NISKANEN CENTER

Policy Brief

A Coasean Rationale for a Carbon Tax

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EXECUTIVE SUMMARY

This policy analysis develops a rationale for a carbon tax based on two key insights from the work of Ronald Coase.

The first insight is that problems of pollution should not be viewed simply as situations in which A harms B, so that A should be restrained with a tax, a suit for damages, an injunction, or a regulatory prohibition. Instead, they should be seen as coordination problems in which the plans of two parties conflict. Reaching optimal coordination typically requires action by both parties. Those will usually include both action by polluters to cut emissions (abatement) and action by pollution victims to reduce harm (adaptation). Putting too much of the burden of coordination on either party is inefficient.

The second insight is that a complete analysis must take into account the direct costs of abatement and adaptation, but also the transaction costs of achieving coordination. Transaction costs include the costs of identifying victims and sources of pollution, assessing damages, reaching agreements on actions to be taken, and enforcing those agreements once they are in place. In some cases, superficially attractive policy solutions turn out to be unsuitable because of their high transaction costs.

The analysis uses the example of coastal flooding caused by climate change as a case study in coordination. The polluters are fossil fuel burning power plants and the victims are coastal property owners. The former have a number of abatement options, including fuel switching and carbon capture, while the latter have abatement strategies that include building sea walls, improving construction, and retreating to higher ground. Following Coase, a full range of policy options are examined for their impact on the behavior of both polluters and pollution victims. When all aspects of the coordination problem are considered, including transaction costs, carbon taxes emerge as an attractive mechanism for dealing with climate change.

INTRODUCTION

The Niskanen Center takes the position[1] that climate change is real, that it is caused by human activity, and that it poses significant risk. Given estimates of possible consequences that range from modest to catastrophic, we believe that reasonable risk management points toward rapid decarbonization as the optimal response.

This analysis examines a full range of policy options for achieving this goal, including private bargaining among property owners, legal action under the common law of torts and property, command-and-control regulation, and market-based solutions that aim to place a price on carbon emissions. Although there may be some role for each of these in addressing the pressing problem of climate change, this analysis concludes that a carbon tax should have a preeminent place in the policy mix.

For us, as for others who are worried about the health of the planet and of our market economy, the "let the polluter pay" principle that lies behind a carbon tax has simple, pragmatic appeal. Sometimes, however, it is worth looking beyond pragmatism to investigate the theoretical and philosophical roots of an idea. This policy analysis does that by developing a rationale for a carbon tax based on the work of Ronald Coase, as expressed in his seminal article, "The Problem of Social Cost."[2]

THE COASEAN CASE *AGAINST* POLLUTION TAXES

At first glance, Coase's paper seems an unlikely place to seek support for a carbon tax. In fact, its very first paragraph warns against automatically assuming that a tax is the best way to resolve problems of environmental externalities:

> The standard example is that of a factory, the smoke from which has harmful effects on those occupying neighboring properties. The economic analysis of such a situation has usually proceeded in terms of a divergence between the private and social product of the factory, in which economists have largely followed the treatment of Pigou in The Economics of Welfare. The conclusions to which this kind of analysis seems to have led most economists is that it would be desirable to make the owner of the factory liable for the damage caused to those injured by the smoke, or alternatively, to place a tax on the factory owner varying with the amount of smoke produced and equivalent in money terms to the damage it would cause or finally, to exclude the factory from residential districts (and presumably from other areas in which the emission of smoke would have harmful effects on others). It is my contention that the suggested courses of action are inappropriate, in that they lead to results which are not necessarily, or even usually, desirable.

Coase goes on to explain that the reflexive preference for pollution taxes arises from a misunderstanding of the problem. We should not, he says, view pollution as a situation in which A harms B, and therefore, we need to restrain A with a tax, a suit for damages, an injunction, or a regulatory prohibition. Instead, we should view them as coordination problems in which the plans of two parties conflict. Those may be conflicting plans for a piece of land, although the notion of property rights can also be extended to personal property and to individual people, whether or not they own tangible property. For example, if you send noxious smoke my way, my choking on your smoke is a violation of my property rights, broadly understood, whether I am standing on land that I own, on property I rent, or walking down a public street.

Coase uses many examples in his paper: a farmer whose wandering cows damage a neighbor's crops, a train whose sparks burn an adjacent woods, a shop whose noisy equipment interferes with examinations being made by a doctor in the next building, and so on. Some of his cases go back to Anglo-Norman times. To the modern reader, many of these examples sound quaint and very limited in scope compared to today's headline pollution issues.

The example in this piece will be damages from sea-level rise induced by human-caused climate change, as suggested by Jordan McGillis.[3] Party A in our example will be a coal-fired power plant that emits CO2 that causes global warming. The warming, in turn, raises the sea level, increasing the frequency of flooding that harms Party B, a coastal landowner. The reader is welcome to think of the power plant as representative of all human contributions to climate change and the coastal flooding as representative of all the harms done by climate change, after netting out any cases in which a warmer climate produces benefits.

The problem here is to coordinate the activities of the two parties in a way that jointly maximizes the value of the two properties when the costs of all measures to mitigate damages are accounted for. Mitigation measures might include, at the power plant, installing carbon capture equipment or converting to less carbon intensive fuel, and on the coast, building sea walls, raising foundations, or moving to higher ground.

At this point Coase, who favored simple numerical examples, might have argued as follows to show why a carbon tax would not necessarily be the best policy. Suppose that when the power plant begins operation, its emissions cause $100 in annual damage to the coastal landowner. Suppose further that it could install equipment to eliminate those emissions at a cost of $80 per year, but that the coastal landowner could reduce damage to zero by building a sea wall at an annualized cost of $60. If so, imposing a $100 tax on the power plant would be a mistake. The tax would induce the power plant to spend $80 on abatement equipment and leave the landowner with no incentive to build the seawall, even though that is the less expensive way to mitigate the harm.

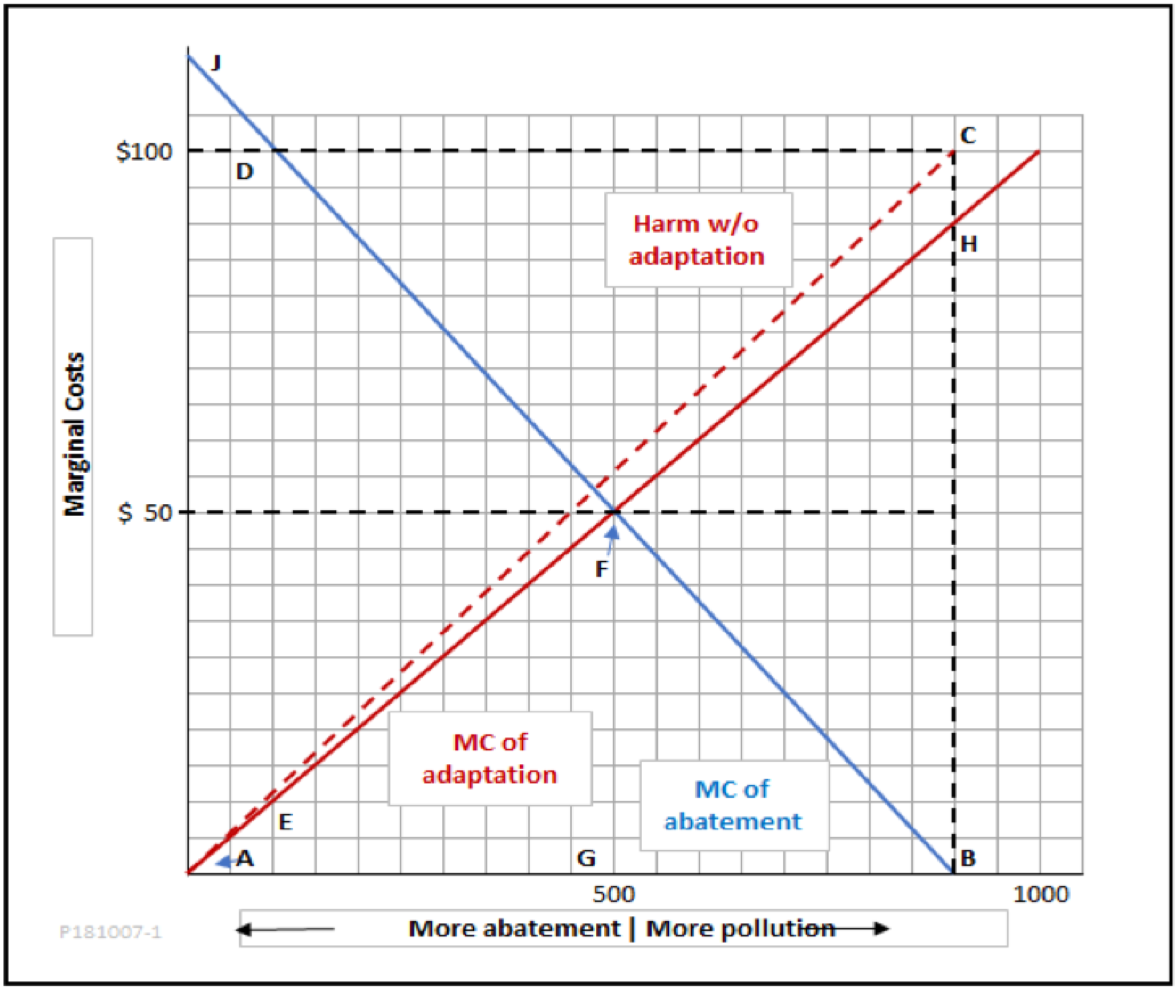
Coase's point is not that pollution taxes are *always* a mistake. Reverse the $80 cost of the abatement equipment and the $60 cost of the seawall, and a tax would produce the right result. Instead, his real point is that we should not just reflexively slap taxes on everything we don't like without a full analysis of alternative solutions to the coordination problems that we want to address. In his words:

> A better approach would seem to be to start our analysis with a situation approximating that which actually exists, to examine the effects of a proposed policy change and to attempt to decide whether the new situation would be, in total, better or worse than the original one.

By all means, let's do just that.

A closer look at the example

Many of the examples that Coase uses have an all-or-nothing character, for example, whether it is worthwhile, or not, to build a fence between one farmer's pasture and another's corn field. However, the case of climate change and coastal flooding is better handled by treating the quantity of pollution, the amount of harm, the costs of pollution abatement and the costs of adaptation as continuous variables. The following diagram represents that approach in schematic form:



The horizontal axis represents the quantity of pollution in arbitrary units and the vertical scale represents the marginal cost per unit of changes in various quantities.

The blue line representing the costs of abatement indicates that if power plant in question faces no cost for CO2, it will emit 900 units (Point B). It can reduce emissions by measures such as installing carbon capture equipment or changing its energy sources. If it decides to reduce emissions below 900, it uses the cheapest methods first, then moves on to increasingly expensive ones. The blue curve representing the marginal cost of abatement thus slopes upward moving from right to left.

The dashed red line represents the harm from the additional coastal flooding that is caused by each additional unit of pollution, assuming that no efforts at adaptation are undertaken. The solid red line represents the marginal cost of adaptation, in this case, the cost of building an ever-higher seawall as pollution increases. The curve slopes upward from left to right because it costs more than twice as much to build a 10-foot seawall than a 5-foot one. For simplicity, we assume that the seawall reduces harm to zero. If it does not – if some risk of flooding remains even with the wall in place, or if the wall itself causes harm such as habitat damage – the solid line would be drawn a little higher in order to include the cost of building the wall plus any harm remaining after it is in place.

Coase's examples typically start from the introduction of a new harm into a previous situation where none existed. In our diagram, the pre-existing situation (Point A) features zero pollution, zero harm, and zero abatement. If the power plant then begins operation with no incentive to undertake abatement measures, it would operate at Point B. Having not yet undertaken any adaptation, coastal dwellers would find themselves at Point C where the harm from the last unit of pollution would be $100. Total harm, equal to the area ABC under the dashed curve, would be $45,000.

Coase is right to say that imposing a pollution tax equal to the marginal harm of $100 would be a suboptimal solution to the problem. Such a tax would induce the power plant to reduce pollution to 100 units (Point D) at a total cost of $40,000 (area under the blue curve between 100 and 900 units). Faced with 100 units of pollution, coastal residents would build a small seawall at a total cost of $500, moving to point E. The combined cost of adaptation and abatement would be $40,500.

But that is clearly a *suboptimal* situation. The least cost method of coordinating the interests of the flood victims and the power plant is found at point F, where the marginal cost of abatement equals the marginal cost of adaptation. Reaching that point would involve installing sufficient abatement equipment to reduce emissions by 400 units, at a cost of $10,000 (equal to area GBF under the abatement curve), and building a seawall high enough to cope with the harm caused by the remaining 500 units of pollution, at a cost of $12,500 (equal to the area AGF under the adaptation curve). Harm would then be reduced to zero at a total cost of just $22,500 – a saving of $18,000 compared to the $40,500 cost of a pollution tax set at a level equal to the $100 marginal harm that would occur when no adaptation or abatement measures are taken.

So far, so good. We have discovered the optimal coordination strategy, but how do we get there? A few more steps are needed to complete Coase's project of examining the situation in total.

THE ROLE OF TRANSACTION COSTS

The next step is to take transaction costs into account. Transaction costs, which play a big role in Coase's analysis, include costs of finding potential partners, negotiating a deal, monitoring compliance once a deal is reached, and resolving disputes. Coasean analysis first looks at how a given coordination problem could be resolved in a world without transaction costs. It then examines the barriers that transaction costs pose to optimal coordination and at ways of mitigating them so that coordination may be improved, even if not fully optimized, in the real world.

The way negotiations would proceed in a world without transaction costs depends on the initial assignment of property rights. In our hypothetical case, we could begin by assuming that the power plant initially has a right to use the air to dispose of CO2 while the coastal owners have no right to exclude CO2 from the air above their property. In that case, a landowner (or group of owners acting together) could contact the power plant and make an offer to subsidize the installation of pollution control equipment up to the point where the marginal cost of abatement exceeded the marginal cost of adaptation. To abate to that level, the plant would be willing to accept any subsidy greater than cost of that amount of abatement (equal to the area of the triangle GBF). The coastal owners would find it worthwhile to make an offer of anything less than what they would save in the costs of a higher seawall (the trapezoid GBHF). The difference (the triangle FBH) is large enough to give plenty of room for a deal that benefits both parties.

Instead, we could start from a situation where the coastal owners had an absolute right to bar unwanted CO2 emissions from their airshed. If so, the power plant could approach them and offer to buy an easement allowing emission of up to 500 units of CO2. The coastal owners would accept any payment greater than the cost of building their seawall high enough to cope with that 500 units of pollution (AGF). The plant would be willing to offer anything less than the cost of squeezing out the last 500 units of CO_2 (the trapezoid AGFJ). The total cost of buying the easement plus the cost of the abatement equipment needed to hold pollution to 500 units would still be far less than the cost of running a completely clean plant (ABJ). Again, there is room for a mutually beneficial bargain.

Regardless of the initial assignment of property rights, then, the parties would achieve optimal coordination in a world without property rights. But, of course, that is not the world we live in.

COORDINATION IN THE REAL WORLD

Our world is a messy one in which there are many pollution sources and many people who are harmed. It is costly for the parties to identify one another, costly to negotiate agreements, and costly to enforce them. The next step in our Coasean analysis, then, is to choose a coordination mechanism that is suitable for the real world with all of its search costs, legal fees, and so on. We need a mechanism that minimizes the sum of abatement costs, adaptation costs, and transaction costs.

Consider three broad types of coordination mechanism. Each is open to many variations. Each posits a different role for government.

The first type of coordination mechanism would rely on private negotiations overseen by a system of courts to enforce a common law of torts and property. It would be up to the government to specify an initial disposition of property rights. The starting point could be the existing set of property rights, whatever those happen to be. However, it would be more in keeping with the Coasean approach to mandate an initial set of property rights designed to minimize the transaction costs encountered in subsequent negotiations.

The common-law mechanism has much to say for it when the number of parties is small and the initial property rights are well defined. In addition to hypothetical examples like farmers and cattle, or railways and sparks, Coase cites actual case law in which a reasonable degree of coordination appears to have been reached. More recently, there was a very Coasean case near where I live, in which a landowner was bothered by noise from a nearby automobile racetrack. To resolve the situation, he negotiated a price with the owners of the racetrack, bought it, and then simply shut it down. But, successful examples of this type almost always involve just one or a few plaintiffs and one or a few defendants. High transaction costs make coordination through voluntary bargaining infeasible in pollution cases where there are millions of pollution sources and millions of victims.

The second type of coordination mechanism, command and control, lies at the opposite end of the range of government intervention. Under this approach, the government issues regulations that specify what pollution control equipment has to be installed at what sites, who can build where, how high buildings must be constructed to resist environmental damage, and so on.

The command-and-control strategy has long been viewed skeptically by economists. The biggest problem is that regulators must operate on the basis of general information that does not reflect the wide variety of local circumstances. As a result, the regulations require too much or too little adaptation in some cases, and too much or too little abatement in others. Even when the degree of adaptation or abatement is reasonable, regulations may mandate technology that is not appropriate. There is no equalization of marginal costs and benefits across categories of pollution sources or victims.

Between common-law and command-and-control lie a category of mechanisms that use the price system to transmit information and decentralize decision making. In recognition of Friedrich Hayek's work on the price system and the [use of knowledge in society][4], we can call these Hayekian coordination mechanisms.

Hayek noted that knowledge of time and place is both impossible to centralize and, at the same time, essential to efficient decision-making. Yet localized knowledge is not enough in itself. As he put it:

> The "man on the spot" cannot decide solely on the basis of his limited but intimate knowledge of the facts of his immediate surroundings. There still remains the problem of communicating to him such further information as he needs to fit his decisions into the whole pattern of changes of the larger economic system.

Prices are the key to making global information available to local decision makers. For example, if the price of an input you use for your farm or factory goes up, you don't need to know why. You only need to know that it has somehow become scarcer, and that you should, if possible, use less of it. The same goes for goods and services used by consumers. Similarly, if the price of something you produce goes up, all you need to know is that you should do your best to produce more.

For ordinary goods, prices are generated by markets through voluntary trading and securely enforced property rights. But what if prohibitive transaction costs make that option unavailable, as is the case for greenhouse gas emissions? We must then choose between markets without prices or prices without markets.

Markets without prices are what we have now. We have markets for energy, capital goods, and consumer goods. Within each of those markets, producers and consumers make choices based on their own knowledge of time and place and on the prices of labor and materials—but with no prices to carry knowledge of scarcities that exist at the planetary level. As producers, should we use electric power from the coal-fired grid or install solar panels? As consumers, should we install heat-conserving blinds or buy a new jet ski? There is no price on emissions to help us make up our minds.

A carbon tax is one way to implement the Hayekian approach. In the simplest version, the tax would be assessed on carbon-based fuels at the point of extraction. It would then be passed along in the form of higher prices to users of carbon-based energy, including both industries and consumers, giving them an incentive to engage in cost-effective abatement measures.

In our example, the tax would ideally be set at the point where the abatement and adaptation curves in our diagram cross, that is, $50 per unit of pollution. Such a tax would make it worthwhile for the power plant to cut pollution to 500 units while giving landowners an incentive to take cost-effective adaptation measures to deal with the remaining pollution.

Cap and trade is an alternative way to put a price on carbon. Under that approach, the government would issue a limited number of permits that would each allow emission of a specified quantity of carbon or other greenhouse gasses. The permits would be traded on an exchange in which the buyers would be parties whose costs of abatement were relatively high and the sellers would be parties whose abatement costs were relatively low. The resulting price of permits would serve as the Hayekian signal to guide the choices of consumers and industrial emitters. In our example, if permits were issued allowing 500 units of pollution, they would trade at a price of $50 per unit. That would produce the same result as an efficient $50 carbon tax.

While the two approaches lead to the same result in our simple example, proponents of carbon pricing seem to be leaning increasingly toward a tax rather than cap and trade. Some emphasize the relative administrative simplicity of a tax. Others worry that cap-and-trade is too vulnerable to the influence of special interests. Still others note that a tax would produce a more stable carbon price, less sensitive to business cycles and other transient market conditions, which would facilitate long-run planning for investments both in clean energy and in adaptation measures.

Critics point out, correctly, that there is no assurance that the government would be able to set the tax or the number of permits in a way that would get the price just right. However, a look at the above diagram shows that a tax could miss the $50 ideal by a considerable amount and still be an improvement over a situation in which transaction costs made it impossible to reach a voluntary coordination agreement of any kind. Similarly, a carbon tax could miss the theoretical optimum rather widely and still be better than the kind of ad hoc command-and-control regulation we have now.

It should go without saying that a carbon tax also has the advantage of attacking the problem of CO2 emissions from many sources and protecting against many different harms all at once. There is no need for a separate policy to control emissions from power plants and a different one to deal with pollution from transportation. There is no need to issue new regulations if new technologies become available. And there is no need for a separate policy aimed at coastal flooding, another to mitigate harm to agriculture, and still another to deal with changes in rainfall patterns.

CONCLUSION

In arguing that pollution control should be viewed as a problem of coordinating the conflicting interests of various property owners, Coase, like many economists before and since, was primarily concerned with improving the efficiency of resource allocation. That is all well and good, but we should not forget that in practice, the choice of coordination mechanism has distributive as well as allocational consequences.

Carbon tax proposals are no exception to the rule that allocative mechanisms have distributive consequences. In the United States, advocates of carbon taxes are split right down the middle on this point. One camp argues for a revenue neutral carbon tax that would allow the reduction or elimination of other, more distortionary taxes. The other camp proposes that carbon tax revenues be redistributed as some kind of social dividend or earmarked for clean energy projects. Disagreement on exactly this issue was a major factor leading to the defeat of the 2016 Washington State carbon tax referendum.

A similar issue divides cap-and-trade advocates. Some propose that the initial allocation of emission permits should be grandfathered free of charge to current polluters, while others argue that they should be sold at auction with the proceeds used to compensate pollution victims, provide tax relief, or invested in climate-related activities such as clean energy research.

Issues of the ethical validity of property rights and the distributional consequences of alternative policies are certainly worthy of debate, but these are issues on which compromise should be possible. It would tragic if they stood in the way of practical measures to mitigate the threats of climate change.

In short, when due consideration is given to the Coasean admonition to examine each specific coordination problem from all sides, a carbon tax—not a punitive one, but one that aims to facilitate the coordination of conflicting interests—stands a good chance of making our situation better than the one we are in now, even if not perfect in all respects.

References

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