

CAP-AND-TRADE VERSUS CARBON TAX
A COMPARISON AND SYNTHESIS



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December 2007



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Introduction

Strict greenhouse gas emission permit programmes could stabilise greenhouse gas concentrations. Cap-and-trade schemes combine strict emission limits on greenhouse gases with market exchange of permits to arrive at a price. Carbon taxes (greenhouse gas equivalent is assumed throughout this paper) charge emitters a definitive price set by governments with the objective of stabilising greenhouse gas emissions. The London Accord, and much other work on climate change, indicates that a significant price for greenhouse gas emissions, somewhere above €30 per tonne expressed as greenhouse gas equivalent CO₂e, is likely to attract investment at a scale that could stabilise greenhouse gas concentrations in the atmosphere.

In short, when you want cost-certainty, then tax; when you want quantity-certainty, then cap-and-trade. Eileen Claussen and Judith Greenwald of the Pew Climate Centre, writing in the Miami Herald on 12 July 2007, elaborate:

"But the key difference between a carbon tax and the cap-and-trade approach comes down to the issue of certainty. A tax provides for cost certainty; the cost is fixed because of the tax. Cap and trade, on the other hand, provides for environmental certainty. What's fixed is the cap itself - and it is based on an assessment of the level of emissions you need to get to in order to protect the climate."

When the London Accord got underway in 2005 and 2006 there was a clear desire among participants to use 'market mechanisms' to manage greenhouse gas emissions. This was a term used by NGOs, policy makers, businesspeople and financial institutions. It seemed clear that the favoured market mechanism among businesspeople and financial institutions was 'cap-and-trade', i.e. set emission targets and then let polluters trade emission rights such that the most progress was made by the most cost-effective initiatives. Given the success of SO₂ cap-and-trade system in the USA and the existence of the European Union Greenhouse Gas Emission Trading Scheme (ETS), it seemed equally clear what constituted the most practical 'market mechanism', namely cap-and-trade.

Then somewhat unexpectedly in 2007, august publications such as The Economist and the Financial Times published pieces supporting carbon taxes in preference to cap-and-trade. These publications questioned the consensus among businesspeople and financial institutions that 'market mechanism' = cap-and-trade; and to some degree, these publications were critiquing the ETS experience to date. There are valid criticisms of ETS. Two stand out – quantity and distribution. The first is that too many permits were issued by the EU, resulting in low, even insignificant prices. The second is that emission permits were given to existing polluters, rather than on other, perhaps more equitable, bases. When emission permit prices were high, which at times they were, these polluters received windfall profits.

The importance of having a price for carbon in order to attract necessary investment, combined with these criticisms by eminent publications, highlighted the need for a commentary by the London Accord that set out the various arguments and explains why the London Accord participants favour (1) cap-and-trade; (2)

accept local tax augmentation to cap-and-trade if politically necessary; and (3) do not support tax as the only market mechanism.

Background

Throughout the London Accord, the subject of carbon pricing was much discussed and debated with participants. The London Accord's participants are likely to share a capitalist ideology, and an affinity to public choice theory. Paul Starr [Starr, 1988] summarised the public choice school: "In short, starting with an individualistic model of human behavior, the public choice school makes a series of empirical claims: (1) that democratic polities have inherent tendencies toward government growth and excessive budgets; (2) that expenditure growth is due to self-interested coalitions of voters, politicians, and bureaucrats; and (3) that public enterprises necessarily perform less efficiently than private enterprises." Thus, there was a need to overcome a bias towards cap-and-trade.

So, the London Accord team held a debate, "Cash In – Carbon Out: Two Different Approaches to Climate Change - Tax versus Carbon Trading", on the evening of 18 October 2007 at the London School of Economics and Political Science (LSE). The debate was hosted by LSE's Environmental Initiatives Network. The speakers were Mr Neil Eckert (Climate Exchange), Mr Sam Fankhauser (MD Strategic Advice IDEAcarbon), Mr Abyd Karmali (Global Head of Carbon Trading, Merrill Lynch), Professor Michael Mainelli (Z/Yen Group Limited and Principal Advisor, The London Accord), Mr Ralf Martin (LSE), Mr Jan-Peter Onstwedder (Project Director, The London Accord) and Mr Martin Wolf (Financial Times). Mr Florian Lennert (IDEAcarbon and Visiting Fellow LSE Centre for Environmental Governance and Policy) chaired the evening, and Mr Henry Thoresby helped to organise everything.

The purpose of the evening debate was to set out both sides of the cap-and-trade versus carbon tax argument. Mr Eckert and Mr Karmali spoke in favour of cap-and-trade while Mr Martin and Mr Wolf spoke in favour of carbon taxation. The debate was extremely helpful, not just in setting out positions, but also in terms of directing the team to some economic principles that had not yet been considered. Much of the discussion that follows is derived directly from the arguments put forward by the participants and the audience.

It Ain't Just Economics

The first thing to recognise is that there are at least three types of policy instrument that could reduce greenhouse gas emissions – cap-and-trade, carbon tax and regulation. Are there clear economic principles that can be applied? Regulation alone has worked. The Montreal Protocol on Substances That Deplete the Ozone Layer of the late 1980's succeeded in phasing out the emission of chlorofluoro compounds and hydrochlorofluoro compounds (CFCs and HCFCs). In the case of greenhouse gases though, the objective is not their elimination, but increasing restriction over a long period of time. Because there is uncertainty in

the marginal costs of abatement, it is important to note that an isolated economics argument does conclude that price instruments (cap-and-trade or carbon tax) will probably be more effective than regulation, e.g.:

"If marginal damages are not constant, the optimal policy is determined by the interaction of marginal damages and marginal abatement costs for both taxes and permits. The result is analogous to Weitzman's (1974) [Weitzman, M.L. (1974), "Prices vs. Quantities", Review of Economic Studies 41:477-491] rule: if the marginal damage curve is relatively flat and there is uncertainty in marginal costs (from the regulator's perspective) due to potential innovation at the firm level, then a price instrument is more efficient."

[Jaffe, Newell, Stavins, 2002, page 14]

The debate focuses on cap-and-trade versus carbon tax. On tax, Adam Smith stated four maxims for good taxation [Smith, 1776, pages 1042-1046] – equality: all subjects should contribute, and in proportion to their respective abilities; certainty: tax calculations, timing and demands are not arbitrary; convenience of payment: in line with cash flow and payment systems; economy in collection: few officers, few inspections, few evaders and few economic distortions. The modern view is not much different:

"The primary purpose of tax is to raise revenue to fund necessary government expenditure. It should do so without, as far as possible, damaging wealth creation and individual freedom of choice. Four principles should be adopted to achieve this:

- ◆ *Economic efficiency. Tax should be as low as possible, should not distort business decisions and should discourage neither economic growth nor individual enterprise and effort.*
- ◆ *Fairness. The least well-off should pay a smaller proportion of tax. People in similar circumstances should be treated equally.*
- ◆ *Simplicity and transparency. Tax should, as far as possible, be clear, easy to understand, of certain application, easy to calculate and easy to collect.*
- ◆ *Stability and predictability. Once the above principles have been adopted, changes to tax law should be kept to a minimum."*

[The Tax Reform Commission, October 2006 - <http://www.taxreformcommission.com/report.php>]

However, in the case of carbon taxes, raising revenue is not the primary purpose, or certainly not the only purpose. Most economists favour neutral tax systems that do not favour one economic activity over another – the market should decide. Some economists do favour taxes whose primary purpose is not raising revenue. A few favour directing markets using tax, and tax breaks, to guide economic activity in ways they favour, such as increasing the attractiveness of employing people rather than capital. A few favour using taxes to reduce negative externalities. Taxes that penalise socially undesirable activities, such as smoking, drinking or gambling, are often termed "Pigovian taxes" after the British economist Arthur Pigou, and are also described as "sin taxes". Pigou felt that taxes could correct negative externalities and saw externality-balancing taxes as preferable to regulation. Of course the rub in Pigovian taxes lies in

calculating what level of tax will counterbalance the negative externality. The paradox is that if Pigovian taxes are effective at penalising negative externalities, the taxes become less effective at raising revenue.

But climate change exhibits changing and steep marginal environmental damage curves. A steep marginal environmental damage curve is where each additional piece of environmental damage is worse than the previous. In the case of climate change, early greenhouse gas emissions are less dangerous than subsequent, cumulative ones. So another isolated economic view is that quantity-certainty is to be favoured over cost-certainty, thus favouring cap-and-trade over carbon tax:

"In terms of environmental performance there is an important distinction between emission taxes and tradable emission permits, following from Weitzman (1974). Suppose that the marginal environmental damage curve exhibits some marked curvature change (going from fairly flat to very steep in a short interval), while marginal abatement costs are reasonably flat, wrongful assessment of these abatement costs on behalf of the regulator could lead to excessive emission levels using a tax instrument. Under such conditions Weitzman showed that quantity restrictions are preferred over tax instruments, the so-called Weitzman proposition."

[Romstad, 2002, page 6]

Cap-and-Trade versus Carbon Tax

Cap-and-Trade has a lot of popular support, not only in Europe but also in the USA. An example of such support in the USA is the "America's Climate Security Act", proposed by Senator Joe Lieberman (Independent) and Senator John Warner (Republican). Their bill introduces a mandatory cap-and-trade system similar to the ETS starting in 2012 with targets of greenhouse gas emissions back at 1990 levels by 2015 (a 15% reduction) and to 65% below 1990 levels by 2050. Despite the economics, the issues involved are at least as much about public choice theory or political pragmatism as about market solutions. The debate is entered into at many levels, but to summarise some of the current arguments:

Pro Cap-and-Trade

The pro-cap-and-trade camp tends to advance the following arguments:

- ◆ Economics – in line with the economic points above, traded emission markets are assumed to find the true cost of carbon rapidly with the least government intervention. Trading allows costs to fall where they are best borne, e.g. across time (such as evaluating older plant) or across countries (such as trading inefficient but existing infrastructure against newer methods);
- ◆ Experience – these markets have worked. Studies of the USA experience of SO₂ (sulphur dioxide) trading show that cap-and-trade can work faster than regulation at a fraction of the estimated costs. Over time, as efficiency improves, market price effects will wither away, while taxes never die;

- ◆ Practicality – these markets already exist, ETS being foremost among them, and can be easily incorporated into our market economies. People understand market prices more easily than taxes;
- ◆ Support - more popular than tax with the business community, cap-and-trade is supported by most environmental groups because there are firm limits on actual emissions. People trust transparent market prices. Many politicians support cap-and-trade, e.g. in the EU, Lieberman & Warner or Schwarzenegger. Politicians would find it difficult to impose a realistic tax that high enough (read: painful enough) to effect material change;
- ◆ Innovation - within the market, businesses can innovate to identify the least expensive way to reduce overall emissions, which not only makes effective abatement potentially profitable, but creates new technologies marketable (and profitable) in their own right. Further, businesses can sell their anticipated abatement ‘forward’ to help fund today’s investments in emission reductions.

Pro Carbon Tax

The pro-carbon tax camp tends to advance the following arguments:

- ◆ Economics – markets could take a lot of time to find a stable range of prices, but a tax could set a price right now;
- ◆ Experience – taxes could be legislated more rapidly. Effective markets require stability in property rights. As carbon emission rights are in their infancy, tax them first and then introduce traded markets;
- ◆ Practicality – people understand taxes more easily than market prices;
- ◆ Support - people are more likely to support a carbon tax because it will be seen as costing everyone, whereas cap-and-trade costs will be less transparent. Carbon taxes could address emissions of carbon from every sector, whereas cap-and-trade systems discussed to date have mostly targeted the electricity industry, which accounts for less than 40% of emissions. People trust governments. Many politicians support taxes, e.g. Michael Bloomberg;
- ◆ Innovation - carbon taxes will lend predictability to energy prices, encouraging investment in less carbon-intensive electricity generation, carbon-reducing energy efficiency and carbon-replacing renewable energy. The tax raised can be hypothecated to research and development for a low-carbon economy or to improve efficiency.

To and Fro

The Economist’s three arguments in favour of a carbon tax [“Doffing the Cap”, 14 June 2007] were (1) there is too much price volatility in cap-and-trade; (2) carbon taxes set a clear floor for innovation; and (3) taxes raise revenue. The contrary points might be (1) tax volatility is dreaded by businesses at least as much as market volatility, as proof consider volatile energy markets versus ‘managed’ energy prices and ‘windfall’ taxes on energy in the UK, or the focus on annual budgetary tax changes over commercial investment decisions; (2) only if a guaranteed minimum level of innovation investment (not result) is required,

otherwise the floor price risks rapidly becoming an inflexible subsidy; and (3) is irrelevant or, by implication, any tax is good.

There are many other counter-arguments and polemics against taxation as well. To note a few of the more obvious:

- ◆ trust in hypothecation: hypothecation is inevitably doomed to go to general revenues, or to become a cosy imposition arranged in concert and spent freely;
- ◆ tax avoidance: point to a simple tax without advisors and tax avoidance. Further, the behaviour towards the discovery of cheating under a property rights system by others in the system is to aid enforcement as cheaters impair other people's property rights. Remedies are also available under the civil law system. Under taxation, the response to the discovery of cheating by others in the system is, "please teach me how to get away with it too";
- ◆ trade issues: cap-and-trade markets are already accepted under international treaties and exist in both bi-lateral and multi-lateral agreements (such as the Kyoto Protocol), providing an internationally agreed-upon framework matching the global scope and impact of global warming itself. International comparisons could be crucial if parties attempt to use 'unpaid' carbon costs as a way of creating 'fair' trade problems. Under a traded market greenhouse gas emissions should be more easily compared across countries than carbon taxes as, it is presumed, taxation policies will be complicated with numerous exemptions;
- ◆ inclusiveness: taxes tend to reflect the organisational and power structure of the status quo. Today, tax debate naturally concentrates on the major polluters: power generators and large energy users, the suppliers to those polluters: fuel suppliers, and the consumers of those polluters: heat, light and mobility. Solution providers, from developers of new and improved power generation technologies to energy management services to improve the efficiency of energy usage, are rarely the focus of tax analysis. Similarly, incentives for adaptation and solution providers for adaptation generally don't feature. A cap-and-trade system seems to be more inventive.

Ah Yes, ETS

Debate about cap-and-trade as implemented so far must address experience with the ETS. Supporters of the ETS point to a rapidly-established market where major organisations commit significant sums of money to trade. ETS has three phases, I – from 2005 to 2007, II – from 2008 to 2012, and III – beyond 2012. Critics focus on two issues – volatile prices in Phase I and windfall profits. On price volatility, *The Economist* explains well ["Carbon Trading: Cleaning Up", 4 May 2006]:

"The ETS is designed to cut greenhouse-gas emissions so that European countries meet the targets set for them by the Kyoto climate-change agreement. Some 13,000 factories and power stations in five different industries may emit carbon only if they have a permit. At the start of the scheme, they were given permits

worth around 2.2 billion tonnes of carbon dioxide per year. Those permits may be used up as fuel is burned and carbon generated, or they may be traded. Around €10 billion-worth (\$12.4 billion-worth) of permits were traded last year. This year the figure will probably be three times that.

When the scheme was originally established, politicians expected the permit price to hover around €10 a tonne. Instead, it rose to a peak of €30. "The gas-coal spread is mostly responsible," explains Anthony White of Climate Change Capital, a specialist investment bank. The power-generation business dominates the carbon market, because it emits so much pollution. In Europe, gas and coal are the main fuels used. When the gas price rises, power companies tend to switch to coal. Coal is dirtier than gas; so, as power companies switch to coal, they need more permits, and the price rises.

Then, in late April [2006], several countries, including France and Spain, announced how much carbon they had emitted last year. The numbers were surprisingly small. Suddenly, the future demand for permits looked lower than expected—and the price crashed. Unfortunately, the numbers reflect not the scheme's success in cutting pollution, but industry's success in getting itself allocated more permits than actual emissions warranted when the scheme was launched."

The second issue is that the emission 'rights' allocation procedures have permitted, to date, 'unfair' / windfall profits. ETS emission allocations have been done on a 'grandfathering' basis. The more a corporation polluted in the past, the more permits it was entitled to. Because corporations could sell their permits, the result was windfall profits for historic polluters who made easy reductions in their emissions and sold at high price points, especially power generation utilities. IPA Energy Consulting, in a 2005 report for the DTI, said that the British power-generation sector profited by £800m (\$1.5 billion) in the first year of the ETS. Although reductions were the objective, the easy profits are resented and there are valid doubts over the permanency of the reduced emissions. Contrasting ETS with the SO₂ cap-and-trade program, SO₂ emissions were carefully measured prior to the distribution of permits and there was a 10 year schedule of allowances. However, supporters point out that 'grandfathering' increased acceptance of ETS permits and that other distribution methods can be addressed in Phases II & III. Wasn't it a good idea to allocate freely and have businesses participate in at least one confidence-building round? Further, by piloting this round, however expensive, it is now much, much clearer the quantity of greenhouse gases emitted by companies.

Equity

One of the issues that bedevils discussion of cap-and-trade is equity. There are at least three basic approaches to allocating emission rights:

- ◆ historic: awarding, as did ETS, rights to emit greenhouse gases based on historic emissions, with a view to reducing them in future;
- ◆ shared distribution: awarding emission rights on some per capita or per value-added basis and then allowing them to be traded. Similar issues arise in the privatisation of state industry. As an analogue, the Czech government privatised state industries in way such that, "the Czech [privatisation]

programme was dominated by an innovative scheme of voucher privatisation. This was a system of mass, almost free, distribution of property rights to domestic participants." [McMaster, 2001]

- ◆ auctioning: treating emission rights as purchasable public goods. As an analogue, the state auctioning of the radio spectrum, such as the US Federal Communications Commission's auctions or the European 3G/UMTS mobile phone license auctions are good examples of how such auctions can work for public goods.

Shared distribution is the 'problem child'. In many ways, it is the most equitable solution under a number of social and ethical assumptions. There has been tremendous focus in Europe and the USA on the potential personal impact of climate change. However, it is more likely that underdeveloped countries, e.g. Saharan and sub-Saharan Africa, are already feeling the effects. One of the simpler and more equitable solutions to climate change is called Cap and Convergence, promoted by Aubrey Meyer of the Global Climate Initiative. The Global Climate Initiative points out that a simple solution to climate change is to cap emissions on a per capita basis and then contract per capita emissions towards convergence at a sustainable level. In the process, the per capita emissions would be tradable. As a consequence, there would be significant payments from high-emitting, developed countries to poorer, low-emitting countries. In extreme cases, a few hundred dollars per person could be sent to poorer countries to purchase their carbon emission rights. Aubrey's proposals seem less biased than most other proposals, but have been attacked as unrealistic or politically naïve.

Auctioning is an attractive option. It combines some elements of historic allocation with some elements of taxation and, implicitly, at least a bit of shared distribution. Under auctioning, no costless tradable emission permit would be issued.

Synthesis: Hybrid Cap-and-Auction

There are a number of variations on the auctioning theme, for instance, issuing permits at the maximum of a fixed minimum permit price (effectively a base tax) or the prevailing permit rate, up to a maximum number of permits. The state clearly has a new revenue base, so an enhanced cap-and-trade system with a minimum carbon price and auctioned permits does approach a carbon tax scheme. Robert Stavins [Stavins, 2007] outlines how such a system might look in the USA starting with half auctioning and half free-distribution, while Cameron et al [Cameron et al, 2006] show how auctioning could work in ETS Phase II.

Parry and Pizer offer the following observations:

"..."

- ◆ *There are many similarities between CO₂ taxes and tradable allowances or permits. Both reduce emissions by associating a uniform price with emitting activities at any point in time, leading to efficient, low-cost emission reductions. Both can be administered on upstream fossil-fuel producers (based on the carbon content of fuels) to capture economy-wide emissions, or on downstream emitters to capture*

emissions from large sources. And both can incorporate incentives for carbon sequestration and other offset activities.

- ◆ *Taxes generally fix the price of emissions, and leave the annual level of emissions uncertain; in contrast, tradable permits generally fix the level of emissions, and leave the price uncertain. Because climate change hinges on the long-term accumulation of global emissions, a predictable price tends to have advantages—for both the environment and the economy—over fixing the level of U.S. emissions for a short time horizon of several years. Over longer horizons, as nations converge on a common target for stabilizing atmospheric GHG concentrations and as international participation in global emission reduction efforts grows, fixed emissions targets become increasingly advantageous.*
- ◆ *Taxes generally raise government revenue, while tradable permits—at least traditionally — have not. New government revenue, if used to cut other taxes or provide valuable public goods, generates additional economic benefits that are not achieved under a traditional system of tradable permits in which the majority of permits or allowances is allocated for free to regulated entities. On the other hand, the allocation of free permits or allowances under an emissions trading regime can be tailored to address concerns about an otherwise unequal distribution of regulatory cost burdens across firms and regions.*
- ◆ *These traditional differences between a tax and trading policy are easily blurred in a hybrid emissions trading system where some allowances are auctioned to raise government revenue and where banking and a safety valve (or perhaps borrowing) stabilize prices. Recent proposals for a Federal Reserve-like body to monitor allowance markets address this same issue.”*

[Parry and Pizer, 2007, pages 1-2]

Perhaps the biggest difficulty for carbon tax advocates is that if cap-and-trade becomes effective, their initiatives will seem local and parochial, interfering with the global scheme of things. The biggest difficulty for cap-and-trade advocates is to prove in short time that their proposals, pragmatic as they may be, are equitable.

There are many areas for further research and commentary, among them:

- ◆ the use of carbon offsets into emissions trading, including the obvious agency bias in the creation of valuable rights under the Clean Development Mechanism (CDM), at the moment under the Kyoto protocol in the hands of the UNFCCC;
- ◆ the credibility or enforceability, globally, of political commitments to taxation or caps;
- ◆ how national or regional solutions interact in the absence of a credible, single, global outcome and the potential evolution, globally, of cap-and-trade;
- ◆ how costs are passed on to end consumers, e.g. VAT analogues;
- ◆ the potential wealth distribution between developed and developing countries for global solutions.

Conclusion

Cap-and-trade is favoured by businesspeople and investment people. Certain economists favour a tax solution.

At the inaugural conference dinner for The London Accord in March 2007, the Rt Hon Chris Huhne MP warned that there would never be a clear choice between markets or regulation in reducing greenhouse gas emissions – real solutions would be “messy”.

For most participants in The London Accord, cap-and-trade should have primacy over carbon taxes as a preferred policy instrument, but not necessarily to the exclusion of carbon taxes. Cap-and-trade schemes exist and seem to work, though they would work better if the key value criteria, scarcity of emission rights, was set out with more certainty by policy-makers. There are equity problems with cap-and-trade schemes to date, but no reason that auctioning permits or changing the allocation procedures couldn't start to redress the inequities.

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Thanks

While many of the people we spoke with might not agree with all of our conclusions, we would like to thank all of them for kindly helping develop our thinking, including Bradford S. Gentry, Florian Lennert, Neil Eckert, Sam Fankhauser, Abyd Karmali, Ralf Martin, Martin Wolf and Henry Thoresby.