Holding Polluters Responsible: Redistributing Externalities Through Pigovian Taxes

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Imagine that all members of a community benefit from a large lake. A local company develops a new technology that brings money and jobs to the community’s economy, but this company also releases toxic by-products into the lake without the citizens’ knowledge. Those pollutants then begin to turn the lake from its original clear blue to a dark, murky green, and several months later begin to poison the lake’s population of fish. Most citizens do not spend enough time fishing or viewing the lake for it to compel them to act. But what if several decades down the road researchers linked the pollutants from the lake to the premature deaths of more than one in every hundred citizens? It is only when individuals see how pollution affects their own lives that they begin to take an interest in stopping it.

Donora, Pennsylvania, witnessed a similar event when a “thick, yellowish, acrid smog” blanketed the town in 1948. Local plants producing toxic chemicals caused a cloud of pollution to hover over the city for five days. The fog was so thick that citizens were unable to drive and were instead forced to walk the streets with lanterns at midday. What finally got the public’s attention, however, was not the loss in aesthetics or the inconvenience of reduced visibility. Ultimately, it was the immediate deaths of twenty of the town’s mere 14,000

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citizens and the ill health effects reported in nearly half of the population that prompted a desire for change. Even a decade later, rates of mortality in Donora were significantly higher than in neighboring towns, indicating the profound effect that pollutants have on human health. This incident was one of the first to suggest a direct link between poor air quality and poor health, and it finally awakened politicians to the undeniable need for pollution abatement nationwide. This began a new era of environmental reform, with the Clean Air Act (CAA) of 1970 as the crowning achievement. This legislation set maximum threshold levels at which industries were permitted to pollute in order to improve air quality and human health.

Though government regulations have helped to reduce pollution, there are still more than 700,000 fatalities each year worldwide attributed to poor air quality, which is 4.5 times more than the number of deaths due to warfare. Regulations attempt to set a threshold level where pollutants can be considered “safe,” but in reality, these amount only to the lowest levels that are politically viable at a given time. Though minor reductions in pollution can result in enormous health benefits, industries tend to pollute at the maximum level because they have no incentive to do otherwise. This would be acceptable if the externalities, or negative consequences, of pollution fell


3 Daniel Krewski, Evaluating the Effects of Ambient Air Pollution on Life Expectancy, 360 New Eng. J. Med. 413, 413-15 (2009). Krewski claims air pollution causes 1.4 percent of all deaths worldwide, or approximately 700,000 of the approximately 50,000,000 annual deaths.

4 See, e.g., Approval and Promulgation of Air Quality Implementation Plans; Utah; Revisions to Utah Administrative Code-Permit: New and Modified Sources, 79 Fed. Reg. 7072, 7074 (Feb. 2, 2014) (demonstrating disagreement between an advocacy group and the EPA on appropriate pollution thresholds).

5 Externalities are the uncompensated impact of one’s actions on the well-being of a bystander. If the impact on the bystander is adverse, it is called a negative externality. If it is beneficial, it is called a positive externality. In the context of this article, the term externalities will be referring to negative externalities only.
only on those who chose to emit the pollutants. However, because air is a public good, the marginal costs and benefits lie on society as a whole—in essence, everyone who enjoys breathing air.

Since current regulations are unable to fully shift the weight of the negative consequences of air pollution to the parties responsible, a new system needs to be implemented that keeps citizens from suffering due to industrial and commercial pollution. In order to most effectively align the negative consequences of externalities with the industries that produce them, governments need to evolve past the current regulations and shift to a system of Pigovian taxation that would more adequately account for the social costs of pollution. Pigovian taxation is an economic system that considers the total marginal costs to society rather than merely the costs incurred by the individual. A tax is levied to address this difference, and ultimately this tax discourages the activity while potentially compensating the negatively affected parties.

I will begin my discussion of Pigovian taxes in Section I by briefly describing why environmental reform in improving air quality is both necessary and beneficial. In Section II, I will discuss Congress’s current methods for reducing pollution, looking specifically at current clean air legislation in the CAA. In analyzing these regulations, I will then describe current systems and show why they are ineffective. In Section III, I will outline how Pigovian taxes have proven effective in correcting for externalities and how these measures can benefit both the environment and the economy more than the current regulatory system. In Section IV, I will propose a shift in focus from regulatory measures to a system of taxation and examine how these changes could make the CAA a more effective piece of legislation.

I. A NEED FOR CHANGE

Strong evidence indicates long-term health benefits from pollution abatement, but short-term health benefits can also result. Empirical studies that analyze sudden and significant changes in pollution show its correlation with respiratory illnesses, even within short periods of time. Dr. C. Arden Pope, an environmental economist, took
advantage of the temporary closure of a Utah steel mill in order to compare hospital admittance data under both high- and low-pollution conditions. Gathering this data along with readings of particulate air pollution from April 1985 through February 1988, Pope was able to find a significant correlation between elevated levels of particulate matter in the air and the occurrence of pneumonia, bronchitis, and asthma. Winter hospital admittances tripled for children with upper respiratory illnesses when the mill was operating in comparison to when it was closed. Even in other seasons when particulate readings were far below the acceptable threshold, children’s admissions doubled and adult admissions increased by forty-seven percent.6

Pope’s long-term studies yield similar results, demonstrating the persistent link between the population’s health and air quality. In the study of a cohort of more than 1.1 million people, Pope found that even a small increase of ten micrograms per cubic meter of particulate matter significantly increases mortality. Twenty years after the study began in 1980, overall mortality was determined to be elevated by 3.6 percent, with deaths due to heart disease increasing by 15.5 percent and those of lung cancer by nearly 11 percent.7 Pope’s discoveries reveal both the immediate and long-term impacts that industry-produced externalities can have on society. The severe negative health consequences of pollution harm society as a whole, thereby justifying action for pollution reduction to improve health.

Though these startling health facts alone merit change, the more hidden economic costs of by air pollution are just as devastating. Chronic illnesses (like respiratory diseases caused by air pollution) affecting the working class harm the economy by decreasing the marginal product of labor. These chronic diseases account for “$277 billion annual expenditure on treatment and a loss in productivity equal to $1.1 trillion per year.”8 Alternatively, pollution reduction

7 Krewski, supra note 3, at 414.
8 Xavier Pautrel, Pollution, Private Investment in Healthcare, and Environmental Policy, 114 SCANDINAVIAN J. ECON. 334, 335 (2012).
results in quantifiable economic benefits. One study found that reductions in acid rain alone engendered $60 billion in health benefits in 2010.9

Logically, it would be in society’s best interest to lower pollution levels for the continued health of individuals and the economy. However, opponents to government regulation claim that a simple cost-benefit analysis reveals that gains in public health are outweighed by economic implications. They also cite evidence that regulations decrease productivity and gross domestic product. This claim does have merit because companies need to expend resources in order to comply with the regulations. A study conducted in 2012 asserts that environmental regulations decrease industry productivity by 2.6 percent with a $21 billion annual loss in GDP.10 These staggering figures show the inherent flaws in government regulation and illustrate how increased restrictions can discourage growth. However, shifting to a system of Pigovian taxation completely alters the economic environment in which industries operate, allowing for greater public health and improved economic efficiency.

II. CURRENT INEFFICIENCIES

Major flaws must exist in the current system to politically justify a shift towards Pigovian taxation. One such flaw is that system regulations create a “one size fits all” solution without considering differences between industries. By placing regulations, the government fails to weigh the individual industry’s profit with the negative social costs of pollution. A market-based approach is able to consistently receive monetary signals, telling buyers and sellers exactly how to conduct themselves in order to maximize profits in relation to the costs of polluting. The government is able to receive signals,


but these signals come in the form of votes during elections and are infrequent and unreliable.\textsuperscript{11}

The free market also allows for the driving and disciplinary force of competition, where merely placing limits does not. When regulations are in place, there is a negative incentive to pollute based on fees and penalties, but there is a lack of a positive incentive to improve efficiency. Under Title VII of the CAA, the EPA can impose fines up to $200,000 for major violations, or up to $5,000 for minor violations without having to take these claims to court.\textsuperscript{12} However, there is rarely an incentive to improve technology or increase efficiency if these threshold levels are being met. Free market approaches provide the positive incentive of increased profit by maximizing efficiency and lowering pollution.

The CAA incorporated a change into Title IV of its 1990 amendment that incorporated a more free-market approach. This provision provides for a cap-and-trade system where industries are allocated sulfur dioxide pollution credits that can be traded at a market-driven price to firms requiring more pollution allowances. This is similar to regulations in that it keeps pollution under a determined level, but it differs in that it allows for free market interaction in purchasing and selling the right to pollute. Under this system, businesses can benefit from tangible monetary benefits for increasing efficiency. This program fulfilled its primary purpose of producing “quantifiable pollution reductions achieved through a flexible approach to compliance that is politically acceptable and keeps societal costs low.”\textsuperscript{13} However, market-based prices for sulfur dioxide emissions were found to be drastically lower than anticipated prices, which led industries to purchase and bank credits rather than trading them. This is harmful because it encourages large-scale pollution and undervalues investment in pollution-reducing technologies. Though innovation peaked


in the period just before the trading system was implemented, patents significantly decreased in the following period.

In contrast, Pigovian taxes allow competition to continue and can incentivize a stable increase in innovation. They also impose a cost on pollution, causing businesses to decrease production until the profit from polluting falls below the cost of paying the tax. Under these conditions, the only way for an industry to become more profitable is to innovate in a way that increases production without increasing pollution. Without innovation, any higher rate of production would be unprofitable. Pigovian taxes are able to achieve significant environmental and economic benefits while still encouraging innovation, as will be further discussed in the Section III.

Special interest groups play a bigger role in influencing the current regulatory system than do concerns for efficiency. Consequently, these groups often cause inefficiencies in public policy. The 1977 amendment of the CAA is an example of the harmful influence that special interest groups can have in determining government regulations. New restrictions on sulfur dioxide required power plants to install electrostatic scrubbers on smokestacks to reduce emissions. An alternative to installing this technology would have been to simply use cheaper low-sulfur coal, but coal companies in West Virginia and Kentucky that produced high-sulfur coal were able to convince lawmakers to require the installation of electrostatic scrubbers. These scrubbers do not work on low-sulfur coal, allowing the lobbyists who produced high-sulfur coal to freeze out the competition. High-sulfur coal is more expensive and more polluting, so the 1977 amendment came with a high price to society.

The example above illustrates how the influence of lobbies on government often comes at the cost of greater overall economic and environmental welfare. The use of high-sulfur coal may produce large returns for its industry, but it results in large costs that fall on

14 Stroup, supra note 11, at 74. The bottom line is that government limits placed either by regulations or cap-and-trade programs do “not bring the same pressures and personal incentives to innovate, to conserve resources, and to avoid damage downwind and downstream that private ownership and market decisions do.” Id.

15 Id. at 53-54.
society. The externalities borne by the public could be more fairly redistributed by implementing a tax on the businesses that produce harmful pollution. While Pigovian taxation still depends on a tax set by the government, it is a more efficient system because it reacts to market signals and is less prone to the influence of special interest groups.

Uncertainties pertaining to monitoring pollutants under the CAA also reveal flaws in the current regulatory system. Whether or not a county attains acceptable pollution levels is dependent on intermittent sampling data, yet these samples fail to take into account interregional pollution displaced by air currents. Counties often have no control over the pollution produced in neighboring regions. Regulations holding these regions accountable for pollution outside of their control is yet another example of parties bearing the weight of externalities. Pigovian taxes correct this as they control only the direct outputs produced by the responsible party. This taxation shifts the responsibility from downwind parties to those that produce pollution and creates an incentive to pollute less. Tax revenues might also be allocated regionally to assist those downwind areas that bear the cost of pollution. By monitoring the pollution of specific sources instead of overall pollution levels, polluters will bear the burden of their actions and parties not responsible for harmful externalities can be compensated. Though the problem of air pollution has not been ignored by the government, it has not been efficiently dealt with. Pigovian taxation is a more efficient system of addressing pollution and can supplement the shortcomings of environmental regulation.

III. PIGOVIAN TAXATION

In 1920, economist Arthur Pigou published his theory that investments by industries often inflict uncompensated costs on society. Pigou’s method for bridging the gap between private marginal costs and the total costs to the public was to instate a tax to account for the monetary cost of damages. A familiar example of Pigovian taxes includes the taxes levied on cigarettes: the government-elevated prices reflect the harm of health care costs and air pollution that is borne by those who do not choose to smoke. This increased cost
creates an incentive for citizens to not participate in the harmful activity, resulting in fewer cigarettes sales and decreased externalities. A shift towards a similar system of taxation for air pollution would see parallel effects.

In addition to effectively decreasing externalities, Pigouvian taxes can incentivize greater levels of innovation. Companies seeking to increase their production in a way that does not create costly pollution will be driven to innovate more efficient methods of industrial practices. As emissions are reduced and new methods for abatement are created, common citizens bear less weight of the emissions and can be compensated for any damages incurred due to industry.

Other favorable results become apparent by examining empirical studies, theoretical models, and anecdotal evidence from countries that have incorporated Pigouvian taxes into their economies. Environmental taxation is positively correlated with economic growth. This is demonstrated in a Pautrel’s multigenerational study examining the economic impact of these taxes on health. He finds that while taxation has some negative effects on production, the net economic effect is positive. Increases in productivity due to better health eclipse any negative effects, with resultant gains in output level and output growth. This study clearly demonstrates what economists term the double dividend of environmental taxation: the ability to simultaneously improve air quality and human health while benefiting the economy.

Another study modeled 139 scenarios in which carbon emissions were taxed and the revenue was subsequently recycled into the economy through various methods. A common method of recycling these carbon tax revenues is to lower or eliminate regressive taxes like income tax. After researchers examined the modeled scenarios, the ability for environmental taxation to produce a double dividend was confirmed. Seventy-five percent of scenarios tested found an increase in employment rates. GDP increased in a majority of simulations where social security contributions were cut. Researchers

Pautrel, supra note 8, at 351. The study also suggests that implementing a “tighter environmental tax is more likely to increase output level and output growth when health is very pollution-sensitive.” Id.
concluded that “when environmental tax revenues are redistributed to cut distorting taxes on labor . . . environmental quality improves” and “small gains tend to be registered in the number of jobs and output in non-polluting sectors.” Accordingly, the negative effect of taxes on the economy can effectively be neutralized by simply recycling revenues in a way that reduces labor perverse taxes on income.

This study, however, also reports disconcerting findings with regards to investments. Seventy-seven percent of the models tested resulted in a decrease in investment, with most investments falling by about a half percent due to the natural price increase resultant of a carbon tax. These could be corrected with proper revenue recycling measures, but the optimum vehicle would, once again, have to be determined using modeling specific to each economy. Another concern is the negative consequences experienced by high-polluting industries. However, increased productivity in in non-polluting sectors will outweigh decreased output in high-polluting sectors, as demonstrated in Pautrel’s studies. Though output may initially decrease in these high-polluting sectors, this is outweighed by increased productivity in non-polluting sectors, as found in the previous study. Initial blows to GDP will be overcome as the economy shifts to favor efficiency.

The same results that researchers are finding in economic models as described above can be seen in practice in European nations that have already enacted similar tax reforms. Sweden has used a tax on industrial emissions since 1974, and several other countries have had taxes on carbon dioxide in place for well over a decade. Data from the 2005 Eurostat survey found that these carbon taxes have an overall regressive effect on the economy, affecting low-income families the most. Acknowledging these regressive tendencies, all of the countries were able to recycle revenue in a manner similar to the one described above. Sweden neutralized negative effects by reducing income and labor taxes, and the Netherlands granted each


18 Id.

19 Pautrel, supra note 8, at 351.
household a certain amount of tax-free electrical consumption each year.\textsuperscript{20} In comparison to models in which countries did not implement carbon taxes, demand for fuel and greenhouse gas pollutants decreased by as much as six percent. Additionally, data revealed a “positive change in real incomes for all socio-economic groups” and very insignificant, if any, change in GDP.\textsuperscript{21}

Based on the theoretical and empirical data available, Pigovian taxes produce a clear double dividend on pollutants when revenue is recycled back into the economy. Environmental tax reform produces significant reductions in pollutions in theoretical models and in those European countries where these taxes are already levied. These environmental gains, when coupled with the economic benefits they exhibit, make Pigovian taxes a logical approach to addressing pollution.

\textbf{IV. Implementation}

If implemented correctly, Pigovian taxes can drastically improve the current regulatory system under the CAA. The first necessary measure is to identify those pollutants that would be most prudent to place under a system of taxation. Although many pollutants are regulated, Title I focuses on only six major pollutants. Attempting to evaluate and tax the complete list of regulated pollutants would be too large of a task to be politically or bureaucratically viable. Instead, several pollutants that are particularly harmful yet easy to monitor could be analyzed and placed under a system of Pigovian taxation. Pollutants that are commonly produced by industries, like nitrogen dioxide, sulfur dioxide, and particulate pollution, can produce toxic secondary pollutants and cause significant damage to air quality. These pollutants could be examined by economists to determine an optimal tax rate that would raise revenue while still discouraging pollution.

\textsuperscript{20} Paul Ekins et al., \textit{The Implications for Households of Environmental Tax Reform (ETR) in Europe}, 70 \textit{Ecological Econ.} 2472-2485 (2011).

\textsuperscript{21} Mikael Skou Andersen, \textit{Europe’s Experience with Carbon-energy Taxation}, 3 \textit{SURVS. \& PERSPS. INTEGRATING ENV’T \& SOC’Y} 1-11 (2010). Note the graphs on pages 4 and 7 demonstrating the effect of ETR on GHG emissions and GDP.
Tax revenues should be prudently recycled in a system of environmental tax reform similar to those in other countries. The regressive economic effect of taxation should be accounted for with decreases in labor-perverse taxes that have been beneficial in several European countries. Each European country designed its own system of revenue recycling specific to its economic structure and income distributions. Further research would reveal how these techniques can best be implemented in the American economy. Determining the prudent rate of taxation and the correct way to recycle revenue is a complex process, but if successful, this method could negate the harmful effects of taxation and improve employment and output as described in Section III. If too low of a tax rate is implemented, companies might find it more profitable to pay the penalty, thereby lessening the intended effect. Market analysts must determine the correct rate in order to preclude this possibility. Placing taxes on only a few chemicals could also reduce the bureaucratic strain of the current regulatory system. A carefully calculated tax would create a market-driven incentive to reduce pollution in a way that best suits most industries without the red tape and inefficiencies.

The negative connotation of the word “taxation” creates significant difficulty in making such reforms politically viable. Most politicians are likely to dismiss such measures because of unpopularity with the public. However, established economic principles can show that Pigovian taxation are more efficient at improving public and economic health than the currently instituted regulatory system.

V. Conclusion

Air pollution regulation under the CAA is flawed, but postponing reform until a perfect alternative manifests itself is inefficient. Consideration of the advantages and disadvantages of a proposed system will properly justify a shift from the status quo. By evaluating reforms based on their net effect, free from the “unworkable assumption that only perfect systems are tolerable,” rational decisions can be made that will improve welfare. If the citizens sharing

access to the polluted lake were to delay action in search of a perfect solution, they would likewise postpone the economic benefits of improved environmental and human health.

Pigovian taxation carries inherent difficulties, but when examined objectively, the environmental and economic effects yield a net benefit superior to the current system under the CAA. From Section I we see that theoretical and empirical data concerning air pollution’s effects on public health and economies provide the political justification for government intervention. In light of the clear shortcomings of the current system under the CAA, Pigovian taxes can help by providing consistent market feedback while properly redistributing externalities. A pragmatic examination of the clear gains in long-term public and economic health makes a governmental shift towards Pigovian taxation a practical solution for dealing with air pollution and redistributing its externalities from citizens to the offending industries.