

# TAX POLICY ANALYSIS OF CLIMATE CHANGE

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### INTRODUCTION

There is now a scientific consensus that the Earth's climate is rapidly changing, mainly as a result of increases in greenhouse gases (GHG) caused by human activities; and that if GHG emissions continue at present levels, the world will experience a radical transformation of its climate by mid- to late century, with grave, possibly catastrophic, consequences to humanity.<sup>1</sup>

Climate change is the outcome of a well-defined efficiency problem known as a negative externality. This refers to instances where an individual or a firm undertakes an action that imposes a cost on other individuals or firms without compensating them for it. The absence of compensation is the result of transaction costs that preclude negotiation of mutually beneficial deals between the affected parties. In the case of GHG emissions, these costs are borne by the entire global population. As a result, there is over burning of fossil fuels, under-abatement and deforestation.

The solution to the efficiency problem is obvious. Individuals and firms need to be forced to internalize the cost; that is, face a private cost that is equal to the social cost. The social cost is the true cost of their actions; therefore, for them to act efficiently, this is the cost they should front. The most straightforward way of achieving this outcome is to impose a tax (known as Pigouvian tax) equal to the marginal social cost. This will correct the externality. Setting a price on GHG

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<sup>1</sup> See, e.g., INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: SYNTHESIS REPORT, SUMMARY FOR POLICYMAKERS (2007) Available at: <http://www.ipcc.ch/ipccreports/ar4-syr.htm>; NICHOLAS STERN, THE STERN REVIEW: THE ECONOMICS OF CLIMATE CHANGE (2007), available at [http://www.hm-treasury.gov.uk/stern\\_review\\_report.htm](http://www.hm-treasury.gov.uk/stern_review_report.htm). In fact, levels of emissions are not expected to continue at present levels but to *accelerate* due to the rapid industrialization of China and India.

emissions is necessary in order to transmit their social costs to the day-by-day decisions of all firms and individuals, thereby bringing their activity to the efficient level.

Another mechanism, or policy tool, to solve the externality problem is a cap-and-trade system. The two policy tools differ in certain respects but, if well designed, could be equally efficient. They do differ, however, in one critical sense: the cap-and-trade system does not allow the separation of efficiency and equity considerations suggested in this paper. The cap-and-trade system is *based* on allocating allowances across countries. Developing countries rightly reject allocation based on current levels of emissions and request that emission rights would be allocated by reference to population. The problem is that a per-capita baseline would be ineffective if developing countries were allowed to pollute according to the current developed countries per-capita levels. If the mechanism chosen were tradable permits with caps set on a world average per-capita basis it would result in the transfer of hundreds of billions of dollars from rich countries, most notably the US, to vastly populated poor countries, China and India in particular. The US is highly unlikely to ever accept such terms.

*Local* pollution is the classic textbook example of a negative externality that requires government intervention to make polluters internalize the full cost of their actions and adjust their activities accordingly. And all governments do so. The case of climate change is much more complicated. National governments are subject to a free riding problem, as they are likely to prefer the interests of their own residents, wishing to provide them with a competitive advantage over foreign residents. Each country would gain a competitive advantage by not sharing in abatement costs, as the benefits are distributed globally, being a *global* public good.

In the absence of a world government, the only solution to the global externality problem is international cooperation. The Kyoto Protocol was an attempt at such cooperation. Unfortunately it failed, leading to the regrettable reality that only about 8 percent of current global emissions are subject to Kyoto limitations, and its impact on climate change is expected to be insignificant.<sup>2</sup> The reason for the failure of the Kyoto Protocol was the exemption of developing countries, which resulted in growth in emissions in those countries as well as to the American withdrawal. An effective agreement would have to cover all major countries.<sup>3</sup>

It seems to me that the only way to reach such an agreement is to separate the efficiency and the equity aspects of the problem, if not fundamentally then at least by framing and that is exactly where tax policy analysis and methodology can help.<sup>4</sup>

The first part of the paper suggests two relevant insights from tax policy analysis and applies them to the problem of climate change. I believe they are the keys to breaking the current stalemate on climate change. The second part of the paper discusses additional issues that are relevant to the choice between carbon tax and a cap-and-trade system. The third part of the paper discusses conditions for optimality. The fourth discusses the interaction between a cap-and-trade system and the income tax system from a tax policy perspective; and the fifth part of the paper answers the main income tax practical questions raised by the introduction of a cap-and-trade system. Finally, I conclude.

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<sup>2</sup> See William D. Nordhaus, To Tax or Not to Tax: Alternative Approaches to Slowing Global Warming, 1 Review of Environmental Economics and Policy 26, 27 (2007).

<sup>3</sup> See Richard B. Stewart and Jonathan B. Wiener, Reconstructing Climate Policy 3 (AEI, 2003).

<sup>4</sup> See David F. Bradford, Improving on Kyoto: Greenhouse Gas Control as the Purchase of a Global Public Good in the Design of Climate Policy 13-36 (ed. Guesnerie and Tulkens 2008) (proposing to create an international fund to which countries will contribute according to “a formula to be determined in the negotiations,” and that fund would then purchase abatement reductions from the business as usual emissions level worldwide. Such a mechanism separates the efficiency and equity issues by relegating the equity issue to the formula that determines the contributions).

## **A. APPLICATION OF TAX POLICY PRINCIPLES TO THE CLIMATE CHANGE PROBLEM**

Tax policy analysis can be very useful in reaching global agreement on the solution to the climate change problem. It can help representatives of the countries overcome the difficulties that currently prevent them from reaching global cooperation. Two relevant important insights of tax policy are: (i) a clear analytical separation between efficiency and equity considerations, and (ii) a mechanism to solve the problem of free riding.

### **1. Efficiency/Equity Separation**

The main hurdle to reaching cooperation seems to be the lack of separation between the efficiency and equity questions. In my view, this is a tragic mistake. Currently, the world is still a livable place. If we keep on doing close to nothing, catastrophes are likely to happen. The current uncoordinated sporadic efforts are not expected to do much.<sup>5</sup>

According to (domestic) tax policy analysis, government intervention in the market is justified on two grounds: correcting for market failures and the promotion of justice (equity). When correcting for market failures, considerations of equity are ignored. The rules are designed to achieve maximum efficiency. Equity takes the form of distributive justice and is addressed by the tax and transfer system that corrects for inequalities in the initial allocation of endowments as well as for any unwarranted

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<sup>5</sup> The fifteenth 'Conference of the Parties' (COP) under the United Nations Framework Convention on Climate Change (UNFCCC) which took place last December in Copenhagen, failed (as was expected) to reach an agreement. A minimalist framework agreement (an 'Accord') was reached, although failing to win consensus support. The accord specified temperature limit and mentioned the provision of financing and commitments on forests and technology transfer. However it not is legally binding and there is nothing in it that pins down countries to individual targets or specifying what major developing countries will do. As it was reached mostly thanks to the efforts of the US President, progress seems to crucially depend on the US making good on its promise to lead on the environmental front. This, however, depends on what will happen with the US Senate cap-and-trade bill, which prospects are currently bleak. See John Broder and Clifford Krauss, *Advocates of Climate Bill Scale Down Their Goals*, N.Y. Times (Jan. 26, 2010).

distributive consequences of the rules that were designed to correct for market inefficiencies.<sup>6</sup>

In the context of climate change, it seems to me that the first step should be securing the future. This does not mean that questions of equity may be ignored. It only means that Earth's climate should not be held hostage in a bargaining game. It is too important, and the dialogue between developed and developing countries seems to lead to a deadlock. Under the Kyoto Protocol, developing countries are not subject to any limitations on emissions. Only the developed countries listed in Annex I are subject to such limitations. The world's largest emitters are not limited by this protocol, either because they were excused or because they are not part of it, making the Protocol's impact on climate change insignificant.

According to my suggestion, countries should first agree to solve the efficiency problem without going into the question of equity. The most direct way of employing the market mechanism to reduce GHG emissions is by making people pay for their pollution, through a harmonized carbon tax, with each country retaining the tax revenue.

The tax rate might be determined by estimates of the price necessary to limit GHG concentrations or temperature changes below some level we are willing to tolerate.<sup>7</sup> The rate will need to be adjusted over time to reflect new information regarding climate change. This will require authorizing a body of international experts

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<sup>6</sup> Louis Kaplow & Steven Shavell, *Why the Legal System is Less Efficient than the Income Tax in Redistributing Income*, 23 *J. Legal Stud.* 667 (1994); David Weisbach, *Taxes and Torts in the Redistribution of Income* 70 *Chicago Law Review* 493 (2002). See also Louis Kaplow, *On the (Ir)Relevance of Distribution and Labor Supply Distortion to Government Policy*, 18 *Journal of Economic Perspectives* 159 (2004).

<sup>7</sup> Agreeing on a GHG concentrations or temperature target is difficult because countries are expected to be differently affected by climate change and because countries use different discount rates when planning for the future. It seems, however, that it is much easier to reach a global agreement on the GHG concentrations or temperature target, most countries agreeing to 450-550 parts per million (ppm) to be "dangerous interference," than on cost sharing where there is an absolute disagreement between countries such as the US on one side and China and India on the other.

to amend the rates every once in a while, or when significant changes take place. This can be set in a formula that adjusts the tax rate according to some measurement of global GHG emissions. It will limit the need for frequent interferences by the international body of experts mentioned above.

The next step is somewhat more difficult: providing individuals, firms and countries with incentives to create negative emissions, that is, to sequester carbon. When an individual or firm sequesters, that is, actively reduce GHG concentrations in the atmosphere, we could expect the government to provide them with negative carbon tax, namely, to pay them. The problem, however, is that the beneficiaries are the entire world population; hence, the national government may lack the incentive to pay.

Payment should come from a global fund to which everyone who stands to gain from the sequestration, that is, the entire world population, contributes. Climate change is a global problem; hence, countries are mere conduits or pass-through entities. As such, they can perform administrative functions but the ultimate costs and benefits must be accounted for on the individual level. Countries can collect national taxes and contribute to the international fund that will compensate negative emitters. The country can aggregate all negative emissions that take place within its jurisdiction, receive the payment from the international fund, and distribute the money to the negative emitters within its jurisdiction. Some countries, such as tropical countries that are ideally suited to engage in forestation, are likely to generate significant negative emissions and they should be paid for their efforts by the rest of the world. An international fund would facilitate such transfers.<sup>8</sup>

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<sup>8</sup> See Bradford, *supra* note 4, proposing the creation of a similar fund. The difference between his proposal and mine is that he proposed using the fund to pay for abatement actions in general, whereas I propose to use it only to pay for negative emissions. I believe that global agreement may be reached over implementing a harmonized carbon tax with each country retaining its revenue, and suggest using

The need for an international fund, financed by contributions made by national governments that raised the money through national taxes, is based on an insight from tax policy, viewing negative GHG emissions as global public goods. The entire global population benefits from it, but each country has an incentive to let other countries pay for it, that is, to free ride. This is the second insight from tax policy mentioned above.

## **2. Addressing Free Riding**

As mentioned in the Introduction, governments may not be willing to enforce limitations because each country has an incentive to free ride. As long as other countries limit the GHG emitted by their resident individuals and firms, any individual country can gain a competitive advantage by not incurring such abatement costs. Solving the free-riding problem without a world government is extremely difficult, but when the benefits of cooperation are great enough, as in this case, governments can be expected to cooperate.

### **2.1. Free Riding in the Context of Mitigation (the Positive Tax Case)**

Emission reductions will be efficient if all emission sources are covered and if the marginal costs of emission reduction are equalized across countries. This requires that all countries participate. The literature emphasizes leakage, namely, the transfer of polluting industries to countries that do not tax or otherwise restrict emissions. The importance of full participation becomes even greater when supply-side effects are acknowledged. If significant countries, in terms of production or market size, are not part of the scheme, leakage, as well as the growth in their use of oil due to the

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the international fund only where carbon tax was negative and it would therefore be unlikely to be paid by the national government. I suggest that contributions to the fund will be done according to a fixed percentage of countries' Gross Domestic Product (GDP). See discussion in A.2. below.

decreased world oil price, may counterbalance the entire effort and could even increase global GHG emissions.<sup>9</sup>

If participation is not full, participating countries should impose border tax adjustments, and trade sanctions should possibly be imposed on non-participating countries.<sup>10</sup>

Border tax adjustments are tariffs imposed on the import of carbon-intensive goods and tax rebates on the export of such goods. Viewing environmental regulation, carbon tax, cap-and-trade or any hybrid system as imposing an “emission tax,” border tax adjustments are required to assure that this tax is imposed on a destination basis. Like Value Added Tax (VAT), each country is responsible for taxing all carbon-intensive goods consumed within its jurisdiction. Each country imposes carbon tax or uses cap-and-trade to impose a tax on GHG emitted in its territory, including those emitted in the production of goods. With regard to imported products, each country can use a rebuttable presumption to impose the border tax. If the exporting country can substantiate the evidence that the emissions were in fact lower than presumed, the importing country can adjust its border tax accordingly.<sup>11</sup>

This will subject emissions generated in the production of goods in non-participating countries to emissions tax whenever they are exported to participating countries. It will also protect firms in participating countries from being at a competitive disadvantage compared to firms producing the same products in non-participating countries.

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<sup>9</sup> See, for example, Mustafa Babiker, *Climate Change Policy, Market Structure, and Carbon Leakage*, 65 *Journal of International Economics* 421 (2005) (arguing that Kyoto resulted in an increase in global carbon emissions).

<sup>10</sup> The term “participating countries” refers to countries that participate in a global harmonized effort to reduce GHG emissions. The term “non-participating countries” refers to countries that do not take part in such effort. See Joseph E. Stiglitz, *Making Globalization Work* 181-182 (New York: W. W. Norton, 2006) (suggestion the use of trade sanctions against non-participating countries).

<sup>11</sup> See Gilbert Metcalf and David Weisbach, *The Design of a Carbon Tax*, *Harvard Environmental Law Review* (forthcoming 2009).

Border tax adjustment cannot offset supply side effects. They cannot affect the increased consumption of oil by non-participating countries. True, non-participating countries will not be able to benefit from the low price of oil by producing products at relatively low cost and selling them in the markets of the participating countries. The border tax adjustment in the participating countries will tax those products. But they will gain from the reduced cost of production when selling in their own local markets and to markets of other non-participating countries. Moreover, their firms will gain a competitive advantage over firms that are residents of participating countries when it comes to sales in markets of non-participating countries. Border tax adjustments will be useless in this respect.

Assume, for example, that China will choose not to participate, namely, will not impose any restrictions on GHG emissions. Its products exported to the participating countries such as the EU, Japan and (hopefully) the US will be subject to carbon tax in those countries. But its local consumption, as well as its exports to other non-participating countries, will not be affected. It will benefit from the world's reduced demand for oil, thanks to restrictions that the participating countries imposed upon themselves, and will consume more oil, thereby emitting more GHG than before. Therefore, the overall effect of green policies adopted by some, but not all, countries, on climate change are unclear. Border adjustment taxes are not enough to secure a positive outcome.

The only way to overcome this problem is to attain (close to) full coverage. If this is not achieved, offering carrots is one solution, but sticks should be considered as well. It is possible that if major emitting countries refuse to join a cap-and-trade agreement or to impose a carbon tax, the participating countries should be allowed to

defend themselves against the free riding forced upon them. Trade sanctions may be an appropriate route.<sup>12</sup>

## **2.2. Free Riding in the Context of Sequestration (the Negative Tax Case)**

I suggest creating an international fund to which countries will contribute according to their ability to pay. This fund would pay countries that generate negative emissions, according to the assessment of an international body of experts.<sup>13</sup>

There are differences in the ways by which countries will be affected by climate change. This means that benefits that countries stand to gain from averting the problem are different. Nevertheless, I suggest that the contributions to the international fund should be based on ability to pay (wealth) without accounting for the differences in the benefits that countries are expected to gain from averting the climate change problem. Assessing the differences in expected benefits across countries depends on scientific assessments that are much too vague and requires agreement on assumptions regarding the baseline for comparison.<sup>14</sup>

An accurate calculation would run into too many objections and bargaining hurdles and would significantly increase the risk that no agreement will ever be reached, or that years will be lost in negotiations.

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<sup>12</sup> See Stiglitz, *supra* note 10.

<sup>13</sup> The availability of accurate monitoring is crucial. Current technology allows measurement of GHG emissions by geographic area, through satellites and other measures. The within country distribution of funds will probably have to be left to the local government. International experts may advise governments on how to identify the projects that were responsible for the GHG sequestration and to assess their contribution.

<sup>14</sup> In order to assess the benefit to each country from averting the climate change problem we need to decide on a baseline of abatement measures taken and on our time horizon. If, for example, we assume a baseline according to which no country does anything to prevent GHG emissions, and look forward a 100 years, then it is quite probable that Earth will be drastically changed and all countries will suffer tremendously. At such levels of cost the differences are not important. The limiting case is that everyone dies. The differences between countries are relevant only under assumptions that some, but not enough, abatement will take place so that moderate levels of climate change will happen. Under such circumstances some countries may even benefit from a warmer weather, whereas other countries will suffer at different degrees.

Ignoring the differences in benefits and basing the contributions to the fund solely on ability to pay (wealth) maintains the general similarity to domestic tax policy analysis. In the domestic context too, we do not tie the taxes paid to the benefit that each individual derives from the public goods financed by the tax. The similarity may help reaching global cooperation as countries are more likely to accept mechanisms they employ in their domestic policies.

We usually compare the wealth of countries using the measure of GDP per capita. Basing the payments to the fund on GDP and not on GDP per capita may sound wrong, but the latter does not make sense. There are huge differences in population size between countries; it makes no sense for the US and Denmark, for example, to pay the same amount in dollars because their GDP per capita are similar. GDP is a measure that accounts for both income and population size.

Countries with larger populations benefit to a greater extent from averting the climate change problem. Because of its large population, India has a larger GDP than that of many wealthier countries. It may seem wrong to ask poor India to pay more than, say, wealthy Norway, but it would in fact be the correct result. Climate change is a global problem that affects all individuals. As mentioned above, the countries should be thought of as pass-through entities. Large countries represent a larger number of individuals who will benefit from solving the problem.

Contributions to the international fund will be according to GDP, which accounts for wealth as well as for population size. Each country will raise the money it is required to contribute through its tax system, thereby basing it on the ability to pay of its residents.

This mechanism seems to me to be inherently fair and suits notions of fairness that are accepted in most countries, including the US, in the design of their tax and

transfer system. It involves a mild version of equity, similar to that of using the tax and transfer system to finance (domestic) public goods. Because the funding is according to GDP, which reflects wealth as well as population, whereas the benefit, namely, the global public good, is not correlated with wealth, the outcome will be redistribution from rich to poor countries. Such a solution is similar to a domestic universal welfare system, where everyone receives the same amount or in-kind transfer. It is also the standard (domestic) solution to the free riding problem inherent to the financing of public goods. Taxes are paid according to ability, but all residents equally share in the benefits.<sup>15</sup>

The distributive element can be demonstrated by assuming a flat tax to finance the provision of public goods. If, for example, a high-income taxpayer pays 30% of one million dollars, and a low-income person pays 30% of 50,000 dollars, then the former pays 300,000 dollars in taxes and receives the same benefit as the latter person who pays only 15,000 dollars. If we assume that the value of the public goods per person is 50,000 dollars, then the effective tax rate of the high income person is 25% whereas the effective tax rate of the low income person is -70% because she, in effect, received 35,000 on an income of 50,000.

The same is true in the global context. All countries would contribute according to GDP and will all receive a benefit that for simplicity and political feasibility reasons I assume to worth about the same to people all over the world.

I believe that all countries including the US will agree to contribute to such a fund on a GDP basis. This is very different from setting caps on emission per capita, a standard that would be extremely costly to the US, much more than to any other country, and that the US therefore strongly opposes. There are many countries whose

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<sup>15</sup> Ignoring differences in the benefits derived from the public goods, for practical reasons mentioned above.

GDP per capita is about the same as that of the US. The GDP of the US is greater than that of those countries but only because the US has a larger population. As mentioned above, it makes sense for countries to pay according to their population size because the benefit from reducing GHG emissions is to individuals, not to countries.

I am therefore quite confident that the US will find such a mechanism, under which many other countries will share the burden according to their ability to pay (adjusted for population size), acceptable.

### **3. Equity**

Developing countries have various moral claims against developed countries.<sup>16</sup> The two leading claims seem to be the following: (1) developed countries are responsible for most of the current stock of GHG in the atmosphere; (2) rich nations must bear the costs of solving the climate change problem as a form of redistribution from rich to poor countries.

The first argument is one of corrective justice. According to this argument justice requires that countries that created the problem would compensate the countries that are not responsible for the current stock but nevertheless suffer its consequences. It resembles a claim for damages or reparations. There are huge differences between countries in their share of the responsibility for the stock of GHG. The popular differentiation between developed and developing countries is not very meaningful when the facts are closely examined.<sup>17</sup> I suggest treating this like a

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<sup>16</sup> For a comprehensive analysis of the equity arguments see Eric Posner, Cass Sunstein & David Weisbach, *Climate Change Justice* (Princeton University Press, forthcoming 2009).

<sup>17</sup> See David Weisbach, *Responsibility for Climate Change, By the Numbers*, John M. Olin Program in Law and Economics Working Paper Series Working Paper No. 448.

tort or a reparation claim leaving the exact amounts to be determined on a per country basis.<sup>18</sup>

The calculation will require assessing the contribution of each country to the existing GHG stock divided by its population size. Calculating the contribution per capita is necessary because climate change is a global phenomenon that affects the lives of individuals all over the world. Countries are mere conduits used for administrative purposes.

Contrary to my proposed mechanism for dealing with the efficiency problem, which ignores, for pragmatic reasons, the differences in benefits that countries are expected to attain from averting the climate change problem, I think that in the context of a corrective justice claim accounting for them is feasible, if found to be required on moral grounds. Quickly reaching an agreement over a mechanism to solve the climate change problem seems to me by far more important than reaching the most accurate one in terms of cost sharing. In the context of a tort/reparation claim, where the forum is judicial, it may be possible to discuss the differences in benefits across countries and make some reasonable determinations.

The compensation for the corrective justice claim should take the form of a one-time payment, as it is compensation for past behavior. The payment itself could be done in installments.

The second argument, global distributive justice, is analytically separate from the issue of climate change. The argument that there is a link between the differences in wealth across countries and climate change, namely, that some countries are rich

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<sup>18</sup> For a discussion challenging the theoretical strength of such claims see Eric A. Posner, *Responses to Global Warming: The Law, Economics, and Science of Climate Change Climate Change and International Human Rights Litigation: A Critical Appraisal*, 155 U. PA. L. REV. 1925 (2007); Posner, Sunstein & Weisbach, *supra* note 16.

because they have been using Earth's resources without paying for them and should therefore compensate the poor countries, belongs in the corrective justice category.

Using climate change as a bargaining chip to put pressure on rich countries to redistribute towards poor countries is dangerous because it delays, and could even prevent, reaching a world solution to the climate change problem. In that case, the entire world will loose. Ironically, poor countries will be the first to suffer the terrible consequences of climate change due to their fewer resources to adapt.

### **3.1. Adaptation**

Developing countries often raise the issue of adaptation as part of the global agreement on the solution to the climate change problem, but it should be noted that this belongs to the equity side. It is *not* part of the solution to the negative externality problem and does not involve any free riding. It is about a country providing benefits to its own residents. By engaging in adaptation, the country does not improve, in any way, the lot of individuals outside its borders. Adaptation is different from emission mitigation or carbon sequestration where the country contributes to global welfare and asks to be paid for doing so.

Transfers from rich to poor countries in order to finance adaptation to climate change in developing countries may be justified on corrective justice grounds as well as under the general argument of global distributive justice.

To the extent countries can make a tort or reparation claim they may receive compensation under a corrective justice claim and use the money to finance adaptation. As mentioned above, some poor countries contributed significantly to the stock of GHG in the atmosphere and some rich countries have not. If such claims can be morally justified, it may be a matter of urgency to make a quick assessment of

which countries are both poor and likely to need significant adaptation even assuming that mitigation takes place, followed by an intermediate assessment of which countries should be paid and by whom, without waiting for a full and accurate settlement of the tort/reparation claim. This depends on whether mitigation alone would suffice to prevent catastrophes from taking place in each specific poor country. If it does, then there is no reason to rush the resolution of the corrective justice claims. If, however, adaptation is required to prevent catastrophes in some poor countries even if the positive and negative taxes described in Part 2 above take place, addressing equity to some limited extent becomes urgent. Under the intermediate assessment, money would be transferred to finance adaptation in those poor countries that have a *prima facie* strong case on corrective justice grounds. In order to secure the participation of the rich countries in this scheme, the amounts transferred would be less than what the final amounts are likely to be, as getting the money back after the final judgment in case of an error in the interim judgment, is likely to be infeasible. But the amounts should be enough to finance some adequate level of adaptation.

As for poor countries that cannot be paid under a corrective justice claim, or if corrective justice claims are dismissed on moral grounds, it seems to me that the case for a moral obligation to help them in financing some minimal level of adaptation costs is strong under any conventional distributive justice theory. According to Utilitarianism, the utility of all individuals is equally important and borders are mostly irrelevant.<sup>19</sup> Cosmopolitanism also supports global distributive justice.<sup>20</sup> Even Statism, which rejects the idea of an indefinite international redistribution duty,

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<sup>19</sup> See e.g., Louis Kaplow, *The Theory of Taxation and Public Economics* 35-50 (Princeton University Press, 2008).

<sup>20</sup> See e.g., Charles Beitz, *Political Theory and International Relations* (Princeton University Press, 1979); Thomas Pogge, *World Poverty and Human Rights* (Polity Press, 2008); Amartya Sen, *Global Justice* (paper presented the World Justice Forum in Vienna, July 2008).

supports distribution that is based on humanitarian duties, such as starvation or severe malnutrition.<sup>21</sup> Without foreign financed adaptation, many of these countries will suffer from flooding or severe drought, and some countries, such as the Maldives and Bangladesh, will be totally or significantly covered by the ocean.

Currently, poor countries rely on the Clean Development Mechanism (CDM) as an outside source of funding adaptation. Article 12 of the Kyoto Protocol allows firms in developed countries to save on abatement costs in their own countries if they engage in CDM, that is, invest in projects that reduce emissions in developing countries.

If a transfer to developing countries is justified under general distributive justice principles it should not be linked to CDM. A direct transfer based on equity grounds is assured whereas CDM may or may not take place, depending on investors' decisions.<sup>22</sup>

CDM provides us with additional examples of how trying to promote efficiency and distributive justice with the same instrument creates perverse outcomes.<sup>23</sup> As mentioned above, some of the countries that are not Annex I countries, and are supposedly developing, are in fact wealthier in terms of GDP per capita than some of the Annex I countries. For example, making Europeans pay

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<sup>21</sup> See John Rawls, *The Law of Peoples* (Harvard University Press, 1999); Thomas Nagel, *The Problem of Global Justice*, 33 *Philosophy and Public Affairs*, 115 (2005).

<sup>22</sup> Under my proposal all countries, including poor ones, will be required to impose a carbon tax, and all countries will be able to receive negative tax payments from an international fund in case they take measurable actions that reduce GHG concentrations in the atmosphere. The transfer payment for adaptation, based on equity grounds, will be justified only if required to prevent catastrophes. As such it is not likely to provide poor countries with significant disincentives to engage in activities that reduce GHG concentrations.

<sup>23</sup> Promoting distributive justice is only one interpretation of Article 12 of the Kyoto Protocol. The main goal of CDM is the promotion of efficiency. The efficiency of CDM is questionable because developing countries are not subject to emissions caps. The CDM provides them with incentives to create opportunities for low cost abatement financed by foreigners, that is, to pollute, or at the very least, crowds out self-financed abatement efforts.

wealthy oil-producing countries for CDM from carbon sequestration does not promote global distributive justice.<sup>24</sup>

The lesson from the first insight of tax policy analysis is that efficiency and equity considerations should be addressed by separate means. The most efficient method for reducing GHG emissions should be adopted by all countries, and equity should be addressed through separate direct transfers. Corrective justice claims are decided by court and result in direct payments if successful. Distributive justice is mostly based on income when promoted on the national level. In the case of global distributive justice, assuming that due to administrative constraints it is confined to transfers between countries and not between people,<sup>25</sup> it should be done according to countries' GDP per capita, which is how we compare the wealth of countries.

## **B. THE CHOICE BETWEEN CARBON TAX AND A CAP-AND-TRADE SYSTEM**

The primary question in the tax policy (public finance) literature on climate change is which of the two tools -- carbon tax or cap-and-trade, is superior.<sup>26</sup> There is no dispute that both are superior to regulatory controls: firms have better information than the regulator regarding abatement costs; hence, market-based approaches allow the firms flexibility to choose the most cost effective means of abatement and to use them in the least costly locations. In addition, they provide polluters with incentives to

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<sup>24</sup> It could be justified, on efficiency grounds, if those countries were subject to emissions caps or introduced a carbon tax.

<sup>25</sup> Transfers between people would promote global distributive justice more accurately, as transfers between countries result in transfers from poor people in rich countries (who suffer the cost of a reduced welfare state) to rich people in poor countries (assuming the poor country is unable to limit the benefits to its poorest residents).

<sup>26</sup> The literature overwhelmingly supports carbon tax. For comprehensive discussions see Reuven Avi-Yonah and David Uhlman, *Combating Global Climate Change: Why a Carbon Tax Is a Better Response to Global Warming Than Cap and Trade*, 28 *Stan. Envtl. L.J.* 3 (2009); Metcalf and Weisbach, *supra* note 11; Shi-Ling Hsu, *Nine Reasons to Adopt a Carbon Tax*, Working Paper (2009).

decrease pollution even when actual emissions are below the required threshold, thereby inducing innovation.<sup>27</sup>

Superficially, the two tools seem quite similar. If permits are allocated at business-as-usual (BAU) level of emissions, a permit may be viewed as a pre-paid tax. The government could either impose a tax that will increase production cost thereby decreasing supply, or fix the quantity supplied, by imposing a cap and auction a permit, bringing to exactly the same equilibrium.

A closer look reveals fundamental differences between the two policy tools. One important difference -- the potential superiority of carbon tax in allowing negotiators to separate the efficiency and equity issues was discussed in Part A above. A few additional differences will be discussed below.

### **1. Differences in the Source of Uncertainty**

The cap in Cap-and-Trade provides certainty of achieving the environmental goal, but this comes at the cost of uncertainty regarding abatement costs. To satisfy the cap, the firm has to spend on abatement either directly or by purchasing permits on the market, and the uncertainty regarding the future cost of abatement (or permits) can be quite high. From our limited experience with permits, we know that the price can be quite volatile. In 2006, CO<sub>2</sub> trading prices under the European Emission Trading System (EU ETS) ranged from \$44.47 to \$143.06 per ton, and the price of permits fell by more than 70 percent in one month. Looking at the US SO<sub>2</sub> emissions-trading program, we see that prices varied from a low of \$66 per ton in 1996 to a high of \$860 per ton in 2005.

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<sup>27</sup> Stewart & Wiener, *Supra* note 3, at 66-68.

A carbon tax, on the other hand, provides cost certainty because the cost is a fixed percentage of output. However, it involves uncertainty as to achieving the environmental goal. It is possible that the tax will not provide sufficient incentives to keep emissions below our environmental target.

Both certainties are important. In setting up the environmental goal, the policymaker assesses the economic cost expected to result from climate change as well as the expected cost of abatement. It is a balance of the two that determines the environmental goal. But which type of error results in greater welfare loss to society? Weitzman (1974) seminal paper suggests that the answer depends on the relative slopes of the curves for the marginal cost and marginal benefits of emissions control.<sup>28</sup> In the many papers that followed, it was argued that carbon tax is superior because the benefits are related to the stock of GHG in the atmosphere (so the marginal benefit is almost fixed), while the costs are related to the flow of emissions and are much more sensitive at the margin.

Beginning with Roberts and Spence (1976), a set of hybrid policy tools was developed.<sup>29</sup> Floor and ceiling prices were added to the cap-and-trade system: the government buys permits when their price reaches the floor and sells more permits (above the cap) when the price reaches the ceiling. The relaxation of the cap is known as a "safety-valve" option. Whenever the cap is relaxed, the system functions as a tax, offering price certainty at the cost of uncertainty in benefits. There are many versions of hybrids. The latest is probably the one suggested by Murray, Newell & Pizer

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<sup>28</sup> Martin L. Weitzman, Prices vs. Quantities, 41 *Review of Economic Studies* 477 (1974).

<sup>29</sup> Marc Roberts and Michael Spence, Effluent Charges and Licenses under Uncertainty, 5 *Journal of Public Economics* 193 (1976).

according to which the maximum number of allowances to be issued in exercising the safety-valve option will be limited.<sup>30</sup>

### **1.1. Price Uncertainty and Innovation**

The literature on price volatility has primarily focused on the need for a safety valve to prevent price hikes. It is worth noting that price floors are also very important due to their effect on innovation. As mentioned above, one of the important advantages of market-based approaches over regulation is providing incentives to innovate. This is necessary because firms have an incentive to reduce abatement at any level of production in order to save taxes (in the case of carbon tax), or to free up permits for sale (in the case of a cap-and-trade system).

Firms depend on innovators to come up with new abatement technologies. Innovators are required to make significant investments in research and development. They will do so only if they expect to be able to sell successful innovations at a profit. If permit prices are low, firms will not be interested in purchasing costly new abatement technology, hence uncertainty regarding price may hinder innovation. Innovators need to be assured that there will be buyers for their products, and a carbon tax or a floor on permit price provide such assurance.

## **2. Administrative Costs and Political Feasibility**

Other, more important, parameters that should be considered when comparing the two systems are administrative costs and political feasibility. Carbon tax is simpler to implement, but cap-and-trade seems more attractive politically. In the domestic context, such as in the US, its popularity can be explained by the success of the Acid

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<sup>30</sup> Brian Murray, Richard Newell & William Pizer, Balancing Cost and Emissions Certainty: An Allowance Reserve for Cap-and-Trade, RFF Discussion Paper 08-24 (2008).

Rain program in dealing with a regional pollutant. It can also be explained by the support of firms that anticipate that the permits will be allocated gratis at BAU levels. Receiving free permits is a windfall to firms because once the program is implemented, the market price of their goods rises because the price reflects the alternative cost of not selling the permits. At the same time, production costs will not increase because they will incur no abatement costs; those will be offset by the permit, which they receive for free.

In the international context, which is more important than the domestic one as we are dealing with a global problem, cap-and-trade has mostly failed. It was adopted by developing countries under Kyoto but this does not mean much because they were exempt from limitations and therefore could only gain from joining it. Reaching a truly global agreement, subjecting all major emitters to limitations, does not seem to be plausible at present course. Promoting harmonized carbon tax coupled with an international fund to finance negative emissions seems to me to be worth trying.

### **3. Supply-Side Effects**

Surprisingly, the vast literature on climate-change finance fails to address one fundamental problem recently raised by Hans-Werner Sinn.<sup>31</sup> Taxes on emissions as well as replacing some of the fossil-based energy sources with clean energy sources, such as wind and solar energy; greater energy efficiency at home or while driving; and many other policies that are thought to be helpful in averting climate change are all meant to reduce the demand for fossil fuels. The assumption is that the reduced demand will lead to a reduction in GHG emissions.

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<sup>31</sup> Hans-Werner Sinn, Public Policies against Global Warming, CeSifo Working Paper No. 2087 (2007).

The problem with this assumption is that it fails to account for the fact that as long as exploration, extraction and refining costs (hereinafter: extraction costs) of oil are relatively low, the decrease in demand will be offset by a reduction in the price of oil, and the quantity consumed will not change.

To state the argument more accurately, theoretically, the carbon tax could be high enough to decrease supply if oil extraction costs are significant, however, the tax rate will have to be much higher than what is generally envisioned. Moreover, efforts to reduce demand for oil, such as encouraging the use of hybrid cars or clean energy, can be entirely offset by the reduction in oil prices, unless these innovations are provided at unrealistically low cost.

In the absence of full coverage, green policies adopted by some countries merely reduce the energy prices for countries that do not adopt such policies, and the increased consumption by the latter will offset the outcome of the green policies implemented by the former. The aggregate amount of GHG emissions will not decrease and the climate change will proceed at the same pace.

Policies that can reduce GHG emissions are those that cannot be offset by a reduction in oil prices; these mostly include forestation and other forms of sequestration. Preventing deforestation is very important as CO<sub>2</sub> emissions from deforestation account for about 18 percent of global GHG emissions, which is equivalent to the emissions created by the entire transportation sector worldwide.

Interestingly, caps on GHG emissions are perfectly efficient if full coverage is attained. It is possible that imposing caps is more realistic than imposing the very high carbon tax rates that would be necessary to offset supply side effects.

In order to make a case for cap-and-trade based on supply side argument, two factual elements need to be established. The first is that extraction costs are

sufficiently low. If they are significant, the ability of oil producing countries to lower prices will be limited. The second is the political feasibility question. In fact imposing a high carbon tax is politically feasible than the supply side argument does not provide any significant support to cap-and-trade.

### **C. CONDITIONS FOR OPTIMALITY**

Emission reductions will be efficient if all emission sources are covered and if the marginal costs of emission reduction are equalized across countries. This requires that all countries, or at least all countries that are significant in terms of production or market size, are part of the scheme.<sup>32</sup>

Another important prerequisite for efficiency is the repeal of all existing taxes, subsidies and environmental regulation, subject to qualifications discussed below.

Most countries have various taxes and subsidies on GHG emissions, even before the implementation of a full fledged carbon tax or a cap-and-trade program. Once a carbon tax or cap-and-trade program is in place, all these taxes and subsidies must be repealed. The reason is simple. The carbon tax or cap-and-trade should be fine tuned to eliminate the externality. Any additional tax will cause distortion, setting a price on emissions that is above the efficient point.<sup>33</sup>

The same is true for subsidies and environmental regulation. Take, for example, the Corporate Average Fuel Economy (CAFE) standard, which requires car manufacturers to meet certain minimal goals of weighted average fuel economy, expressed in miles per gallon. Once the carbon tax or the cap-and-trade program is in

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<sup>32</sup> See discussion in Part 2.1. above.

<sup>33</sup> This may not be true in sub-markets that do not respond to prices. A common example in the literature is the case of homeowners or developers that are separated from the tenants who bear the increased costs of electricity. This seems to me to be an empirical question that is worth exploring, figuring out whether there really is an inherent inefficiency problem, or whether it is merely the usual questions of tax incidence or transition. If found to exist it may call for targeted intervention in those sub-markets that could take the form of subsidies.

place, the market will provide firms with accurate incentives for GHG emissions. If it turns out that certain car manufacturers find it efficient to pay the tax or to purchase permits and produce big cars, there is no reason to intervene, as long as we know that the overall emissions are at or below our stated goal. The CAFE is an indirect way of achieving this goal and it will only create distortions once an accurate method is implemented.

The only exceptions are those government interventions that seem to be aimed at limiting GHG emissions but in fact can be justified on other grounds. Gasoline taxes, for example, may be justified as Pigouvian taxes to correct for other externalities such as congestion.

Tax incentives (subsidies) for research and development are likely to be the most important exceptions. Innovation is a public good. An unlimited number of people can use one innovation simultaneously, future innovations will be based on it, and it is relatively difficult to limit its use only to those who pay for using it. There will almost always be spillovers. Hence, the social benefits from innovation far exceed the private ones, and as a result, there is underproduction of innovation.

This is especially true when research requires significant upfront investment. If access is not restricted, innovators will not be able to recoup their costs. Government intervention is therefore required, and this takes various forms such as providing innovators with intellectual property rights to allow them monopolistic power for a limited period of time, bestowing grants, offering prizes, and tax subsidies.

Therefore, subsidies or government grants for research in the area of alternative clean energy sources may be justified, even though the carbon tax by itself will provide firms with incentives to buy innovative products. This will be justified because, in addition to the negative externality of emission that is corrected by the

carbon tax or the cap-and-trade program, there is the positive externality of innovation that takes the form of positive spillovers to society, and this needs to be addressed as well.

As a harmonized carbon tax is merely a theoretical option at this point in time, whereas a cap-and-trade system is effectively in place under the Kyoto Protocol, although on a very partial scale, the remainder of the paper will focus on the latter and will briefly examine its interactions with income taxation on both policy and practical levels.

#### **D. CAP-AND-TRADE INTERACTION WITH INCOME TAXATION: POLICY QUESTIONS**

##### **1. Is there a “Double Dividend”?**

Carbon tax is a source of revenue. So is a cap-and-trade system if permits are auctioned. This revenue can be used to reduce taxes such as the income tax that distorts labor-supply and saving decisions. As the carbon tax, or cap-and-trade system ("emission taxes") correct a market inefficiency thereby increasing welfare, and using the tax revenue generated by the emission taxes to reduce a pre-existing distortion is also welfare-increasing, emissions taxes are thought to produce a “double dividend” to society.<sup>34</sup>

This argument fails to account for the fact that environmental policies interact with distortions caused by other taxes such as the income tax. For example, the emissions taxes raise the price of the underlying products, thus lowering the real wage thereby distorting labor supply, as leisure cannot be taxed. This may create the same excess burden as a tax on labor income. It is therefore more accurate to say that there

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<sup>34</sup> See David Pearce, *The Role of Carbon Taxes in Adjusting to Global Warming*, 101 *Econ. J.* 938 (1991); Don Fullerton and Gilbert E. Metcalf, *Environmental Taxes and the Double-Dividend Hypothesis: Did You Really Expect Something for Nothing?*, 73 *Chi.-Kent L. Rev.* 221, 238 (noting that Pearce 1991, was the first to use this term).

is only one dividend. Moreover, unless something is done to offset the distorting effects of the environmental tax on labor supply -- such as raising revenue and using it to reduce income tax rates -- there may not be even one.<sup>35</sup> This supports the argument that permits should be auctioned and not allocated gratis.

## **2. Loss Limitation Rules**

Countries that have income tax systems do not allow full loss offsets; that is, they do not treat positive and negative tax bases symmetrically. They fully participate with the taxpayer in her gains but refrain from doing so in the case of a loss. No rationale has been offered so far and the literature often argues that it is both inequitable and distortive, leading to too little risk-taking.<sup>36</sup> The most plausible explanation is an unspecified fear of tax evasion. Governments may be concerned that full loss offset would motivate taxpayers to engage in tax planning and evasion. But it is unclear in what way this is qualitatively different from their motivation to reduce their taxable income, and why government policy should have a discontinuous change when taxable income reaches zero.<sup>37</sup>

Empirical papers show that this asymmetric treatment of gains and losses has had significant effects on US corporations;<sup>38</sup> and theoretical papers demonstrate its significant excess burden and its adverse effect on production.<sup>39</sup> Tax asymmetry in a world of uncertainty (that is, in the real world) distorts production level. The type of

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<sup>35</sup> See Gilbert Metcalf, *Environmental Taxation: What Have We Learned in this Decade?* in *Tax Policy Lessons from the 2000s*, ed. Alan D. Viard (AEI, 2009).

<sup>36</sup> See, e.g., Mark Campisano and Roberta Romano, *Recouping Losses: The Case for Full Loss Offsets*, 76 *Nw. U. L. Rev.* 709 (1981). Lily Batchelder and Alan Auerbach suggested, in a discussion at NYU Tax Policy Colloquium, that net operating losses could be an indicator good for ability. This would justify loss limitations on equity grounds, assuming the intuition could be substantiated empirically.

<sup>37</sup> Comment made by Dan Shaviro at the Colloquium mentioned in the previous footnote.

<sup>38</sup> See, for example, Rosanne Altshuler and Alan Auerbach, *The Significance of Tax Law Asymmetries: An Empirical Investigation*, 105 *Quarterly Journal of Economics* 61 (1990).

<sup>39</sup> See Rafael Eldor, Yoram Margalioth, Eyal Sulganik & Itzhak Zilcha, *Tax Asymmetry and the Futures Markets*, 48 *Economics Quarterly* 246 (2001).

inefficiency is different from the inefficiency caused by the (symmetric) income tax system, captured by the conventional concept of excess burden. Interestingly, a low asymmetric tax may be more distortive than a high symmetric tax rate.<sup>40</sup>

The income tax limited-loss deductibility may exacerbate the distortion caused by the permit price volatility under a cap-and-trade system. Adopting a large-scale cap-and-trade system, especially if adopted without a safety valve in order to promote benefit certainty (and to mitigate supply-side effects), may call for re-evaluation of the income tax loss-limitation rules. Making the tax system symmetric with respect to gains and losses will increase the efficiency of a cap-and-trade system, as it will reduce the cost of permit price volatility. Alternatively, it could be part of a discreet set of tax rules if one is applied to permits. In the meantime, developing markets for permit forwards, options, and swaps could assist in hedging the risk, thereby increasing efficiency.

## **E. INTERACTION WITH INCOME TAXATION: PRACTICAL QUESTIONS**

### **1. Deductibility**

Business expenses – the costs incurred by the taxpayer in the production of income, must necessarily be deductible if the income tax is to be imposed on income and not on sales, thus becoming an excise tax on transactions. Section 162(a) of the Internal Revenue Code authorizes the deduction of “all ordinary and necessary expenses incurred during the taxable year in carrying on any trade or business.”

Abatement costs clearly fall into this category. These are costs incurred in order to produce business income in compliance with the law. The business could not

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<sup>40</sup> Loss limitations are not the only source of tax asymmetry. Tax planning could reverse the outcome. See Yoram Margalioth, Eyal Sulganik, Rafael Eldor & Edrey, A Cost of Tax Planning, *Review of Law & Economics* (forthcoming 2009). It is therefore important to study the tax planning opportunities created by permit markets to assess the relevant effective tax asymmetry and even its direction.

legally be operated without incurring them and they do not provide any personal consumption. Hence, they should be deducted from gross income.

Instead of incurring abatement costs, the taxpayer can surrender a permit to the Environmental Protection Agency (EPA). Permits therefore replace abatement costs and should be similarly treated for tax purposes; that is, their cost should be deducted from gross income. When permits are traded, the cost of a permit will equal the marginal cost of abatement.

Carbon tax is no different from a permit. In the absence of uncertainty, taxes and permits are substitute methods for imposing the Pigouvian tax on emissions. The firm can either incur abatement costs and pay no carbon tax, or refrain from abating and pay carbon tax on its emissions. Following this logic, the carbon tax should also be deducted, as like abatement, it is a cost incurred in the process of generating taxable income.

## **2. Practical Tax Issues Raised by Cap-and-Trade**

The cap-and-trade system creates a new asset – the permit, which raises various questions as to its appropriate tax treatment. In the US, there are currently only three official sources of guidance on the subject: Rev. Rul. 92-16,<sup>41</sup> Rev. Proc. 92-91,<sup>42</sup> and Private Letter Ruling 200825009.<sup>43</sup> The first two relate to sulfur dioxide (SO<sub>2</sub>) emissions permits under the Clean Air Act of 1990, and the third concerns US taxation of the sale of permits under the European Union Emissions Trading Scheme.

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<sup>41</sup> Internal Revenue bulletin, No. 1992-12, March 23, 1992, p. 6.

<sup>42</sup> Internal Revenue bulletin, No. 1992-46, November 16, 1992, p. 32-33.

<sup>43</sup> PLR 200825009; 2008 PLR LEXIS 778 (March 7, 2008).

A fourth document is IRS Announcement 92-50<sup>44</sup> that predated the revenue procedure and raised questions, soliciting comments from the public. These questions were later answered in Rev. Proc. 92-91.

Rev. Rul. 92-16 tells us that permits allocated by the EPA for free, that is, gratis, will not be taxed. The taxpayer's basis in such permits will be zero.

According to Rev. Proc. 92-91, “[t]he costs incurred to acquire or hold an emission allowance must be capitalized because the allowance has a useful life substantially beyond the taxable year to which it is allocated. These costs, including any amounts paid to acquire or hold an allowance (such as the purchase price and any properly allocable legal, accounting, and engineering fees), constitute the holder's tax basis in an emission allowance under section 1012 of the Code.”

The taxpayer can deduct the cost of the permit only upon surrendering the permit (possibly in parts) to the EPA, that is, in the year in which emissions took place. This is seen as if the taxpayer sells the permit for zero amount realized, hence, gets to recover its cost basis. The asset is a capital asset, but abatement costs are deducted against ordinary income. Therefore, the deduction of permit costs should also be allowed to offset ordinary income. The revenue procedure seems to allow such a deduction, stating that “[a] utility will generally be permitted to recover its basis in an emission allowance that is applied against sulfur dioxide emissions occurring in a particular year by deducting the amount of its tax basis in that emission allowance in the year that the sulfur dioxide was emitted.”

Prior to actual use of the permit, the taxpayer cannot invoke a depreciation deduction because there is no ascertainable useful life over which it could be

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<sup>44</sup> Internal Revenue bulletin, No. 1992-13, March 30, 1992, p. 32.

depreciated. Moreover, the permit does not experience gradual exhaustion, wear and tear, or obsolescence.

If the firm sells or exchanges an emission permit, it will recover its basis under section 1001 of the Code. The difference between the consideration paid to the firm (the amount realized) and its cost basis in the permit, will be the taxable capital gain.

If the firm is a dealer in such permits, namely, it holds emission permits primarily for sale to customers in the ordinary course of trade or business of dealing in permits, any gain or loss realized from the sale or exchange will be ordinary. The firm will recognize gain or loss in the year of the sale or exchange, unless a non-recognition provision of the Code (such as section 1031) applies.

When two permits are exchanged, they are considered to be like-kind property for the purposes of section 1031, regardless of the year to which the permits are allocated by the EPA. Hence, gain will not be recognized for tax purposes at the time of exchange. Each firm will transfer its tax basis in the relinquished permit to its newly owned permit.

Penalties imposed in case of emitting without a permit, or beyond the level allowed by the permit, cannot be deducted for income tax purposes. Such a penalty falls within the meaning of section 162(f) of the Code, which states that “no deduction shall be allowed under subsection (a) for any fine or similar penalty paid to the government for the violation of any law.” See also section 1.162-21 of the regulations.

The revenue procedure does not analyze the case of gifts, but there seems to be no reason not to continue applying the usual property tax treatment to the permits in the case of a gift. Therefore, sections 102 and 1015 will apply to permits, i.e., excluding the gift from taxation but giving the donee the tax basis of the donor in order to preserve the potential for taxing appreciation that took place prior to

receiving the gift. The same should be true when the permit is transferred by bequest or inheritance. The transfer will be excluded from income under section 102, and the recipient will get the permit with a basis equal to the fair market value on the date of the decedent's death, according to section 1014.

A more recent directive is Private Letter Ruling 200825009. This is a weak form of guidance as it is directed only to the taxpayer who requested it and, according to Code section 6110(k)(3), it may not be used or cited as a precedent. Nonetheless, it is most important to us because it deals with CO<sub>2</sub> emissions.

The question concerned US taxation of the sale of permits under the European Union Emissions Trading Scheme. An American was a shareholder in a Controlled Foreign Corporation (CFC), which is a foreign corporation more than 50% of whose voting stock is owned by US stockholders, each of whom owns at least 10% of the voting power. The US shareholder in the CFC must include in gross income her pro rata share of the corporation's subpart F income for the taxable year, even if that income is not distributed to her in the form of dividend. Subpart F income is mostly made up of "passive" income like dividends, interest, royalties, and rents.

The CFC sold CO<sub>2</sub> permits and the question was whether this constituted Subpart F income. According to the PLR, it was not. The IRS found the permit to be intangible property that is used or held for use in the CFC's trade or business, and as such does not generate Subpart F income.

It is worth noting that the PLR stated that "[t]he Service is currently studying this question" and limited the analysis by explicitly refusing to commit to any classification of the permit beyond the confines of the specific question. Thus, even though the tax treatment of SO<sub>2</sub> permits according to the revenue ruling and revenue

procedure seemed quite straightforward the PLR creates uncertainty as to the future tax treatment of CO<sub>2</sub> permits.<sup>45</sup>

### **3. New Challenges Created by Cap-and-Trade**

The cap-and-trade system creates two unique challenges to the income tax system. One is an exacerbation of the lock-in effect, when the permits are allocated gratis. The other challenge, noted by Mitchell Kane, relates to the fact that countries tend to have quite different tax rates, and cap-and-trade creates a new possibility for tax planning -- purchasing and deducting permits in one country where the tax rate is high, though the actual production takes place in a second country where the tax rate is low.<sup>46</sup> In the remainder of this paper, I will briefly explain the exacerbation of the lock-in effect when permits are allocated gratis and suggest potential solutions.

#### **3.1. Lock-in Effect**

An income tax system is supposed to tax the increase in the taxpayer's ability to consume. There is no need for the taxpayer to actually consume in order to levy the tax. That would be a consumption tax. Income tax measures the taxpayer's potential to consume. A change in the value of assets owned by the taxpayer affects her ability to consume in the same way that a change in the amount of cash she has does. Nonetheless, changes in the value of an asset owned by the taxpayer are not taxed

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<sup>45</sup> As suggested by Mitchell Kane, our choice of transition rule with regard to the initial allocation of permits could complicate the tax rules and distinguish them from ordinary property tax rules. See Mitchell Kane, Taxation and Global Cap and Trade, prepared for NYU Conference on Climate Change: Financing Green Development, May 3-5, 2009.

<sup>46</sup> See Kane, *supra* note 45.

before a realization event takes place. Realization under section 1001(a) of the Code is a sale or other disposition of the property.<sup>47</sup>

The primary reason for the realization requirement is the difficulty in assessing the value of assets before they are actually sold.<sup>48</sup> A secondary reason is liquidity. Taxpayers may not have the money to pay the tax before they have actually sold the asset. This is much less important, as the taxpayer can borrow either from a third party or from the government by paying the tax later with interest. A third, probably the primary reason in terms of its effect on real policy, although erroneous in theory, is the conception that “paper gains” do not constitute income.<sup>49</sup>

The incentive created by the realization requirement creates a distortion called the lock-in effect. The owner of an asset that has appreciated will be deterred from selling even if somewhat better investment options are available,<sup>50</sup> because upon sale the gain will be realized and taxed. This results in misallocation of capital, that is, inefficiency.

Permits are assets. When a firm purchases a permit either from the government in the primary auction, or on the secondary market, it receives a cost basis in the permit. It may use the permit in the current year, deducting the cost upon surrender, or it may bank the permit for use, or sale, in the future. If a firm decides to bank the permit, it must be expecting abatement costs to increase in the future at a rate that is higher than the yield it can earn on investment in other assets. The income tax

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<sup>47</sup> The realization requirement is a significant tax concession. Owners of assets can sell them at the end of the year if they have depreciated, but retain them in case of appreciation and defer the tax. Moreover, section 1014 of the Code exempts appreciation from tax altogether in the case of a bequest.

<sup>48</sup> Although disposition of property includes an exchange of properties if the properties exchanged are materially different. Such an exception to the cash rule is necessary in order to prevent a (tax motivated) retreat to a barter economy.

<sup>49</sup> See Deborah Schenk, A Positive Account of the Realization Rule, 57 Tax Law Review 355, 356 (2004).

<sup>50</sup> The alternative investment will have to offer a yield that is equal or greater than  $r(1-t)$ ,  $r$  being the current investment's rate of return.

will have a lock-in effect on the permit market. Firms will tend to defer permit sales that might otherwise be efficient in order to defer the tax on the accrued capital gain.

The lock-in effect will be especially significant when permits are allocated gratis and are not taxed upon receipt, as is the case under current US law according to Rev. Rul. 92-16 mentioned above. The firms have a zero tax-basis in their permits, hence their gains from deferral will be even greater. This increases demand for permits and distorts their market price. Similarly, firms will be tax-induced to defer the use of their permits, that is, to continue banking them. When a purchased asset is realized, the investor can deduct the nominal (that is historic) cost. This means that the amount invested in purchasing the asset is not even adjusted for inflation. No such amount exists in case the permit was allocated gratis. This makes a permit a tax preferred investment, distorting its price in equilibrium.<sup>51</sup>

To reduce the distortion created by the lock-in effect, the government can auction the permits instead of allocating them gratis. As mentioned above, this is warranted on other grounds as well, as it will provide the government with revenue instead of creating a windfall for the firms. The cap creates scarcity and, by allocating the permits gratis, the government gives the scarcity rent to the firms instead of using it for better causes such as reducing the labor/leisure distortion by lowering income tax rates.

If due to political constraints, the permits have to be allocated gratis, then they should be taxed when they are issued. This will provide the government with revenue and will give the firms a tax basis equal to the fair market value of the permit on the date of receipt, thereby decreasing the lock-in effect to its regular size.

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<sup>51</sup> See Ethan Yale, Taxing Cap and Trade Environmental Regulation, 37 J. Leg. Stud. 535 (2008).

A related point is inventory management. As mentioned above, the price of permits tend to fluctuate. The firms, which purchase permits at different times, pay different prices and have an incentive to surrender and deduct the costs of the more expensive permits while retaining those permits that were bought for low prices to sell in the long term, benefiting from tax-deferral. This type of tax planning can be prevented by requiring firms to manage their permits use and sale on a First-In-First-Out basis.

The mechanism of inventory accounting could be used to tax the value of the permits on a mark to market basis. The values of all permits held by the firm will be aggregated, based on their market values at the end of each year. The difference between the opening year balance (determined on the previous day) and the end year balance will be taxed. Sales and surrenders of permits throughout the year will be deducted from the closing balance and the proceeds from sales will be included in taxable income. This would eliminate any tax deferral and eradicate tax induced intertemporal distortions.

The advantages of taxing capital assets on an accrual basis are well known, and the question of whether it is efficient to distinguish between assets that are traded, such as traded securities, and non-traded assets whose value is difficult to ascertain, has been much debated. Tradable permits seem to differ in most relevant aspects and a case could be made for taxing them separately on an accrual basis.

## **6. CONCLUSION AND POLICY RECOMMENDATIONS**

This paper is an effort to provide tax policy and tax practice perspectives on climate change. Tax policy analysis and methodology could help to generate the cooperation necessary to solve this global public goods problem. In order to prevent

catastrophes from happening, all major countries worldwide must cooperate and this does not seem to be the current trend. The major obstacle to cooperation is disagreement over sharing the costs of abatement. Tax policy analysis can help to separate the efficiency and equity aspects of the problem, and to start to take care of the future while dealing with equity as a claim for damages or reparations.

The suggested solution is a harmonized carbon tax under which each country retains the tax revenue. An international fund, financed according to GDP, would pay for negative emissions.

The second part of the paper presents the following comments and suggestions: Global coverage is crucial. Border tax adjustment would only be of limited help if significant markets remained uncovered. The literature emphasizes the problem of leakage, but supply side effects could be even more detrimental. A reduction in oil prices is bound to offset a large part of the current efforts, if oil extraction and refining costs are sufficiently low. An empirical assessment of extraction costs is therefore necessary before any global plan, including the one suggested in this paper, is chosen.

Focusing on cap-and-trade and its interaction with tax policy and the income tax system, I make the following comments and suggestions: The importance of innovation requires setting floors on cap-and-trade to assure inventors of demand for their inventions.

Existing environmental taxes and subsidies must be repealed upon implementation of the cap-and trade program. The only exceptions are provisions aimed at other externalities such as congestion or innovation.

The permits should be auctioned and the revenue be used to reduce income taxation in order to offset the labor/leisure distortion caused by the program.

If permits are allocated for free, they should be taxed in order to generate some revenue and in order to provide permits with a tax basis at fair market value. This will mitigate the lock-in effect that would otherwise take place.

Taxing the appreciation (and depreciation) of banked permits on an accrual basis, managed on a FIFO basis, would eliminate the lock-in effect, and should be considered. The distortive effects of treating them unlike other assets need be assessed.

Lastly, the price volatility of permits creates significant uncertainty, but safety valves compromise the environmental goal. Making the income tax more symmetric in its treatment of gains and losses could reduce price uncertainty, as the government will share in the risk.