Climate Change Remedies

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Climate Change Remedies

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Abstract

The law and economics analysis of the climate change remedies has been focused on the question of which would be the policy instrument most suited to provide incentives to reduce greenhouse gas emissions. The literature focuses mainly on the comparison of carbon taxes and emission trading scheme. But a relevant role can be played by financial and insurance instruments, especially considering the adaptation and mitigation strategies. Finally, another instrument is considered, largely used to internalize other environmental externalities but still not so much analysed for climate change, the liability system.

Definition

Over the last centuries, climate change has become a very important issue all over the world. The change in climate corresponds to an increase in the earth's average atmospheric temperature, which is usually referred to as global warming.

In response to scientific evidence that human activities are contributing significantly to global climate change, and particularly the emissions of greenhouse gas (GHG) emissions, decision-makers are devoting considerable attention to find remedies to reduce the consequences in terms of climate change.

The Concept of "Economic Global Public Goods"

Dealing with climate change implies the concept of "economic global public goods" that can be defined as goods with economic benefits that extend to all countries, people, and generations (Kaul et al. 2003).

First of all, the emissions of GHG have effects on global warming independently of their location, and local climatic changes are completely linked with the world climate system.

In addition, the effects of GHG concentration in the atmosphere on climate are intergenerational and persistent across time.

The fact that climate change is clearly "global" in both causes and consequences implies that, on one side, we cannot determine with certainty both the dimension and the timing of climate change and the costs of the abatement of emissions, on the other side, it emerges a relevant equity issue among countries because industrialized countries have produced the majority of GHG emissions,

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but the effects of global warming will be much more severe on developing countries.

About this last point, the countries that have more responsibilities will face less consequence in the future and vice versa. So it is a global issue to decide the distribution of emission reductions among countries and how the costs should be allocated, taking into account the differences among countries characterized by high- or low-income, high- or low- emissions level, and high and low vulnerability.

Climate change is going to generate natural disasters, meaning events caused by natural forces that become "man-made" disasters, meaning events associated with human activities, given the role of greenhouse gases emitters. More precisely, we can speak of "unintended man-made" disasters originated by global warming (Posner 2004, p. 43).

The rising costs associated with climate change effects pose serious challenges to governments to adopt efficient strategies to manage the increasing economic consequences, and governments are facing the issue to introduce policies to tackle the causes and combat all the effects of greenhouse gas emissions.

Dealing with global public goods, the choice of environmental policies requires a global coordination (Nordhaus 2007). But, in any case, it is difficult to determine and reach agreement on efficient policies because economic public goods involve estimating and balancing costs and benefits where neither is easy to measure and both involve major distributional concerns. As a consequence, it is necessary to reach through governments to the multitude of firms and consumers who make the vast number of decisions that affect the ultimate outcomes.

Carbon Tax and Emission Trading Scheme

The policy instruments that are mainly implemented as remedies against climate change are carbon tax and emission trading scheme (ETS).

A carbon tax is a particular levy on GHG emissions generated by burning fuels and biofuels, such as coal, oil, and natural gas. It is generally introduced with the main goal to level the gap between carbon-intensive (i.e., firms based on fossil fuels) and low carbon-intensive (i.e., firms that adopt renewable energies) sectors.

A carbon tax provides a strong incentive for individuals and firms to adjust their conduct, resulting in a reduction of the emissions themselves because the relative price of goods and services changes. Hence, by decreasing fuel emissions and adopting new technologies, both consumers and businesses can reduce the entire amount they pay in carbon tax.

An emission trading scheme (ETS) is an instrument based on an agreement that sets quantitative limits of emissions and the allocation of emission, allowing the trade in order to minimize abatement costs. At the beginning the allocation of permits can be set through either an auction or a grandfather allocation. Under an auction, government sells the emission permits, whereas under the grandfather rule, the allocation of emission permits is based on historical records.

An ETS is defined as a quantity-based environmental policy instrument. It is also called cap and trade because it is characterized by the allowable total amount of emissions (cap) and the right to emit that becomes a tradable commodity. Under an ETS system, prices are allowed to fluctuate according to market forces.

On the other hand, carbon taxes are defined as price-based policy instruments for the correlated effects to increase the price of certain goods and services, thereby decreasing the quantity demanded.

An emission trading system may efficiently give the incentive to decrease the emissions wherever abatement costs are lowest with positive effects beyond the national borders. As costs associated with climate change have no correlation with the origin of carbon emissions, the rationale for this policy approach is that an emission trading system allows to fix a certain environmental outcome and the companies are called to pay a market price for the rights to pollute regardless of where there will be the benefits. This is the reason why an emission trading system is suitable for international environmental agreements, such as the Kyoto Protocol, and also for the characteristic

that a defined emission reduction level can be easily agreed between states.

Emission trading can be an advantage for private industry because, by decreasing emissions, firms can actually profit by selling their excess GHG allowances, in a way that such a market of permits could potentially drive emission reductions below targets.

A system of ETS entails significant transaction costs, which include search costs, such as fees paid to brokers or exchange institutions to find trading partners, negotiating costs, approval costs, and insurance costs. Conversely, taxes involve little transaction cost over all stages of their lifetime.

Carbon taxes are economic instruments that works dynamically offering a continuum incentive to reduce emissions. In fact, technological and procedural improvements and their subsequent efficient diffusion lead to decreasing tax payment. On the other hand, trading systems will adjust when the emission goals are easier to meet, so that in this case a decreasing demand of permits causes a reduction in their price but not as rapidly as taxes.

The law and economics literature describes as alternative instruments carbon tax and tradable permit system, the former as a price control instrument and the latter as a quantity control one.

Many contributions compare the relative performance of price and quantity instruments under uncertainty, starting with the seminal contribution of Weitzman (1974). For example, Kaplow and Shavell (2002) deal with the standard context of a single firm producing externality; moreover, they consider the case of multiple firms that jointly create an externality, concluding with the superiority of taxes to permits.

In the case of climate change, there are arguments for price controls. The first point is that climate change consequences are uncertain because it is not the level of annual emissions that matters, but rather the total amount of GHG that have accumulated in the atmosphere. The second point is that "while scientists continue to argue over a wide range of climate change consequences, few advocate an immediate halt to further emission" (Pizer 1999, p. 7).

Even if a carbon tax is preferable to an ETS scheme in terms of social costs and benefits, this policy obviously faces political opposition. Private industry opposes carbon taxes because of the transfer of revenue to the government; environmental groups oppose carbon taxes for an entirely different reason: they are unsatisfied with the prospect that a carbon tax, unlike a permit system, fails to guarantee a particular emission level.

The Role of Financial and Insurance Instruments

To face climate change economic consequences, a role can be assigned also to private sector to stimulate the reduction of the probability of catastrophic losses and to manage economically large-scale disaster risks. In this sense a relevant part can be played by the financial and insurance products that are based on mechanisms to manage the economic consequences of risk, including the threat posed by natural hazards.

With the typical insurance contract, for example, individuals and companies protect themselves against an uncertain loss by paying an annual premium toward the pool's expected losses. The insurer holds premiums in a fund that, along with investment income and supplementary capital (where necessary), compensates those that experience losses.

First of all, climate change consequences are insured through the coverage of the risks that insurance companies accept from their customers, since policies already include the provision of the economic consequences of changes in the intensity and distribution of extreme weather events and of the resulting risk of catastrophic property claims (Porrini 2011).

The supply of this kind of products, that are the core business of the insurance industry, experiences some problems.

First, climate change's relationship to global weather patterns increases the potential for losses so large that they threaten the solvency of the insurance companies.

Second, uncertainties in assessing climate change's impacts are high, affecting property

and casualty, business interruption, health, and liability insurance, among others. As a result, insurers could charge a significantly higher premium or, in certain cases, avoid to supply this kind of policies.

Third, many climate change-related risks may be correlated, creating a skewed risk pool and exacerbating the risk of extremely large losses, and that some of these risks are not well distributed across existing insureds.

Beyond the problems of insurability, financial and insurance market provide for other kind of products. Examples are "compensation funds," such as special government disaster funds, to promote framework of contingency measures to tackle climate change consequences. These funds, created in connection with a regulatory system mainly to cover environmental damage and victims' compensation, can be financed by a taxation system or by a firm's contribution system. The main example is the Superfund in the United States, connected with the regulatory system by Environmental Protection Agency (EPA).

Other examples are products characterized by ex ante commitment of financial resources, such as the so-called "financial responsibility" instruments. This term defines all the tools that require polluters to demonstrate ex ante sufficient financial resources to correct and compensate for environmental damage that may arise through their activities.

In its common application, financial responsibility implies that the operation of hazardous plants and other business is authorized only if companies can prove that future claims will be financially covered, for example, through letters of credit and surety bonds, cash accounts and certificates of deposit, self-insurance, and corporate guarantees.

Generally, financial responsibility may be complementary, sometimes mandatory, to the legislation on environmental accidents. In its different applications, it has a common motivation: to ensure the future internalization of the costs in order to indemnify the victims and discourage different forms of environmental deterioration.

On a law and economics point of view, financial responsibility can be defined as (potentially) efficient instruments to correct the asymmetric information issue. First of all, there is an incentive for the financial institutions to check that the companies are taking adequate preventive measures. Secondly, the companies are motivated to take precautions because financial responsibility guarantees that the expected costs of environmental risks appear on their balance sheet and business calculation (Feess and Hege 2000).

There are also alternative risk transfer products. A first kind of products is catastrophe bonds, consisting in securitizing some of the risk in bonds, which could be sold to high-yield investors. The cat bonds transfer risk to investors that receive coupons that are normally a reference rate plus an appropriate risk premium. By these products, financial institutions may limit risk exposure transferring natural catastrophe risk into the capital markets.

Weather derivatives are another kind of financial instrument used to hedge against the risk of weather-related losses. Weather derivatives pay out on a specific trigger, e.g., temperature over a determined period rather than proof of loss. The investor providing a weather derivative charges the buyer a premium for access to capital, but if nothing happens, then the investor makes a profit.

With all this kind of insurance and financial products, it is possible to reach some efficiency goals. First of all, they give the possibility to stimulate ex ante preventive measure and to economically compensate ex post the victims. The second goal is the availability of extra capital for recovery that comes from financial markets. Finally, the accuracy and the resolution of hazard data and the likely impacts on climate change may improve with the involvement of financial market forecast ability.

The Mitigation and Adaptation Strategies

The challenge of reducing in the future the consequences of climate change is often framed in terms of two potential strategies: adaptation and mitigation. Mitigation involves lessening the magnitude of climate change itself; adaptation,

by contrast, involves efforts to limit the vulnerability to climate change impacts through various measures, while not necessarily dealing with the underlying cause of those impacts.

"Mitigation" indicates any action taken to permanently eliminate or reduce the long-term risk and hazards of climate change to human life. A definition can be "An anthropogenic intervention to reduce the sources or enhance the sinks of greenhouse gases" (IPCC 2001).

"Adaptation" refers to the ability of a system to adjust to climate change to moderate potential damage, to take advantage of opportunities, or to cope with the consequences. A definition can be "Adjustment in natural or human systems to a new or changing environment" (IPCC 2001).

Mitchell and Tanner (2006) defined adaptation as an understanding of how individuals, groups, and natural systems can prepare for and respond to changes in climate. According to them, it is crucial to reduce the vulnerability to climate change. While mitigation tackles the causes of climate change, adaptation tackles the effects of the phenomenon. The potential to adjust in order to minimize negative impact and maximize any benefits from changes in climate is known as adaptive capacity. A successful adaptation can reduce vulnerability by building on and strengthening existing coping strategies.

In general, the more mitigation there is, the less will be the impacts to which we will have to adjust and the less the risks for which we will have to prepare. Conversely, the greater the degree of preparatory adaptation, the less may be the impacts associated with any given degree of climate change.

The idea is that less mitigation means greater climate change effects, and consequently more adaptation is the basis for the urgency surrounding reductions in greenhouse gases. The two strategies are implemented on the same local or regional scale and may be motivated by local and regional priorities and interests, as well as global concerns. Mitigation has global benefits, although effective mitigation needs to involve a sufficient number of major GHG emitters to foreclose leakage. Adaptation typically works on the scale of an impacted system, which is regional at best, but mostly local, although some adaptation might result in spillovers across national boundaries.

Climate mitigation and adaptation should not be seen as alternatives to each other, as they are not discrete activities but rather a combined set of actions in an overall strategy to reduce GHG emissions. The challenge is to define an efficient mix of government policy interventions to provide the right incentives to invest in cost-effective preventive measures to reduce the final cost of disasters. The target is to tackle the consequences of climate change by mitigation, through the promotion of ways to reduce greenhouse gas emissions and make society to adapt to the impacts of climate change, by promoting the effective limitation and management of risks from extreme weather-related hazards.

On a law and economics perspective, generally, private contracting has been recognized as a significant and potentially effective means of influencing private actors' behavior and even as a form of environmental policy instrument. So the financial and insurance products, that we have above analyzed, have significant potential to influence the behavior of individuals through its contracting contents, and this implies that the financial markets can play a role within the mitigation and adaptation policies.

For example, insurance companies may offer differential premiums to customers depending on the customers' level of protection from loss caused by weather-related disasters with an opportunity for insurers to reduce their own overall and maximum possible loss exposure while promoting communities' overall resilience in the face of climate change's impacts. Moreover, financial products can include arrangements intended to bring needed capital that will reduce the risk posed by future climate-related hazards to those who are most likely to be in peril.

Financial and insurance products could affect incentives for individuals to address climate change seeking mechanism to facilitate mitigation of GHG and adaptation to the inevitable impacts of climate change. Additionally, financial institutions are motivated to take significant actions aimed at mitigating overall societal greenhouse

gas emissions and increasing adaptive capacity because these actions would reduce overall uncertainty and decrease people and business' potential exposure to catastrophic risks in excess of their capacity.

Conclusive Remarks on a Future Climate Change Liability System

The law and economics analysis of the climate change remedies has been focused on the question of which would be the policy instrument most suited to provide incentives to industry and other sources to reduce greenhouse gas emissions. And the literature is still giving attention mainly to the comparison of carbon taxes and emission trading scheme (Nordhaus 2006).

Not so much attention has been addressed to another instrument to provide incentives to polluters to reduce emissions, largely used to internalize other environmental externalities, the liability system. With "liability" we intend the possibility of applying national tort law to the damage caused by climate change and the possibility for holding states liable under international law if emissions originating from a country were to cause damage to the citizens of other nations.

Even if it seems that the application of a liability system to climate change is merely a theoretical issue, in reality more and more public authorities or individuals have tried to sue large emitters of GHG, and, in some cases, claims were directed against governmental authorities for failure to take measures to reduce emissions of greenhouse gases.

As an example, in 2002, the small island state Tuvalu threatened to take the United States and Australia to the International Court of Justice as a result of their failure to stabilize GHG emissions, thus causing the melting of ice caps which consequently leads to a rise in sea levels which threatened its territory. Although for a change in government the application was never made, this example demonstrates the way in which international law could be used to impose liability for climate change-related harm.

Beyond this specific case, most of these claims would probably not qualify as liability suits in the strict sense, since it is usually not compensation for damage suffered that is asked by the plaintiffs, but rather injunctive relief in order to obtain a reduction of greenhouse gasses. Moreover, most of the claims brought so far, mainly in the United States, were either not successful, were withdrawn, or have not yet led to a specific result.

On a law and economics point of view liability is not only an instrument "to obtain compensation for damages resulting from climate change (the more traditional liability setting) but equally are looking at the question to what extent civil liability and the courts in general may be useful to force potential polluters (or governmental authorities) to take measures to reduce (the effects of) climate change" (Faure and Peeters 2011, p. 10).

A liability system could also play a role in mitigating climate change, and a question is open to what extent it is useful to use the civil liability system to strive for a mitigation of greenhouse gas emissions in addition to the existing framework which largely relies on carbon tax and emission trading systems.

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