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E-MISSION POSSIBLE

Low-emission investment and ETS reform

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Keynote address

Professor Geoffrey Heal

“Managing GHG Emissions”

Columbia Business School

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Managing GHG Emissions

Geoffrey Heal

Columbia Business School

Five alternatives -

- Regulation
- Taxes
- Cap-&-Trade
- Legal liability
- Activism



REGULATION

- The default
- The approach all econ texts love to hate
- Because it's inefficient – want to abate so that MCs are equal
- Goes back a long way – in 1492 “John Everard, Butcher, allowed his dunghill to drain into the common stream of this village, to the serious detriment of the tenants and residents; fined 4d; pain of 10s”
- But it does work – responsible for solving many pollution problems in the last 50 years

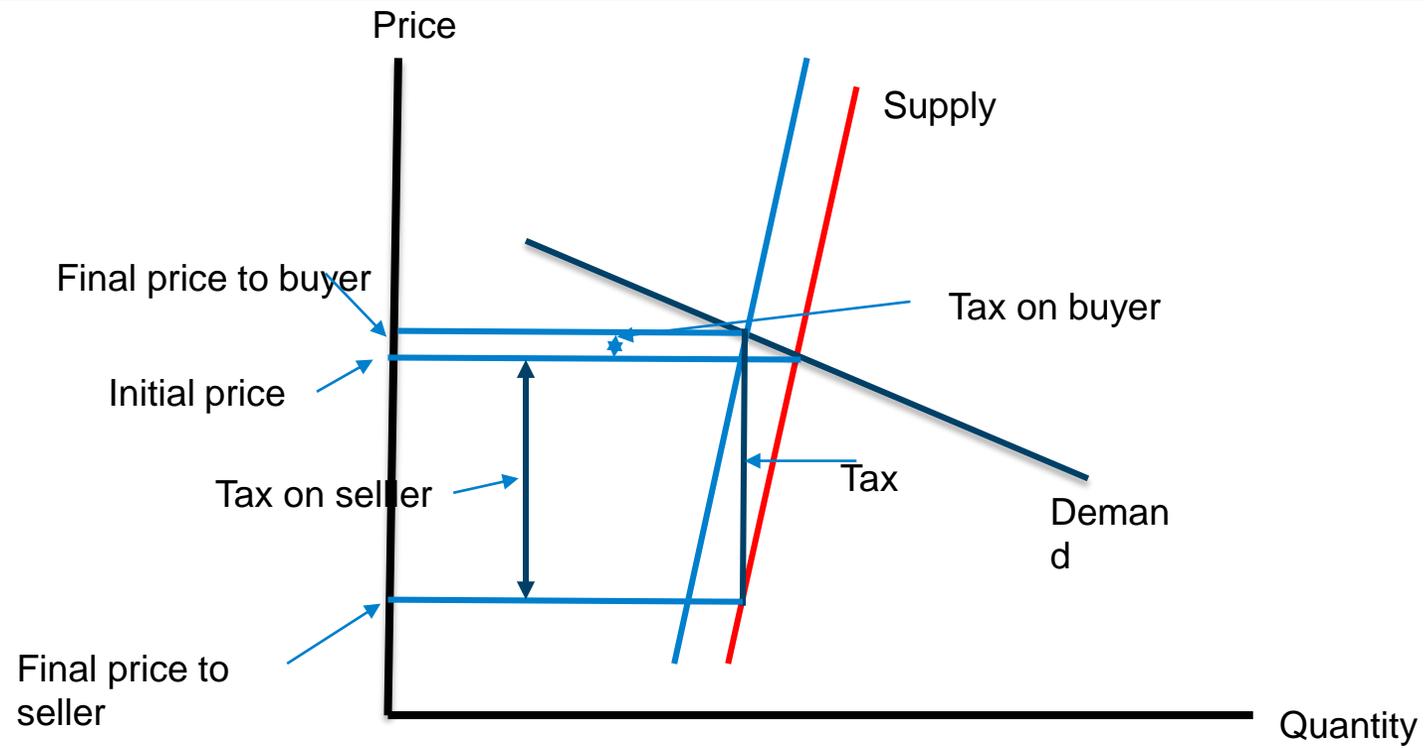
Regulation

- Regulation can be tempered with elements of market-based approaches
- US CAFE regs govern vehicle emissions of GHGs. They set standards and fine non-compliers
- But firms that over-comply can sell their over-compliance to those who under-comply. So Toyota, Honda and Nissan regularly sell over-compliance credits to BMW, Mercedes and VW
- Provides an incentive not just to comply but to over-comply
- Obama's Clean Power Plan was also regulation-based, setting limits to CO2 emissions per MWH



TAXES

- Pigouvian approach – internalize the external costs, make agents aware of the external costs of actions
- For GHGs involves a carbon tax – tax on energy
- Efficient – but generally seen as regressive as poor spend proportionally more on energy
- But distributional impacts depend on tax incidence, involving elasticities
- If S is inelastic and D is elastic then most of the tax is paid by the supplier and it's not borne by the consumer. Tax can always be rebated to consumers, as in British Columbia



Social Cost of Carbon

- For GHGs ideal tax is the SCC, PDV of marginal impact 1 extra ton CO₂ has on welfare

- $W(K, L, GHG): SCC = \frac{\partial W}{\partial GHG} = \frac{\partial}{\partial GHG} \int_t^{\infty} U e^{-\delta t}$

- Complex to evaluate:
 - Quantify all impacts of GHGs
 - Value impacts
 - Choose discount rate – or sequence of discount rates
- In Obama administration done using Integrated Assessment Models

- Damage functions of IAMs are weak in the extreme, omitting many impacts of climate change
 - Pindyck: IAMs “have crucial flaws that make them close to useless as tools for policy analysis...[they] create a perception of knowledge and precision, but that perception is illusory and misleading.”
 - Researchers are working to improve this but we are still far short of a comprehensive model of GHG impacts – and so of SCC
 - Best study to date is Bloomberg Paulson and Steyer’s “Risky Business” – but just for the US

Social Cost of Carbon

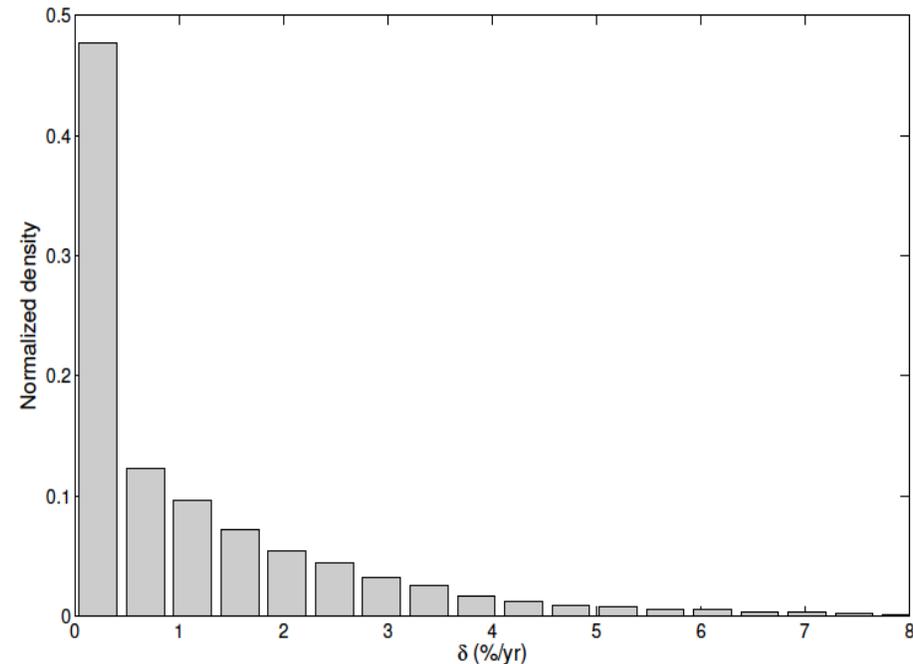
- Discount rate also a key and difficult choice. Obama number in 2007\$/metric ton CO2

Year	5% average	3% average	2.5% average	95Pct@3%
2020	12	42	62	123
2030	16	50	73	152
2040	21	60	84	183
2050	26	69	95	212

- Answer sensitive to discount rate and to uncertainty

Social Cost of Carbon

- What is the right discount rate?
 - Antony Millner and I have argued for 0.5%. Nordhaus suggests 1.5%, Stern zero, etc.
 - 0.5% based on recognizing that different people have different discount rates and treating the amalgamation of these as a social choice problem
 - Can also argue for non-constant discount rate, falling to zero



From Drupp et al.: distribution of pure rates of time preference over climate change experts

Social Cost of Carbon

- Bottom line – hard to implement a Pigouvian tax. But not an argument for no tax!
- Alternative approach – what tax would tip the economy away from fossil fuels? Easier to calculate than the SCC and tipping away from FF is what we really need to do
- Questions here are – What tax on CO₂ would suffice to transfer power generators to non-fossil energy? What tax will shift people from ICEs to EVs?
- Answer will vary from country to country and with the prices of oil and gas

Social Cost of Carbon

- A more tractable calculation. For the US
 - For electric power generation, a tax of \$25/ton CO₂ would end the use of FFs – which in fact is already ending
 - For cars, very sensitive to the price of oil. At \$60/bbl close to \$100/ton

Co-Benefits

- Note that reducing use of fossil fuels brings many benefits in addition to GHG reductions –
- Reduced emissions of NO_x, PM_x, SO₂, ozone,
- Substantial positive impact on health in particular in urban areas – examples Beijing, Dehli
- In fact some of world's most aggressive carbon policies motivated more by these co-benefits than by the GHG implications of fossil fuels
- IMF estimates \$57/ton CO₂ justified by co-benefits in top 20 emitting countries

IMF: How much carbon pricing is in countries' own interests? The critical roles of co-benefits. Ian Parry et al 2014



CAP AND TRADE

Cap-&-Trade

- We choose the emissions level, and the market chooses the implicit tax rate – the permit price
- Like a tax, efficient but could be regressive.
- Choice of allocations of permits and revenues from permit sales gives regulators some control over distributional impact. Can mitigate political objections
- Increasingly widespread at national and subnational levels and potential for linking internationally (California, NE States, China, NZ, EU,...)

Cap-&-Trade

- Biggest success has been with reducing SO₂ emissions under the acid rain program in the US
- Introduced by Bush I in 1990, estimated to have reduced cost of phasing out SO₂ by well over 50% relative to standard regulatory approach
- Volatility of prices may be an issue (see EU) – California has caps and floors to the market price of an emission right



LEGAL LIABILITY

Legal Liability

- Give people affected by externalities the right to sue for compensation
- This and Cap-&-Trade emerge from Coase's ideas about property rights and externalities
- High profile cases – Exxon Valdez oil spill (1989) in Alaska, BP oil spill in Mexican gulf (2010)
- Very slow – Valdez case still before the courts, Deepwater Horizon took eight years to settle
- Transaction costs – legal fees run to \$ hundreds of millions



ACTIVISM

- Shoppers & Investors are increasingly willing to base their choices on their values as these relate to the activities of alternative vendors
- Boycott products of companies of whose actions they disapprove (buyers) or avoid their shares (investors)
- In some cases this has produced clear results – Hong and Kasperczyk on impacts of SRI on stock prices
 - Prices of “sin stocks” low relative to model predictions
 - Prices of bonds not affected, leading to excessive leverage

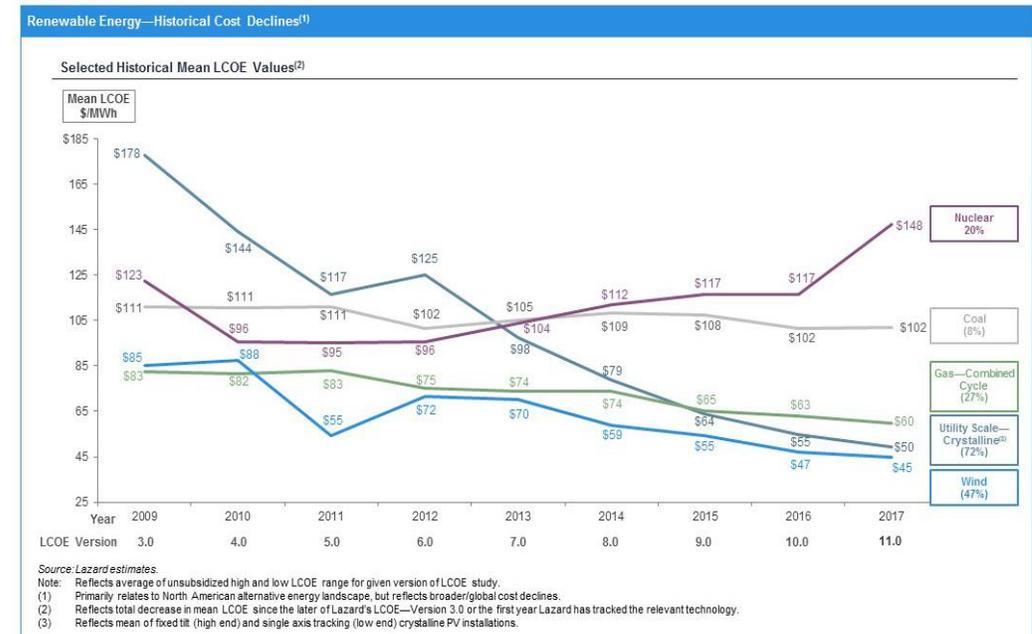
- ABC Homes and Carpet experiment in Manhattan
 - Towels all organic and fair trade
 - Some labelled to indicate this and some not
 - Labelled sales rose, even if prices increased
- Nike boycott over child labor in supply chain
- Fisman et al. on tie-in sales on eBay
- Need a measure of climate impacts to trigger activism – not simple. GHG emissions of scopes 1, 2 and 3
- Overall activism can be effective, but possibly not for global problems



CONCLUSIONS

Conclusions

- Many options for reducing emissions
- Reducing electricity emissions easier now because of drop in renewable energy costs
- Cap-&-trade most popular approach
- This & carbon taxes equally effective from economic perspective
- Scale of problem means that tackling it at least cost matters:
 - 30+ billion tons of reductions required: if each costs \$50 more than needed, \$1.5 trillion in excess





THANK YOU!