace hazards. There are many workplace hazards—chemical, machine, or otherwise—that could be eliminated without disabling an industry, and OSHA has frequently considered (and sometimes enacted) regulations that eliminate a workplace harm entirely.[154] Thus, while a combination of extremely stringent standards and formalist jurisprudence might sometimes derail the use of Pigovian taxes, this should affect at most a subset of potential regulations.

Finally, we note that workplace safety differs from other areas of potential Pigovian regulation in the sense that workplace hazards are not really externalities. Workplace hazards only affect employees who are in contractual privity with their employers. In theory, then, all workplace hazards could be priced into workers' employment contracts. (Indeed, the most prominent methods of calculating the value of a statistical life for purposes of cost-benefit analysis assume that they are.) If one conceives of Pigovian taxes as strictly meant to regulate externalities, then they would be inappropriate in the context of workplace safety. Of course, this is a critique of workplace safety regulation in general, rather than Pigovian taxes in particular. There may well be employment market failures, such as high information costs for workers or hold-up problems, that justify workplace regulation. If market failures exist, Pigovian taxes and other types of regulation would be justified.

III. Objections and Obstacles

We explained in Part I that most economists believe that Pigovian taxes are the best means of regulating a wide variety of harms across a wide variety of contexts. In Part II, we argued that many federal regulators have the authority under existing law to implement Pigovian taxes. If Pigovian taxes are not infeasible or undesirable for some other compelling reason, regulators should be employing them much more frequently than they currently do (which is never). This Part explores whether a reason to avoid Pigovian taxes exists. We canvas five potential objections or obstacles to implementing Pigovian taxes. The first three apply equally to legislators and administrative agencies, while the latter two are specifically relevant to administrative agencies.

Our conclusion is that none of these obstacles is either normatively compelling or politically insuperable. If agencies and legislatures have refrained from using Pigovian taxes for some combination of these reasons, they are unjustified in having done so.

A.   Administrative Problems

One concern about Pigovian taxes is that they may be difficult to administer. If the regulator cannot reliably determine the social cost of an activity, it cannot calculate the optimal

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[154] *See* Masur & Posner, *Against Feasibility*, *supra* note 76*,* at 673.

Pigovian tax. This problem would of course affect Pigovian taxes whether imposed by statute or regulation. Economists have discussed these issues for decades and the consensus appears to be that administrative problems are generally manageable.[155] In a recent paper, Victor Fleischer argues that Pigovian taxes are frequently inefficient because they are typically calculated based on an assumption of uniform marginal social cost when in fact the social cost of an activity often varies across individuals or firms.[156] He provides the example of taxes on fatty foods, which may be justified on the theory that obesity creates social costs. However, some people eat fatty foods without becoming obese. They should not be taxed; and a tax might deter them from a valuable activity. A tax based on the average contribution of fatty food to social costs will also under-deter obese people. A better tax would vary according to the likelihood that any person becomes obese, but such a tax would be difficult to administer.

We are skeptical of Fleischer's arguments, at least as they apply to our thesis. If Fleischer's argument is simply that Pigovian taxes may be so hard to calculate that it is better not to regulate at all, then surely he is right in some cases, but this is an argument against any kind of regulation based on social costs, not against Pigovian taxes. Regulators already engage in an enormous amount of command-and-control regulation; to the extent that regulation is justified,[157] then Pigovian taxation would be justified as well, indeed would be more justified.

B.   Interest Group Explanations

Another potential explanation for legislative and administrative reluctance to employ Pigovian taxes relates to interest-group politics. In addition to the organizations and individuals advocating greater regulation, there is a natural constituency for command-and-control regulation: the firms that sell to regulated entities the means for complying with regulations. With respect to environmental regulation, these firms produce pollution-controlling (or safety-enhancing) equipment or manufacture the alternative chemicals and machinery that regulations will mandate. Environmental regulatory standards are often based upon a particular type of technology, and the firm that manufactures it stands to benefit directly from regulation imposing that standard. Indeed, some researchers have estimated that regulation can produce significant employment gains in industries that supply new equipment or material to regulated firms. Those firms thus have an incentive to lobby strongly for new regulation.[158]

Similarly, an enormous industry sells its services to financial institutions so that they can comply with regulations. Accountants and lawyers belong to this industry. So do credit rating agencies, which profited enormously in the years leading up to the financial crisis by selling the

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[155]   For a recent survey, see Fleischer, supra note 16.

[156]   *Id*.

[157] Various attempts to calculate the costs and benefits of regulation tend to conclude that in aggregation U.S. regulation produces more benefits than costs, although individual regulations do not always satisfy cost-benefit tests. *See*, *e.g.*, Robert W. Hahn & Patrick M. Dudley, *How Well Does the U.S. Government Do Benefit-Cost Analysis?*, 9 Rev. Environ. Econ. Pol'y 192 (2007) (analyzing the use of cost-benefit analysis over time).

[158] Gretchen Morgenson, *The Stone Unturned: Credit Ratings*, N.Y. TIMES, (March 23, 2014), http://www.nytimes.com/2014/03/23/business/the-stone-unturned-credit-ratings.html?_r=0.

ratings that investment banks needed in order to market collateralized debt obligations.[159] Indeed, there is a sense in which the same entities that were subject to regulation—banks, hedge funds, investment banks—also profited by inventing financial instruments that allowed themselves and others to comply with (or circumvent) those regulations. Put differently, command-and-control financial regulations bifurcated the finance industry, creating a group of supporters who profited from them and lobbied to support them, and a group that objected to them.

The incentive to lobby for new legislation or regulation dissipates when the regulation takes the form of a Pigovian tax. Of course, a Pigovian tax makes pollution-controlling equipment or materials more valuable and induces firms to install that equipment—that is precisely the point. But it does not do so as directly as regulation that forces firms to reduce emissions below a particular level or install a particular type of equipment. Any given firm would be less certain that regulated entities would install its products. Those firms will then have a smaller incentive to lobby for regulation, and might instead advocate for particularized command-and-control regulation as a substitute for Pigovian taxes.

In addition, Pigovian regulation might in many cases be considered inferior by regulated entities because it does less to inhibit new market entrants. There is a voluminous literature documenting the ways in which existing firms can use regulation to block competitors.[160] Generally speaking, regulation can impose significant upfront costs on doing business, as when firms are required to purchase an expensive piece of equipment or obtain a costly or complicated permit. Large, existing enterprises may be able to surmount these regulatory hurdles, while new entrants might have much greater difficulty.[161] Pigovian taxes do not have this feature, however. The cost of complying with a Pigovian tax scales linearly with the externality imposed; there is no initial upfront cost and thus no especially great hurdle to new entrants. Conditional upon being regulated, then, existing firms might in some contexts prefer conventional command-and-control regulation.

These may be barriers to regulatory implementation of Pigovian taxes, but they are not insuperable ones. Agencies that are less beholden to their regulatory constituencies, or executives who are less politically bound (second-term presidents, for example) might forge ahead with Pigovian regulation despite greater opposition from regulated parties. For that matter, if our analysis is correct, Pigovian regulation represents something of a collective action problem for regulated parties. There are many regulated parties that should weakly prefer Pigovian regulation to standard command-and-control regulation because it is more efficient, compared with a few entities that might strongly prefer command-and-control regulation. This is a canonical public choice problem. Political entrepreneurs within the regulated community would have incentives to

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[159] Matt Kratz, *2008 crisis still hangs over credit-rating firms*, USA TODAY (Sept. 13, 2013), http://www.usatoday.com/story/money/business/2013/09/13/credit-rating-agencies-2008-financial-crisis-lehman/2759025/.

[160] Thomas J. Dean & Robert L. Brown, *Pollution Regulation as a Barrier to New Firm Entry: Initial Evidence and Implications for Future Research*, 38 ACAD. MGMT. J. 288 (1995); David Kline, *Positive Feedback, Lock-in, and Environmental Policy*, 34 POL'Y SCI 95 (2001); Eric Helland & Mayumi Matsuno, *Pollution Abatement as a Barrier to Entry*, 24 J. REG. ECON. 243 (2003); David W. Bromley, *Environmental Regulations and the Problem of Sustainability: Moving Beyond "Market Failure"*, 63 ECOLOGICAL ECON. 676 (2007).

[161] Bromley, *supra* note 160, at 682.

form trade groups to lobby for Pigovian regulation (if there must be regulation at all), as a counter-weight to firms that prefer command-and-control regulation.

C.   Negative Symbolism & Ideology

The rarity of Pigovian taxes could also be based in part upon the negative expressive and symbolic nature of such measures. Taxes have long had a negative connotation in American politics, even when they are not being imposed directly upon individuals.[162] When the Obama administration began to pursue legislation to reduce greenhouse gas emissions, it rejected Pigovian taxes as politically unpalatable, precisely (and entirely) because of the word "tax" in the name.[163] President Clinton encountered stiff resistance to a much more modest energy tax several years earlier.[164] This was despite the fact that, as economists have shown, a properly structured Pigovian tax and a properly structured cap-and-trade system will function almost identically.[165] Then, when Obama eventually proposed a cap-and-trade system, opponents attacked it as "cap and tax,"[166] seeking to tar it with the same brush. The word "tax" is toxic, particularly for political conservatives.[167]

At the same time, Pigovian taxes have a bad reputation among many political liberals, particularly when compared with the alternative of direct regulation. Part of the opposition relates to the fact that Pigovian taxes allow a company to continue polluting so long as it is willing to pay the appropriate price. If pollution is a moral wrong, in that the polluter is imposing harm upon an unconnected victim, then it strikes some commentators as immoral to permit a firm to continue to pollute on the condition that it pays a fee.[168] This objection evokes concerns of compensatory or distributive justice: if a polluter pays a Pigovian tax in order to harm some victim, the tax payment may go to the general fisc rather than the victim herself. Of course, this concern ignores the fact that an ideally designed Pigovian tax would reduce pollution and harm to the same level as an ideal system of command-and-control regulation.

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[162] There is an extensive literature on so-called "tax aversion." *See, e.g.*, Judd B. Kessler & Michael I. Norton, *Tax Aversion in Labor Supply* (2014), http://assets.wharton.upenn.edu/~juddk/papers/KesslerNorton_TaxAversion.pdf.; Ed. McCaffery & Jonathan Baron, *Thinking About Tax*, 12 PSYCH., PUB. POLICY & LAW 106 (2006); Andrew T. Hayashi et al., *Experimental Evidence of Tax Salience and the Labor-Leisure Decision: Anchoring, Tax Aversion, or Complexity?* (2012), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2067157; Christopher C. Fennell & Lee Anne Fennell, *Fear & Greed in Tax Policy: A Qualitative Research Agenda*, 13 WASH. U. L. & POL'Y 75 (2003); Steffen Kallbekken, Stephan Kroll, & Todd L. Cherry, *Do You Not Lke Pigou, or Do You Not Understand Him? Tax Aversion and Revenue Recycling in the Lab*, 62 J. ENVTL. ECON. & MAN. 63 (2011).

[163] Coral Davenport, *Republicans Pounce on Obama's Global-Warming Regulations for Political Fodder*, NATIONAL JOURNAL (Sept. 22, 2013), http://www.nationaljournal.com/energy/republicans-pounce-on-obama-s-global-warming-regulations-for-political-fodder-20130922.

[164] Richard J. Pierce, Jr., *Energy Independence and Global Warming*, 37 ENVTL. L. 595, 601 (2007) ("Many politicians and business leaders prefer a cap and trade system to a carbon tax, but those preferences are based on dubious reasoning. Many politicians prefer cap and trade because it allows them to avoid the dreaded 't' word.").

[165] *See* Weisbach, *supra* note 16, at 1

[166] Opinion, *The Cap and Tax Fiction*, (June 26, 2009), WALL ST. J., http://online.wsj.com/news/articles/SB124588837560750781; Republican Study Committee, RSC Outlook: Cap & Tax Overview (April 2009) http://rsc.woodall.house.gov/uploadedfiles/rsc_outlook_cap_and_tax_042109.pdf.

[167] Campaign for Liberty, *"Cap and Tax" is Back!*(June 2, 2014) *available at* http://www.campaignforliberty.org/national-blog/cap-tax-back/.

[168] Sandel; Wallace E. Oates, *From Research to Policy: The Case of Environmental Economics*, 2000 U. ILL. L. REV. 135 (2000).

Relatedly, there is a powerful resistance within both academia and public opinion to the idea of putting a price on human life or health.[169] That opposition is typically voiced with reference to cost-benefit analysis,[170] but Pigovian taxes trigger the same considerations with equal force. A Pigovian tax requires the regulator to price the externality being created and then allow the regulated entity to continue producing that externality if it pays the requisite price. Human lives are being converted into dollars even more directly. From this standpoint, command-and-control regulation appears superior because (at least ostensibly) it entirely prohibits the disfavored activity.

We have criticized these approaches to monetization and regulation in other work,[171] but the normative issues are not the central point. The negative symbolism of using a tax to control pollution or other harms can have powerful political effects, particularly when the tax is viewed negatively on both sides of the political spectrum. It is tempting to believe that efficiency will win out in the long run—that if Pigovian taxes really are superior to command-and-control regulation, policymakers will eventually enact them as the various constituencies come to recognize their advantages. On this view, costs and benefits will eventually triumph.[172] We suspect (and hope) that the negative connotations attached to Pigovian taxes will eventually disappear as norms and attitudes shift. There are certainly precedents for this type of change, such liberals' eventual adoption of market-based regulation of the environment (cap-and-trade legislation dealing with acid rain) and health care (the Affordable Care Act).

D.   Legal and Conceptual Hurdles

We now turn to explanations that are primarily relevant to Pigovian regulation, as opposed to Pigovian taxes imposed through legislation. In the preceding Part we considered specific agency authority to regulate via Pigovian taxes. But there are broader legal and conceptual issues as well. Pigovian taxes also raise a legal question of whether regulators can, in fact, "tax" regulated entities. The legal community thinks of "taxes" and "regulations" and different creatures. Regulators do not impose taxes; they issue regulations and fine companies that violate them. Congress creates taxes and delegates to the Treasury Department the authority to issue regulations that implement them. A large and complex set of norms and practices surround the process by which taxes are authorized. Can regulators impose Pigovian taxes consistently with these rules?

The Supreme Court has answered this question in the affirmative. Adjudicating a constitutional challenge to a system of pipeline fees, the Court in 1989 held that "Congress may wisely choose to be more circumspect in delegating authority under the Taxing Clause than under other of its enumerated powers, but this is not a heightened degree of prudence required by the Constitution."[173] In reaching this conclusion, the Court swept aside a series of earlier cases in

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[169] Frank Ackerman & Lisa Heinzerling, *Pricing the Priceless: Cost-Benefit Analysis of Environmental Protection*, 150 U. Pa. 1553 (2002).

[170] *Id.*

[171] Masur & Posner *Against Feasibility*, *supra* note 76; Masur & Posner, *Regulation, Unemployment, and Cost-Benefit Analysis*, 98 Va. L. Rev. 579 (2012).

[172] *Cf.* Cass R. Sunstein, *Of Montreal and Kyoto: A Tale of Two Protocols,* 31 Harv. Envtl. L. Rev. 1 (2007).

[173] Skinner v. Mid-America Pipeline Co., 490 U.S. 212, 214 (1989).

which it had suggested that the ability to levy taxes might be a solely "legislative" power that Congress cannot delegate.[174] Even if an agency's Pigovian tax were understood as a tax, rather than a fine, it should raise no special constitutional problem.

The only other relevant law we can think of is the Origination Clause of the U.S. Constitution, which provides that "[a]ll Bills for raising Revenue shall originate in the House of Representatives; but the Senate may propose or concur with Amendments as on other Bills."[175] It is possible to argue that a regulator can impose a tax only if its authorizing statute originated in the House, which will not be the case for many regulators, or may be ambiguous. However, the Supreme Court has held that the Origination Clause applies only to statutes whose purpose is to raise revenue. For example, the Supreme Court held that a law that imposed a tax on bank notes was not subject to the Origination Clause because the purpose of the law was not to raise revenue but to finance a national currency.[176] The D.C. Circuit similarly rejected a challenge to the Affordable Care Act based on the Origination Clause on the grounds that the purpose of the tax imposed on people who fail to obtain health insurance is not to raise revenue but to encourage people to obtain health insurance, even if a byproduct of the law is an increase in tax revenues.[177] Likewise, the purpose of a Pigovian tax is not to raise revenue but to deter socially harmful behavior.[178] Accordingly, a regulator whose authority is based on a Senate-originated bill does not violate the Origination Clause by imposing a Pigovian tax.

E.   Risk Averse Regulators

We close with one final potential explanation. It is conceivable that regulators are simply highly risk averse—they understand that they have the authority to employ Pigovian taxes, but they have little incentive to experiment and prefer to opt for tried-and-true methods that have been repeatedly validated. Risk aversion might be coupled with misaligned institutional incentives: it is plausible that an agency head has more to lose from attempting a new type of regulation and having it be rejected (judicially or politically) than she has to gain if the regulation succeeds. The safer path of command-and-control regulation might also be the more personally advantageous one. The uncertainty embedded in agencies' organic statutes might be heightening these tendencies.

The story is more complex as applied to state behavior under the Clean Air Act. As we described above, when the EPA creates a national ambient air quality standard, the states can formulate state implementation plans designed to achieve the air quality standard in any manner they choose. Yet to our knowledge no state has ever employed a Pigovian tax as part of its state implementation plan. This is despite the fact that there can be no doubt that the states would have

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[174] *See* Nat'l Cable Television Ass'n, Inc. v. U. S., 415 U.S. 336, 340-41 (1974) ("Taxation is a legislative function, and Congress, which is the sole organ for levying taxes . . . . It would be such a sharp break with our traditions to conclude that Congress had bestowed on a federal agency the taxing power that we read 31 U.S.C. s 483a narrowly as authorizing not a 'tax' but a 'fee.'"); Fed. Power Comm'n v. New England Power Co., 415 U.S. 345, 349-51 (1974) (reinterpreting a fee as a tax in order to avoid constitutional questions about delegation of the taxing power).
[175] U.S. Const., Art. I, s. 7.
[176] Twin City Nat. Bank of New Brighton v. Nebecker, 167 U.S. 196, 202 (1897).
[177] Sissel v. U.S. Dept. of Health and Human Services, 2014 WL 3714701 (D.C. Cir. 2014).
[178] *Cf.* Robert D. Cooter & Neil S. Siegel, *Not the Power to Destroy: An Effects Theory of the Tax Power*, 98 VA. L. REV. 1195 (2012), on difference between taxes and mandates.

authority to do so (as the Obama administration's stance regarding greenhouse gases makes clear). It is possible that state legislators and regulators fear that a SIP that relied upon Pigovian taxes might be rejected by EPA officials as too outlandish or unlikely to succeed—in essence, EPA risk aversion transferred to the states. But uncertainty as to the legality of state-implemented Pigovian taxes under the Clean Air Act cannot be driving the behavior of state policymakers.

Conclusion

Economists have extolled the virtues of Pigovian taxes for decades. Yet regulators have hardly ever enacted Pigovian taxes, instead relying almost exclusively upon the command-and-control regulation that economists have denigrated in comparison. This is despite the fact that agencies with authority over a vast swath of economic activity in most cases are permitted by their organic statutes to impose Pigovian taxes. We suspect that the absence of Pigovian taxes is due to a combination of practical and political factors, possibly coupled with a failure of imagination (or nerve) on the part of state and federal regulators, plus the overwhelming force of bureaucratic inertia.

A first step for remedying this problem would be for the executive branch to instruct agencies to give serious consideration to Pigovian taxes. There is precedent for such an action. Many years ago, the Office of Information and Regulatory Affairs, the White House agency that provides guidelines to executive-branch agencies, issued a guidance document for regulatory agencies. Among other things it encouraged regulators to use "market-oriented approaches."

> Market-oriented approaches that use economic incentives should be explored. These alternatives include fees, penalties, subsidies, marketable permits or offsets, changes in liability or property rights (including policies that alter the incentives of insurers and insured parties), and required bonds, insurance or warranties. One example of a market-oriented approach is a program that allows for averaging, banking, and/or trading (ABT) of credits for achieving additional emission reductions beyond the required air emission standards. ABT programs can be extremely valuable in reducing costs or achieving earlier or greater benefits, particularly when the costs of achieving compliance vary across production lines, facilities, or firms. ABT can be allowed on a plant-wide, firm-wide, or region-wide basis rather than vent by vent, provided this does not produce unacceptable local air quality outcomes (such as "hot spots" from local pollution concentration).[179]

By referring to economic incentives including fees, OIRA is implicitly suggesting that agencies should explore the use of Pigovian taxes. (OIRA's reference mirrors similar language in the Clean Air Act.[180]) But OIRA could and should have recommended Pigovian taxes much more explicitly. Indeed, as we have explained, Pigovian taxes are no less market-oriented than emission-permit programs, and will usually be more efficient than them. So a simple step toward reform would be for OIRA to amend A-4 to explicitly advocate Pigovian taxes.

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[179] OMB, A-4.

[180] *See supra* Part II.A.

Beyond that, we hope that our paper will directly persuade regulators to start experimenting with Pigovian taxes. Just as regulators discovered (with some prodding from the executive branch[181]) that they could use cost-benefit analysis to evaluate proposed command-and-control regulations, they can also recognize that they possess the authority to impose Pigovian taxes in lieu of command-and-control regulations. It's time to transform the "cost-benefit state"[182] into the Pigovian state.

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[181] Exec. Order. No. 12,291; Exec. Order 12,866 *supra* note 3.
[182] CASS R. SUNSTEIN, THE COST-BENEFIT STATE (2002).

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