Domestic Options for Global Climate Change Policy

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Two Issues:

1. How to structure an international climate agreement

2. How to meet the obligations of an international agreement through domestic policies

I shall focus on issue 2.

Two General Types of Domestic Policy

1. Direct Emissions Policies (raise price of emissions)

-- carbon taxes

-- carbon caps (perhaps tradeable)

2. Technology Policies (lower private supply cost)

-- subsidies to encourage adoption of existing low-carbon technologies

-- subsidies to R&D in new low-carbon technologies

The former have less political backing (in the U.S., at least)

-- the “losing” group is highly concentrated

But relying exclusively on the latter is inefficient

-- two distinct market failures justify the use of two types of policy instrument.

Two Market Failures

Appropriability problem: justifies subsidies to R&D

External costs from increased CO_2 concentrations: justify direct emissions policies

Thus, two types of policies are justified

-- but the latter policies are unpopular

Can the Resistance to Direct Emissions Policies Be Overcome?

Standard direct emissions policies impose significant burdens on key industrial stakeholders

- standard carbon tax, or system of auctioned carbon permits, would significantly reduce profits of carbon-supplying sectors

Alternatives:

- Carbon tax with inframarginal exemptions
- Carbon tax combined with targeted corporate tax relief
- Tradeable carbon permits with partial grandfathering

Enhancing Political Feasibility Entails a Cost

The alternatives are more favorable to key stakeholders.

But they are likely to be less cost-effective than the “standard” direct emissions policies

Reason:

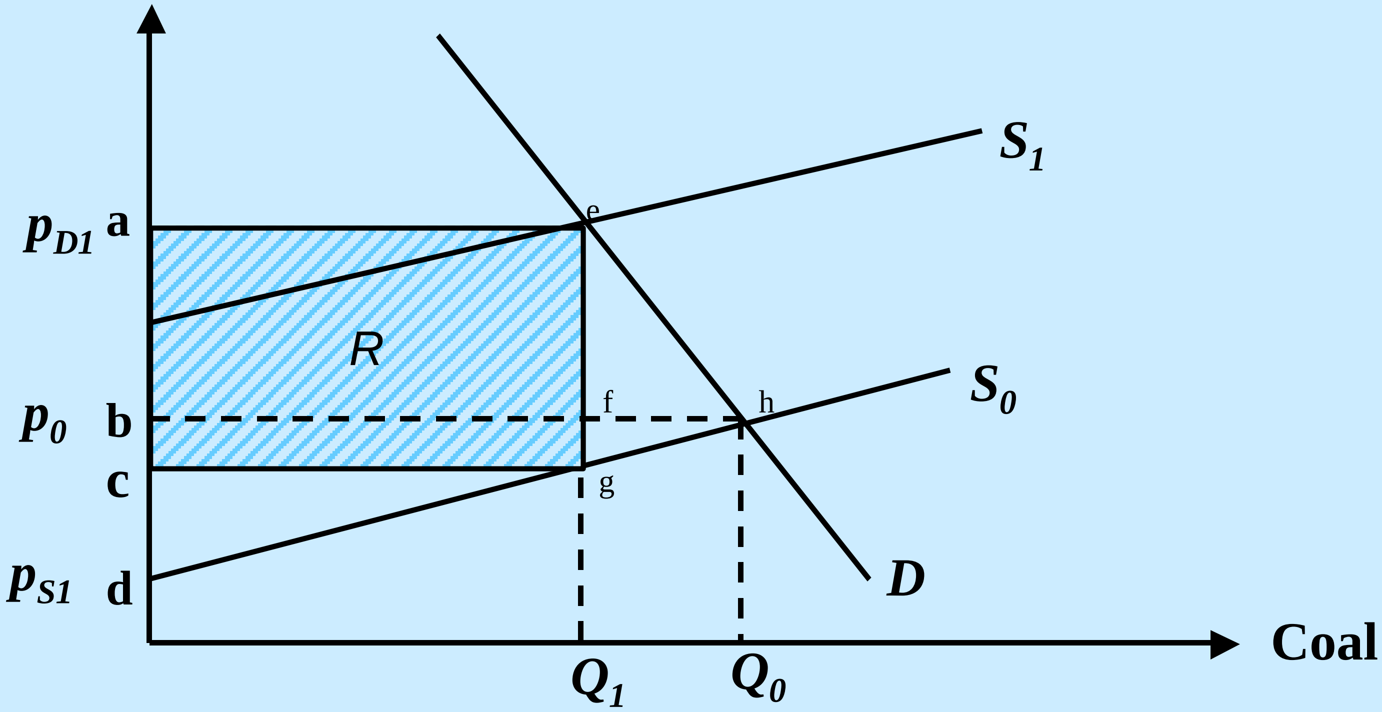
- the alternatives involve a sacrifice of government revenue.
- therefore they compel government to rely more on ordinary, distortionary taxes for revenue
- this implies a sacrifice of efficiency

Main Research Questions

How can direct emissions policies be designed to address significant industry distributional considerations?

How much does attending to these distributional impacts add to overall policy costs?

CO_2 Abatement and Profits



Reduce *Q* from Q_0 to Q_1 via auctioned permits (or carbon tax)

lost consumer surplus: ***aehb***

government revenue: area ***R***

lost producer surplus: ***bhgc***

Same reduction via grandfathered permits

lost consumer surplus: ***aehb***

private rent: area ***R***

gained producer surplus: ***R – bhgc***

Are the Rents Large in Relation to Profits?
– Some Back-of-the-Envelope Calculations –

Consider U.S. coal industry in year 2000

1. Tax Revenues (or Potential Rents)

Gross output under status quo [1]	
(in billions of 1997 dollars)	**29.28**
Est. gross output after $25/ton carbon tax	
(assumes 33% reduction [2])	**19.62**
Est. carbon tax revenues	
($25 per ton carbon x .0228 tons carbon	
per dollar of fuel x $19.62 billion)	**11.18**

2. After-Tax Profits

After-tax dividends plus retained earnings under status quo [3]	
(in billions of 1997 dollars)	**.33**
Loss in dividends and retained earnings under $25/ton carbon tax	
(assumes 30% reduction [4])	**.10**

3. Loss in Profits as Percentage of Potential Carbon Revenues **0.9%**

(i.e., .012 x 11.18 = .13)

[1] Gross output in 1997 reported in *Survey of Current Business,* Nov. 1998, Table 15. This output figure was projected to year 2000 assuming 2% real growth rate.

[2] Underlying assumptions: (a) 55% price increase and (b) price elasticity of demand of .6

[3] Based on average before-tax profits for period 1990-97, as reported by U.S. Dept. of Commerce, Bureau of Economic Analysis. These figures were converted to after-tax values assuming an overall effective corporate tax rate of 35 percent.

[4] The detailed numerical model projects a loss of about 28 percent.

Tools for Analysis

- **Analytically tractable 2-sector model**
- **Numerically solved multisector general equilibrium model**
  - Intertemporal
  - 13 U.S. industries (6 energy industries)
  - Capital adjustment dynamics (crucial for evaluating impacts on profits)

Table 3: Equity Values

	Policies with No Distributional Adjustments		*Permits Policies*			*Carbon Taxes Combined with Corporate Tax Credits*			
	Constant Carbon Tax, Lump-Sum Repl	*Carbon Tax Growing at 7%, Lump-Sum Repl.*	*100% Auctoning*	*Partial Free Allocation (Equity-Value Neutrality)*	*100% Free Allocation*	*Credits to Coal and Oil&Gas*	*Add Credits to Electric Utilities*	*Add Credits to Petroleum Refining*	*Add Credits to Metals&Machinery*
	A1	A2	B1	B2	B3	C1	C2	C3	C4
Equity Values of Firms, Year 2000 (percentage changes from reference case)									
Agriculture and Non-Coal Mining	-1.0	-1.7	0.1	0.0	-1.1	0.0	0.0	0.0	0.0
Coal Mining	-43.2	-55.8	-54.6	0.0 (7.8%)	611.0	0.0	0.0	0.0	0.0
Oil&Gas	-9.8	-18.5	-20.0	0.0 (14.0%)	124.2	0.0	0.0	0.0	0.0
Petroleum Refining	-2.8	-4.1	-2.1	-2.3	-3.7	-2.2	-2.2	0.0	0.0
Electric Utilities	-4.5	-6.7	-4.2	-4.3	-5.9	-4.3	0.0	0.0	0.0
Natural Gas Utilities	1.6	1.9	4.3	4.1	2.6	4.2	4.2	4.2	4.2
Construction	-1.8	-2.7	1.5	1.0	-1.3	1.3	1.2	1.3	1.3
Metals and Machinery	-2.5	-3.5	-0.9	-0.8	-0.9	-1.0	-1.1	-1.0	0.0
Motor Vehicles	-0.7	-1.2	3.3	3.2	1.5	3.0	3.0	3.0	3.1
Miscellaneous Manufacturing	-2.3	-3.4	-0.8	-0.9	-1.6	-1.0	-1.0	-1.0	-1.0
Services (except housing)	-0.7	-1.1	1.1	1.0	-0.5	1.0	1.0	1.0	1.0
Housing Services	-0.5	-1.0	0.6	0.4	-0.6	0.5	0.5	0.5	0.5
Total	-1.1	-1.8	-0.7	-0.9	-0.1	-0.7	-0.8	-0.8	-0.8

Table 4: Emissions, Revenues, and Efficiency Costs

	Policies with No Distributional Adjustments		*Permits Policies*			*Carbon Taxes Combined with Corporate Tax Credits*			
	Constant Carbon Tax, Lump-Sum Repl	*Carbon Tax Growing at 7%, Lump-Sum Repl.*	*100% Auctoning*	*Partial Free Allocation (Equity-Value Neutrality)*	*100% Free Allocation*	*Credits to Coal and Oil&Gas*	*Add Credits to Electric Utilities*	*Add Credits to Petroleum Refining*	*Add Credits to Metals&Machinery*
	A1	A2	B1	B2	B3	C1	C2	C3	C4
Emissions									
Absolute Change	-11.42	-17.58	-17.20	-17.23	-17.50	-17.22	-17.22	-17.22	-17.22
Percentage Change	-14.84	-22.85	-22.36	-22.39	-22.74	-22.38	-22.38	-22.38	-22.38
Present Value of Carbon Tax Revenues	2113.4	3553.0	3541.1	3212.3	0.0	3540.7	3540.6	3540.6	3540.5
Efficiency Cost									
Absolute	1190.0	2228.0	1478.0	1591.0	2810.0	1501.4	1504.8	1506.0	1506.2
Per Ton of CO2 Reduction	104.2	126.7	85.9	92.3	160.5	87.2	87.4	87.5	87.5
Per Dollar of Carbon Tax Revenue	0.563	0.630	0.417	0.495	NA	0.424	0.425	0.425	0.425

Conclusions

Potentially large losses in profit to key industrial stakeholders can be neutralized at fairly low cost

- Only a small fraction of potential revenues needs to be sacrificed; hence efficiency sacrifice is small
- Price tag on enhancing political feasibility may be fairly low

Caveats

- Compensation to labor (for unemployment)
- Political process is complex