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# Climate Finance

## *Regulatory and Funding Strategies for Climate Change and Global Development*

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EDITED BY

*Richard B. Stewart, Benedict Kingsbury,  
and Bryce Rudyk*

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## Taxation of Carbon Markets





## Fiscal Considerations in Curbing Climate Change

Lily Batchelder

*Professor, NYU School of Law*

### *Key Points*

- The choice between cap-and-trade and a carbon tax should mostly be made on political grounds, focusing on whether the targeted price change or emissions level is clearer, the likelihood of accurate distributional offsets, budgetary conventions, agency competence, and the salience of the cost imposed.
- Climate regimes are highly regressive, disproportionately burdening the least well-off. Offsetting these distributional impacts is desirable purely from an efficiency perspective, and also because such regressivity undercuts one of the fundamental goals of curbing climate change.
- Carbon taxes are likely to raise more revenue than cap-and-trade schemes to mitigate distributional effects because of the political tendency to allocate many permits for free. Free permits run the risk of benefiting the owners of politically savvy emitters, rather than those who are actually burdened. Funds from both schemes, however, may fail to reach those most affected, including the elderly, disabled, working poor, and unemployed.
- Domestically, distributional offsets are more likely to be sufficiently large and well-targeted if structured as a universal contributory scheme, with all carbon revenues transparently used to fund direct rebates for all. Internationally, reasonable approaches include

gradual extension of permitting or tax regimes to less developed countries coupled with international carbon offsets, or excess permit allocations based on an objective measure of fiscal capacity.

### *Introduction*

Climate change abounds with fiscal issues. At a macro level, the debate between a carbon tax, cap-and-trade system, and command-and-control regulation is about the extent to which the tax system is the best vehicle to address climate policy objectives. At a micro level, energy-related fiscal incentives and the tax treatment of carbon taxes, carbon permits, and climate markets can have important implications for a regime's effectiveness. The question of how to address the distributional impacts of carbon mitigation, both domestically and internationally, is also a fiscal issue.

This chapter provides a brief summary of the fiscal, administrative, and political considerations relevant in designing a climate mitigation regime. It then focuses on the importance of distributional offsets, and the challenges in implementing them. Other fiscal issues, including the nuts and bolts of taking carbon permits and carbon markets, are addressed by Kane (chap. 35) and Margalioth (chap. 36).

### *Fiscal Issues in Climate Regulatory Choices*

While climate change policy can be, and is, implemented through a variety of mechanisms, including fiscal subsidies and command-and-control regulation, the current debate rightfully focuses on carbon taxes and cap-and-trade systems. Because the two can theoretically be structured to be economically equivalent, the decisive issues are political—how each will realistically be enacted and implemented.

Keohane (chap. 5) outlines two critical considerations. Because the damages from climate change appear to rise sharply above some emissions level, cap-and-trade regimes can minimize externalities with fewer adjustment costs. Allowing permit banking can address permit price volatility under a cap-and-trade scheme. In addition, the fact that a carbon tax is denominated as a “tax” may generate more political opposition and thus limit its scale. Nevertheless, three additional fiscal issues, described below,

are usually overlooked and highlight that there may be no one right answer. The best choice between carbon taxes and cap-and-trade will vary by country, and may be a hybrid of the two.

### Domestic Budgetary Conventions

How a climate mitigation regime will be treated under a country's budgetary conventions and procedures may be important when selecting a regime. The EU, for example, requires a unanimous vote for tax legislation, but only a majority vote for other bills. As a result, it has adopted a cap-and-trade regime, which policymakers were careful to ensure was not categorized as a tax. In other countries, however, enacting tax legislation is typically easier. For example, the US periodically requires fully paying for the cost of any legislation with revenue raisers. Costs and revenue raisers are calculated over a five- or ten-year budget window. These rules tend to make it easier to pass tax legislation because the tax committees control which revenue raisers are passed. They also artificially reduce the budgetary cost of legislation that raises revenue in the short term while deferring costs to the long term. Cap-and-trade regimes are more likely to grandfather existing emitters in the short term, which artificially inflates their budgetary cost, and are not treated as taxes. Thus, they may be more difficult to enact in a US-style budgetary environment.

### Domestic Administering Agency

States must also consider what agency can administer the regime most efficiently. Revenue agencies usually take the lead on carbon taxes, while environmental agencies take the lead on permitting regimes. Revenue agencies have the advantage of extensive experience in auditing and collection, and typically administer energy-related taxes and subsidies already. But their primary focus is on measuring income, not emissions. An environmental agency, by contrast, may focus more narrowly on this dimension and obtain higher compliance rates. However, these differences are probably overstated. Countries are increasingly giving substantial responsibility to other agencies when administering tax programs. Likewise, permitting agencies can verify carbon use more effectively if they partially rely on information from revenue agencies on firms' income and deductions.

### Offsets to Mitigate Distributional Inequity

Because the impact of any climate regulatory regime is likely to be strongly regressive, a final important issue is what distributional offsets are likely to accompany each approach. As explained below, such offsets are desirable purely on efficiency grounds. They are also necessary from an equity perspective, even if one disregards historical contributions to climate change and claims that the current global economic distribution is unjust. In addition, they are important practically. While low-income individuals and countries typically have less political influence, they may nevertheless block enactment of a climate regime that disproportionately burdens them.

Carbon taxes are likely to raise more revenue that can be used for such offsets. Allocating free permits under a cap-and-trade system is another way to limit the distributional impacts. But it is less well targeted because much of the value accrues to investors in recipient firms, rather than the consumers burdened. Free permits can also result in inequities and inefficiencies if some industries and countries obtain them for emission reduction efforts that they would have undertaken absent the regime. Despite the greater revenue generated by a carbon tax, however, it may be difficult politically to direct such revenue to those most affected, as discussed next.

### *Addressing the Regressivity of Climate Mitigation*

Offsetting the distributional effects of a climate regime is critical for two reasons. First, these effects undercut one of the fundamental rationales for curbing climate change—avoiding the increased rate of poverty and preventable deaths that scientists project if we continue on our current emissions path. In 2000, the World Health Organization (WHO) estimated that climate change already cost about 5.5 million disability-adjusted years of life annually. Stern and others project that further climate change will result in a roughly 11% reduction in global GDP, and large increases in infectious diseases and malnutrition. The total disease burden will be borne largely by children in developing countries. This creates a strong imperative to act now. As John Roemer argues, there is little reason to weight the utility of current generations more heavily than future generations.

If the distributional effects of climate mitigation are not offset, however, the regime may increase poverty and preventable deaths on net. Most economists agree that the burden of any climate regime will be borne largely by low-income individuals and, if it is multilateral, individuals in developing countries. About half of the world's population lives on less than \$2 per day. Largely as a result, an immense number of people already die of preventable deaths each year. For example, the WHO estimated that malnutrition cost roughly 138 million disability-adjusted years of life in 2000, and unsafe water, sanitation, and hygiene cost about 54 million. The vast majority of these deaths and disabilities were children in developing countries.

Because climate regimes tend to be regressive on a national and global level, they will increase short-term global poverty absent large and well-targeted offsets. At the extreme, this possibility implies that we should do less to mitigate climate change if distributional offsets are not enacted at the same time. Put differently, if there are no distributional offsets, we would be addressing the catastrophic costs that climate change imposes on future generations by imposing greater catastrophic costs on the most vulnerable individuals in the present.

Second, even if these considerations are disregarded, the distributional effects of climate regimes should be fully offset purely on efficiency grounds. Analyzing the efficiency of a policy change requires holding distributional preferences constant. All societies have distributional preferences, and redistribution entails efficiency costs. If distributional preferences were not held constant, one could argue that all regressive policy changes (say, a subsidy for private yachts) were efficient, even if the only efficiency benefits stem from an assumption that society's distributional preferences have changed.

In the climate change context, there are two options for holding the level of redistribution constant. One is to use all of the revenues potentially generated by the regime to fund transfers offsetting its regressive effects. Another is to use these rents in other ways (say, to buy off interest groups), and raise existing taxes to fund the even larger transfers necessary to hold the level of redistribution constant. The latter approach entails efficiency costs because it increases the distortions the tax system already imposes on the choice between labor and leisure. Thus, the only way to avoid efficiency costs is to use climate revenues directly to offset the scheme's distributional effects. This is true even under the assumption that the current global distribution is fair.

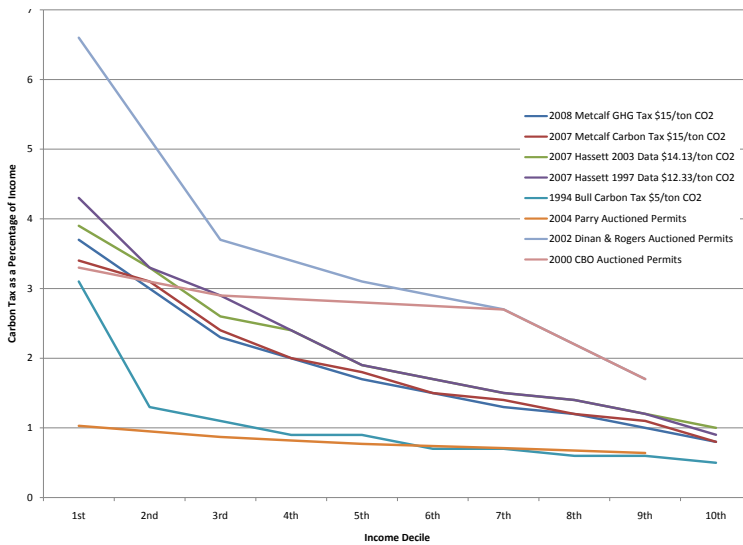


Fig. 34.1. Estimates of burden of U.S. carbon tax as percentage of income by decile. (Source: Tracey M. Roberts, *Mitigating the Distributional Impacts of Climate Change Policy* (mimeo, May 1, 2009))

As illustrated by Figure 34.1, climate regimes are indeed highly regressive, even in a purely domestic setting. Lower-income households bear a larger burden as a percentage of their income because they tend to spend a larger share of their income on carbon-intensive products. This is also true in other nations and across countries.

#### a. Challenges in Enacting Distributional Offsets

A number of political dynamics may limit the ability to offset these distributional effects of climate regimes. First, experience suggests that, at least initially, cap-and-trade systems tend to allocate most permits to existing emitters for free. Theoretically, this could result in permitting regimes addressing distributional effects more reliably. After all, direct transfers and foreign aid are often stigmatized as welfare. But if free permits are allocated disproportionately to some firms, such as those that are old, large, or politically savvy, they will generate sharp differences in the costs of the regime for competing companies. Firms receiving free permits may be able to raise their prices in the short term by the same amount as

their competitors. Then much of the benefit of these free permits would accrue to the owners of such firms in the short term. Those burdened by the regime—ordinary consumers—would obtain relatively few benefits.

In addition, any funds that are raised by carbon taxes or auctioning permits may fail to reach the groups most affected by climate change policies. These include the elderly, disabled, working poor, and unemployed. While some developed countries may be willing to provide direct transfers to such households, others, like the US, may resist doing so. There is traditionally strong opposition in the US to transfers that are not conditional on work. Offsets delivered through the tax system may fare better, but they also present political challenges. For example, most income tax subsidies in the US take the form of deductions, exclusions, and non-refundable credits. These subsidies provide few benefits to households in lower tax brackets, and none to those with no income tax liability—roughly 40% of US households. The only tax benefits that can reach such households are refundable tax credits, but these are also difficult to enact politically.

Offsetting the distributional impact of a climate regime internationally will be even harder. There is strong opposition to increasing foreign aid in many developed countries. For example, according to the Congressional Research Service and OMB, the US spends about 1.2% of its discretionary budget on foreign aid aimed at poverty reduction, much less than the roughly 28 percent spent on domestic income security programs. Voters may be even more resistant to international offsets if they involve cutting back on domestic distributional offsets that they have come to view as an entitlement.

#### b. Steps to Enhance the Efficacy of Distributional Offsets

Despite these challenges, past experience does imply at least two ways to improve the sufficiency and accuracy of distributional offsets that policymakers should consider.

First, experience with domestic programs like government pensions (e.g., Social Security in the US) suggests that earmarking a discrete revenue source for transfers structured as a universal contributory scheme can protect a program over time. Under a universal contributory scheme, all receive transfers linked to contributions. Because all benefit, and benefits are linked to burdens, they tend to garner more widespread political support.

This experience suggests that the revenue raised by any climate regime should be dedicated exclusively to distributional offsets. The funds raised should be rebated to all households, not just those bearing the largest burdens, perhaps as a flat dollar amount per person. Prices on consumer goods should also separately state the embedded cost of carbon taxes or permits so that it is clear that all are contributing.

Second, opaque redistributive transfers appear to garner more political support than transparent ones. This would imply allocating free permits in the domestic context, but, as explained above, they are likely to be poorly targeted. Instead, issuing domestic rebates through the tax system as refundable tax credits is probably the better approach.

Internationally, excess permit allocations may be the only option that is politically viable, given the aversion in developed countries to spending on foreign aid. However, doing so raises targeting issues similar to those in the domestic context. If excess permits are allocated disproportionately to some developing countries, or some firms operating there, the principal beneficiaries in the short term may be the investors in such countries and firms. The consumers who are burdened would benefit relatively little. As a result, policymakers should consider using an objective measure of fiscal capacity, such as per capita income, to allocate excess permits. Allowing low-income countries not to participate in tax or permitting regimes may also be effective from a distributional perspective. Non-participation could undercut environmental goals given the large share of emissions from the developing world. But if firms could purchase carbon offsets in such countries in lieu of purchasing permits or paying taxes domestically, there would still be incentives to reduce emissions in non-participating countries. As discussed elsewhere in this volume, such international carbon offsets are prone to gaming, but new forms may be more effective.

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## Tax and Efficiency under Global Cap-and-Trade

Mitchell A. Kane

*Professor, NYU School of Law*

### *Key Points*

- Two approaches to the taxation of carbon markets and abatement opportunities can be taken to avoid distorting the market and its participants' behavior and thereby to preserve the efficiency of trading-based climate regulatory systems: inter-firm tax neutrality and intra-firm tax neutrality.
- Inter-firm tax neutrality requires that all abatement costs receive the same tax treatment and that all permits receive the same tax treatment, regardless of the firm which undertakes the abatement or acquires permits. In the context of international emissions trading, this approach requires harmonization of the respective domestic tax rates for permits and abatement.
- Intra-firm tax neutrality requires that each firm face the same tax treatment of actual abatement and permits on the margin. In the context of international emissions trading, this approach requires each country to achieve this matching, but does not require harmonization of tax rates. It does not require international harmonization of tax systems.
- In the real world, intra-firm tax neutrality is the preferred policy approach due to the lesser degree of required coordination among national tax systems. The key challenge in implementing intra-firm tax neutrality will be to match tax treatment of permits and abatement. Because permits are likely to receive the same tax treatment

for all holders, this means the efficient tax policy will require removing national-level tax differences among different methods of abatement (except where they are justified by non-climate externalities) or making them ineffective at the margin. Coordination of this particular tax policy goal would be best achieved under the aegis of international climate agreements rather than through tax treaties.

A cap-and-trade regime relies on the price of permits to signal which abatement opportunities are cost-effective, in light of the overall cap. Just like any market where we use price signals to achieve allocative efficiency, taxation is a looming problem. To the extent that taxes distort prices, the market will not function optimally, impairing the efficiency of the regulatory system. The very fact that one requires a market to achieve efficient abatement in the first place only arises because there are firm-specific low-cost abatement opportunities. Such firm-specific opportunities can take one of two forms. First, some firms may have low-cost abatement opportunities due to the ownership of some type of proprietary technology that allows production with fewer emissions than competitors. Second, some firms may have low-cost abatement opportunities because they happen to operate in jurisdictions where there are relatively low-cost abatement opportunities. Taxation presents the same type of potential problem in each of these cases: abatement opportunities that should be favored on a pre-tax basis become relatively expensive on an after-tax basis due to differential tax treatment of firms operating in the market, either due to their mode of production/abatement or their territorial location of operations. (Some tax preferences might be independently justified by non-climate externalities, such as national security, and would accordingly not distort the market; these preferences are not the subject of the analysis which follows.) In a first best world there are two ways to structure tax systems in order to preserve efficient allocation of abatement. Each approach involves concepts of tax neutrality, but they operate at different levels. Thus, we can distinguish between inter-firm tax neutrality and intra-firm tax neutrality.

### *Inter-firm Tax Neutrality*

Inter-firm tax neutrality is the more intuitive of the two types of tax neutrality, albeit the form that is much more difficult to achieve in a multi-jurisdictional cap-and-trade system. The goal is to remove tax distortions

that operate to shift abatement away from firms which have low-cost abatement opportunities and toward firms with high-cost abatement. For example, suppose that Firm A can abate a ton of carbon emissions at a cost of USD 20 and Firm B can abate a ton of carbon emissions at a cost of USD 15. If we imagine that Firm A faces a 50% marginal tax rate and Firm B faces a 10% marginal tax rate, then the after-tax cost of abatement (which should give rise to a deductible expense under standard income tax principles), will be USD 10 and USD 13.50, respectively. All else equal, Firm A will inefficiently abate on the margin instead of Firm B. To remove the distortion it would be necessary to ensure that Firm A and Firm B face the same tax rate on their abatement expenses. By itself, however, this condition would not be sufficient because there is another aspect of the market that may give rise to tax differentials. Specifically, firms may face differential tax treatment of permits (e.g., the acquisition cost of permits might be deductible by each of two firms but at different rates). If we conceive of acquiring and holding permits as the functional equivalent of *not* abating, then what we require under inter-firm tax neutrality is that all firms face the same tax treatment with respect to (i) actual costs of abatement and (ii) actual costs of *not* abating (i.e., acquiring or retaining permits and using them to cover emissions). Note, however, that inter-firm tax neutrality does *not* require that we tax actual abatement and permits the same as each other. If they are taxed differentially, then in a liquid market we should observe equilibrium price effects on the price of permits (which will capitalize the tax benefit or detriment relative to the tax treatment of actual abatement), but there would be no reason for abatement to shift inefficiently across firms, as no firm has an advantage relative to any other firm with respect to either abating or not abating. The chief problem in achieving inter-firm tax neutrality is that it would require an unprecedented degree of harmonization of tax rates and bases across the world.

### *Intra-firm Tax Neutrality*

A different type of tax neutrality which could be substantially more feasible to implement might be termed intra-firm tax neutrality. The intuition here is that if every firm in the market is made tax indifferent on the margin between abating and not abating (i.e., acquiring and holding permits), then the market taken as a whole should be efficient. The condition

required to implement this form of neutrality is that any given firm face the same tax treatment of actual abatement costs and the permits that operate as substitutes for that abatement. This condition does not require that a given firm face the same tax rate on all possible methods of abatement and permits that it might acquire. The point rather is that when a source faces the choice between particular methods of abatement versus holding an additional permit on the margin, then the tax treatment of such abatement and of such permit should be the same. This is crucial because the condition can be satisfied without harmonization of tax rates across countries. Thus if Firm A operates in Jurisdiction 1 and Jurisdiction 2, intra-firm tax neutrality does not require that it face the same tax rate on abatement and on permits in Jurisdiction 1 and Jurisdiction 2. Rather, all that is required is the same treatment of abatement and of permits within each jurisdiction, i.e., that Firm A face the same tax treatment on (i) permits held for surrender to Jurisdiction 1 and actual costs of abatement which reduce emissions in Jurisdiction 1 and (ii) permits held for surrender to Jurisdiction 2 and actual costs of abatement which reduce emissions in Jurisdiction 2, and so on.

### *The Pragmatic Policy Solution*

Intra-firm tax neutrality is the superior tax policy solution for minimizing market distortions and regulatory inefficiency because it can be implemented without tax rate and base harmonization across countries, which would be impossible to achieve. The key problem in achieving intra-firm tax neutrality is that governments, responding to powerful political pressures, will inevitably give tax credits or other preferences for particular abatement technologies or activities. Permits are very likely to receive uniform tax treatment (e.g., a straight deduction at the taxpayer's marginal tax rate in the period that the permit is surrendered). But variations in the treatment of abatement costs mean that national tax systems will never successfully achieve complete matching of abatement and permit costs. Nonetheless, intra-firm tax neutrality requires only that firms face the same tax treatment for permits and actual abatement on the margin. Intra-marginal tax differentials do not matter. Thus, it is possible to achieve intra-firm tax neutrality in the presence of tax subsidies for particular abatement methods, so long as the subsidies are fully exhausted short of the margin at which firms choose between abatement and permits. For

example, if a country gave tax credits for solar energy, intra-firm neutrality would be achieved so long as the program is designed in a way such that any firm that takes advantage of it exhausts its allotment of credits prior to the point at which it must decide between further abatement and holding permits.

In the context of domestic climate trading systems, a country can successfully achieve intra-firm neutrality without harmonization of tax systems across countries. In the case of trading systems operating among states, coordination among countries is needed. The goal is not to harmonize rates or bases but to agree that national tax preferences regarding abatement should be designed to operate only infra-marginally. Moreover, universal coordination is not necessary to attain benefits, which will arise as each additional country adopts the preferred policy. Because the ultimate objective is adoption by all countries of the same policy, coordination is more likely to be achieved under the aegis of a multilateral climate agreement, rather than through the fragmented processes of bilateral tax treaties. The climate framework agreement is also the preferable forum because the tax policy goal in question has important substantive implications for the efficient and equitable functioning of international emissions trading. If one or more countries fail to follow the intra-firm neutrality norm, for example, by maintaining tax preferences that are effective at the margin, then we will observe too much abatement in those countries as compared to the efficient outcome. Moreover, the effect will be to deflate worldwide permit prices because equilibrium marginal abatement costs will be depressed due to the tax preferences. Countries that are net permit exporters would thus bear a cost in terms of lower permit revenue. Thus, the coordination of tax policy with respect to trading systems has efficiency and distributional consequences that go to the core of climate policy and climate politics.

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## Tax Consequences of Carbon Cap-and-Trade Schemes

### *Free Permits and Auctioned Permits*

Yoram Margalioth

*Visiting Professor, NYU School of Law;  
Professor, Tel Aviv University School of Law*

#### *Key Points*

- The tax treatment of cap-and-trade permits can distort permit markets and thereby undermine regulatory efficiency; tax rules should be designed and if necessary modified to avoid these problems.
- In terms of basic tax treatment, abatement and permit (upon surrender to the government) costs should be deductible from gross income. No depreciation deduction for permits should be allowed. Any gains made by selling permits should be taxable capital gains, unless the seller carries this out as a business, in which case these gains are ordinary income.
- The lock-in effect of imposing taxes only when an asset is sold is exacerbated when permits are allocated gratis, distorting permit prices. This effect can be reduced by auctioning permits (with the additional potential of using the proceeds to moderate regressivity) or by taxing the permits upon receipt.
- First-in-first-out and inventory accounting (using a mark-to-market basis) can help reduce additional lock-in distortions associated with fluctuating permit prices.
- Making the tax system symmetric with respect to permit gains and losses will reduce price volatility and resulting lock-in and other inefficiencies.

- Cap-and-trade increases the importance of transfer pricing rules to prevent market distortions arising through tax arbitrage strategies by multinational firms seeking to exploit differences across jurisdictions in the taxation of permits.

The cap-and-trade system creates a new asset—the permit. The tax treatment of permits can potentially distort the tradeoffs that sources make between abating or holding permits to cover their emissions, and thereby impair the efficiency of the regulatory system. This chapter first outlines the appropriate general income tax treatment of permits. It then addresses ways of dealing with the intensified lock-in effects and inefficiencies created by the current tax system's treatment of gratis permit allocations—by inventory management practices in the face of permit price fluctuations and by asymmetric tax treatment of permit gains and losses. It also addresses transfer pricing problems arising out of multinational firms' arbitrage among differences in the taxation of permits in the different jurisdictions in which they operate.

### *The Appropriate Basic Income Tax Treatment of Permits*

Business expenses, the costs incurred by the taxpayer in the production of income, must be deductible if the income tax is to be imposed on income and not on sales, thereby becoming an excise tax on transactions. In the US, for example, 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 incurred in order to produce business income in compliance with the law clearly fall into this category and should be deducted from gross income. Instead of incurring abatement costs, the taxpayer can obtain, hold, and in due course surrender to the government a permit to cover its emissions at the end of the year in which they occurred. Permits therefore replace abatement costs and should be similarly treated for tax purposes in order to avoid distorting the abatement/permit tradeoff; although permits are capital assets, their cost should accordingly be deducted from gross income upon surrender.

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

If the firm sells or exchanges an emission permit, 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. The firm will recognize gain or loss in the year of the sale or exchange, unless a non-recognition provision applies.

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 income.

Penalties imposed for emitting without a permit, or beyond the level allowed by the permit, should not be deducted for income tax purposes. In the US, for example, section 162(f) of the Code provides 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.”

### *New Tax Challenges Created by Cap-and-Trade*

#### Exacerbated Lock-in Effect If Permits Are Allocated Gratis

Income tax measures the taxpayer’s potential to consume. A taxpayer’s ability to consume is as much affected by a change in the value of her assets as by a change in the amount of cash she has. Nonetheless, changes in the value of an asset owned by the taxpayer are not taxed before a realization event takes place. Realization is a sale or other disposition of the property. The primary reason for the realization requirement is the difficulty in assessing the value of assets before they are actually sold. A secondary reason is liquidity problems that taxpayers may face if they are required to pay tax on an asset’s appreciation prior to sale or disposition of the asset.

When a firm purchases a permit, either from the government in a primary auction or on the secondary market, it obtains a cost basis in the permit. It may use the permit in the current year to cover its emissions, deducting the cost upon surrender to the government, 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 (its own and others’) 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's realization rule will, however, 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. This in turn will distort the permit/abatement tradeoff.

The lock-in effect will be especially significant when permits allocated gratis are not taxed upon receipt, as is the case under current US law (according to Rev. Rul. 92-16) and as is generally the case under the European Union Emissions Trading System (EU ETS). The firms have a zero tax-basis in their permits; hence the incentive to defer use or sale and the lock-in effect will be even greater. This increases demand for permits and distorts their market price upward, tending to result in inefficiently high levels of abatement.

Similarly, firms will be tax-induced to defer the use of their permits, that is, to continue banking them. Compared to other investment assets, investment in permits with zero-basis provides a tax-preferred return for the following reason. When a purchased asset is realized, the investor can deduct only the nominal (that is, historical) cost. This means that the amount invested in purchasing the asset is not even adjusted for inflation; hence inflationary gains are taxed, and the real value of the investment is decreased. No such out-of-pocket investment exists in case the permit was allocated gratis. This makes banking a permit that was received gratis a tax-preferred investment, distorting its price in equilibrium.

To reduce the distortion created by the lock-in effect, the government can auction the permits instead of allocating them gratis. Auction may be preferable on other efficiency grounds and on equity grounds as well. The cap creates scarcity and, by allocating the permits gratis, the government gives the scarcity rent to the firms, which is likely to have regressive effect to the extent that the rents are retained by firms rather than being passed on to consumers or labor. Moreover, the cap-and-trade system (even under a gratis allocation) raises the price of the underlying products by imposing a cost on products based on the emissions generated in their production, thereby lowering the real wage and distorting labor supply (as leisure cannot be taxed). This may create the same excess burden as a tax on labor income. If permits are auctioned, the revenue can potentially be used to reduce taxes on income and capital to correct for the inefficiency mentioned above, and/or to offset any regressive effects created if low-income people bear a larger share of the price increase. Of course, whether revenues are actually spent in these ways is politically contingent.

If, due to political constraints, the permits have to be allocated gratis, then they should be taxed on receipt. 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 the same level as other assets.

### Inventory Management Issues

A related issue is the inventory rule used in assessing taxes on stocks of assets. Firms which have purchased permits at different prices at different times 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 in order to benefit from tax deferral, thereby exacerbating the lock-in effect. This additional effect can be prevented by requiring firms to manage their permits' use and sale on a first-in-first-out basis.

Alternatively, a firm's stock of permits could be valued and taxed annually on a mark-to-market basis. The values of all permits held by the firm are aggregated, based on their market values at the beginning and end of each year. The difference between the opening year balance and the end year balance is taxed. Sales and surrenders of permits throughout the year are deducted from the closing balance, and the proceeds from sales are included in taxable income. Eliminating the realization requirement in this way would eliminate the tax incentive for deferring use or sale of a permit and associated regulatory 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 traded assets, such as traded securities, and non-traded assets, whose value is difficult to ascertain, has been much debated. One could make a case for taxing tradable permits separately on an accrual basis.

### Loss Limitation Rules

All countries with an income tax limit the deductibility of losses. They can only be used to offset gains (sometimes this requirement is eased by allowing some loss carry-forward to future tax years). Limited-loss deductibility introduces an asymmetry because gains are fully taxed but the taxpayer may not be able to deduct all losses. This asymmetry may exacerbate the lock-in effect as a result of permit price volatility. Firms

may continue to hold permits in years in which they would otherwise sell them because if they did so they would incur losses that would not be fully tax deductible. This problem and the problems of market price volatility more generally (increasing uncertainty thereby resulting in sub-optimal production levels and in under-investment in innovation) can be addressed in the design of a cap-and-trade system by including safety valves to limit either excessively high or excessively low permit prices or both. Also, making the tax system symmetric with respect to gains and losses will reduce the cost to firms of permit price volatility and increase the efficiency of a cap-and-trade system. Symmetrical treatment could be limited to permits or applied to assets more generally. It is impossible to estimate, without empirical support, whether the inefficiencies are greater for permits than for any other assets, but there seems to be a consensus that a move to a more symmetric tax system would improve efficiency, and the treatment of permits could lead the way. Encouraging the development of markets for permit forwards, options, and swaps could assist in hedging the risk of price volatility, thereby increasing efficiency.

#### Transfer Pricing Problems

Countries tend to have quite different tax rates, and cap-and-trade creates a new possibility for tax arbitrage by multinational firms—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. In order to deal with this problem, which will impair regulatory efficiency, countries must require multinational corporations to match the deductions of permits with the actual production whose emissions are being accounted for, and apply the same tax rate to both income and expense. This is already done by many countries in other contexts involving matching of income and expense items through transfer pricing rules. Cap-and-trade will add significantly to the importance of such rules and practices.

#### FURTHER READING

On the application of the problem of lock-in to the cap-and-trade system: Ethan Yale, "Taxing Cap and Trade Environmental Regulation," 37 *Journal of Legal Studies* 535 (2008).

## Afterword

### *Reflections on a Path to Effective Climate Change Mitigation*

Thomas Heller  
*Professor, Stanford University*

#### *Key Points*

- There is a danger that in the international community's quest for a new climate agreement, we will lock things in too early around a weak arrangement, although the door is open for us to do much more.
- Two of the major challenges to reaching an international agreement are: uncertainty about the costs and effectiveness of mitigation efforts; and the conflict between developed countries that want to have global cap-and-trade and developing countries that do not.

There are many challenges along the path to a meaningful climate policy framework, but two stand out as particularly threatening. The first is uncertainty. More specifically, there is a serious risk that nations will not undertake meaningful action because of the persistence of uncertainty surrounding the relative cost and effectiveness of policies designed to mitigate climate change.

The second major challenge is the tension between the belief that a global cap-and-trade program is the best policy instrument to limit global greenhouse gas (GHG) emissions and the demand for fairness in allocating carbon caps among states, especially among developing nations.

Unfortunately, the debate has often seemed stuck on this tension, but recent actions by developing nations have pointed toward a different way forward. A growing chorus of voices is arguing that we need to quickly create a framework that will help encourage and finance bottom-up mitigation actions in developing countries even in the absence of caps. Despite the promise of this approach, it remains on the margins of the mainstream climate change debate.

In light of these developments, I am perhaps more afraid of a weak climate change agreement than no agreement at all. My fear is that a weak climate change agreement will result in complacency, and shut down efforts focused on building a framework to promote the changes that are already emerging out of the national policies of developing nations. This may be our greatest opportunity to mitigate global emissions reductions early, and we cannot afford to let it pass us by.

### *Uncertainty about Mitigation Benefits and Costs*

Uncertainty can often have a paralyzing effect on both policymaking and investment. Societies and investors alike are averse to accepting policies with steep price tags when they are uncertain as to whether or not the benefits outweigh the costs. However, the risks of inaction are so great as to justify substantial investment in mitigation now. Recent reports (including the Stern Report) show that the costs of inaction outweigh, by a significant margin, the costs of action; that the current failure of markets to price carbon results in massive inefficiencies; and that the costs of postponing fixing the problem will only increase as time passes. However, the widespread resistance to climate change policies suggests that many politicians and voters do not believe in these conclusions or are afraid of the risk that costs will be much greater than predicted.

### *Obstacles to Global Application of Cap-and-Trade*

A second fundamental challenge to our ability to limit global emissions in a timely fashion is the conflict between industrialized nations' drive towards a global cap-and-trade system and developing nations' resistance to national caps.

Industrialized nations have adopted or are adopting domestic cap-and-trade systems and have reached a consensus that a global cap-and-trade program would be the most efficient and effective means to address climate change. This consensus has emerged out of both scholarly literature and experience with actual policies, including failed attempts at imposing BTU taxes in the US and carbon taxes in Europe, as well as the success of SO<sub>2</sub> trading programs in both the US and Europe. This understanding has already been embodied in the cap-and-trade structure of the Kyoto Protocol's obligations for Annex I countries, as well as in the European Union Emissions Trading System (EU ETS). A major part of subsequent discussions has focused on increasing the participation in international cap-and-trade until it encompasses all nations, or at least all major emitters.

However, as is often the case in international negotiations, there is a countervailing principle—common but differentiated responsibility. This principle centers on the recognition that although all nations bear some responsibility to address global environmental problems, the scope of their obligations vary according to a wide variety of legitimate concerns, all of which push against an easy or straightforward application of global cap-and-trade. Developing countries strongly resist caps. They point to the developed countries' historical responsibility for the greater part of the emissions that are causing warming today. Moreover, they are deeply concerned that the adoption of national caps will hem in their future economic growth in a way that is extremely constrictive and unfair.

Because of the resulting impasse, negotiations have been stuck in a bind for some time. On the one hand, we acknowledge that cap-and-trade is the most efficient solution. On the other hand, we are unable to resolve the distributional problems necessary to implement it on a global scale.

In the shadow of this debate, separate discussions have grown around alternative means of financing mitigation actions in developing countries, as seen in many chapters in this book. However, these alternatives have not been fully embraced by either industrialized or developing nations. Industrialized nations tend to view climate finance alternatives to global cap-and-trade as partial solutions at best, a distraction from the larger push toward cap-and-trade. Developing nations, on the other hand, tend to view many of these proposed mechanisms suspiciously, in part because they fear that they are a hook to draw them into binding caps.

### *Consequences of the Conflict*

The consequence of this conflict and the resulting turn toward smaller, narrower discussions has been a balkanization of climate change negotiations. At present there are many special negotiations and working groups focused on specific issues, such as technology transfers, flexibility mechanisms, comparability, carbon finance, and deforestation. This process has both advantages and disadvantages. The advantages are that it helps policymakers refine specific policies, begin to implement them, and gain a greater understanding of the difficulties they and other similar policies will present. For example, discussions about forestry have resulted in the development of a wide portfolio of proposed programs for reducing emissions from deforestation and forest degradation (REDD), a more refined understanding of how to create an international framework for REDD crediting, as well as an understanding of the broader challenges in implementing REDD and complex problems presented by sectoral caps or crediting baselines generally.

However, the disadvantages to this micro-policy approach are that parties begin to excessively focus on small victories, reduce their expectations, and lose sight of the main goal—creating a framework that will facilitate and encourage global mitigation actions on the scale necessary to avert catastrophic warming. In other words, we may end up with a lot of small projects that yield only small benefits and overall are not particularly efficient or effective, at least when viewed from a global perspective.

### *An Alternative Path Forward*

Accordingly the view from the top is bleak. However, an entirely different picture emerges when one begins to look at national-level actions that are occurring across a wide variety of nations. Increasingly, both developed and developing countries are beginning to view high-carbon economic growth as an oxymoron, because of fears that the negative consequences of high-carbon growth will ultimately undercut the gains reaped from such growth. As a result, we are beginning to see changes in developing countries' national policies that are consistent with the idea of low-carbon growth. Even more promising, these efforts become part of international negotiations. This position has perhaps been stated most clearly by South Africa, which said: we will do what is in our self-interest; we will

do something more than that because we are part of the global community, and there are things we will do still further with support from those who are better positioned to help us. To realize this, policymakers must answer the following questions: how do we increase mitigation efforts in developing nations in the absence of binding targets, and how do we best structure and scale up financial and technical assistance from developed to developing nations in the absence of national caps? It is to be hoped that this book provides useful answers to these questions.

