

# Using the Tax System To Address Competition Issues with a Carbon Tax

Gilbert E. Metcalf  
Tufts University and NBER

CLOSING THE CARBON GAP: PUBLIC FINANCE AND  
CLIMATE POLICY

MERCATOR RESEARCH INSTITUTE

BERLIN

MAY 22, 2014



# Using the Tax System to Address Competition Issues with a Carbon Tax

---

Gilbert E. Metcalf

Considering a Carbon Tax: A Publication Series from RFF's  
Center for Climate and Electricity Policy

1616 P St. NW  
Washington, DC 20036  
202-328-5000 [www.rff.org](http://www.rff.org)



# Energy Intensive Trade Exposed Sectors

- EITE sectors a concern in negotiations leading to H.R. 2454
- EITE treatment under a carbon tax reform
  - Should there be special treatment for EITE sectors?
  - What are the options?
  - How should we assess these options?
- Border tax adjustment versus a compensation approach?

# Destination Based Carbon Tax: Theory

Product	Domestic Production	Foreign Production
Fossil fuels consumed domestically	Taxed	Taxed
Exported fossil fuels	Exempt	NA
Embodied carbon in products consumed in US	Taxed	Taxed
Embodied carbon in exported products	Exempt	NA

# Destination Based Carbon Tax: Border Adjustment

Product	Domestic Production	Foreign Production
Fossil fuels consumed domestically	Taxed	Taxed
Exported fossil fuels	Exempt	NA
Embodied carbon in products consumed in US	Taxed	Taxed
Embodied carbon in exported products	Exempt – in principle	NA

- Which imported goods are subject to tax?
- How is carbon content measured?

# Destination Based Carbon Tax: Compensation Approach

Product	Domestic Production	Foreign Production
Fossil fuels consumed domestically	Taxed	Taxed
Exported fossil fuels	Exempt	NA
Embodied carbon in products consumed in US	Some sectors afforded relief from carbon tax	Exempt
Embodied carbon in exported products	Exempt – in principle	NA

- Which sectors afforded relief?
- How is relief provided?

# Should There Be Special Treatment for EITE Sectors?

- Compensation costly on efficiency grounds
  - May undercut carbon price and raise the cost of achieving desired emission reductions
  - Reduces revenue available for lowering tax rates or deficit reduction
  - Dynamic moral hazard concerns (Kaplow, 1992).
    - Socially inefficient to ignore potential government policy
    - Policy can affect technological innovation. We don't compensate technology runner ups
- Compensation motivated by political economy or distributional concerns

# Tax Incidence and EITE Sectors

- Highly trade-sensitive sectors may be less able to pass carbon costs on to consumers through higher prices.
- Capital and labor in EITE sectors are likely to bear the burden of the carbon tax.
  - In the short run, old capital and labor may share the burden in some mix.
  - Over time, the burden is likely to fall predominantly on labor.
- Any EITE-specific compensation mechanism should ensure that the compensation flows to the burdened factor(s).



# Modeled Carbon Tax

- \$20 per ton on energy-related emissions in 2010 modeled
- SR revenue estimate: ~\$100 billion before tax offset
- EITE sector revenue: \$8.5 billion
- Portion of revenues used for tax reductions to benefit EITE sectors

# Targeted Compensation Approach

- Presumptive eligibility if one or more of the following hold:
  - Energy intensity is 5 percent or greater, and trade intensity is 15 percent or greater
  - GHG intensity is 5 percent or greater, and trade intensity is 15 percent or greater
  - Energy intensity is 20 percent or greater
  - GHG intensity is 20 percent or greater

# Tax Reforms Considered

- Targeted credit for carbon tax on income tax
- Payroll tax reduction
- Capital investment incentives
- Corporate income tax rate reduction

# Credit for Carbon Tax

- Credit on corporate income tax considered
- Sufficient tax appetite to credit 15 to 25 percent of carbon tax across sectors for “typical” sectors
  - 23 percent across EITE sectors on average
- Credit could be output based as in HR 2454

# Output Based Credit

$E_{ij}$  – emissions of firm  $i$  in sector  $j$

$C_{ij}$  – tax credit for firm  $i$  in sector  $j$

$Y_{ij}$  – value of shipments for firm  $i$  in sector  $j$

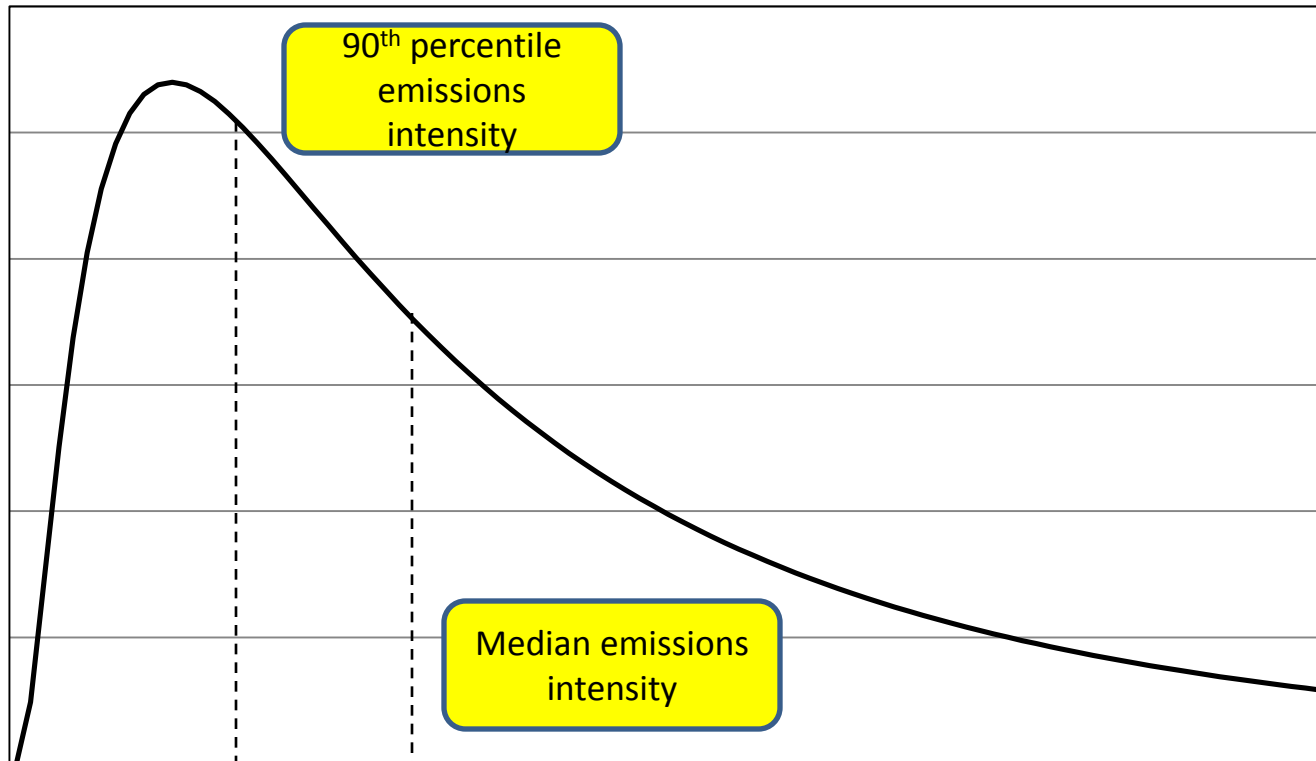
$\hat{\phi}_j^\mu$  – measure of emissions per value of shipments  
in sector  $j$

$\tau$  – carbon tax rate

$$C_{ij} = \tau \hat{\phi}_j^\mu Y_{ij}$$

Credited Emissions	Non-Credited Emissions
$\hat{\phi}_j^\mu Y_{ij}$	$E_{ij} - \hat{\phi}_j^\mu Y_{ij}$

# Crediting Base



Emissions Intensity  $(E_{ij}/Y_{ij})$

$$C_{ij} = \tau \hat{\phi}_j^\mu Y_{ij}$$

# Best Practices Credit

- An output based credit that addresses competitiveness issues
- Set appropriately, it avoids tax appetite problems
- Incentivizes best practices and investments in new technologies to reduce emissions

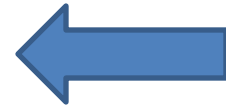
# Payroll Tax Rate Reduction

- Payroll tax rate could be reduced by maximum of 0.72 percentage points.
- Reduction for all workers, not just EITE sector workers
- Increase in before-tax wage of 0.67 percentage points assuming full incidence of tax on workers
- Benefit of reform to workers



# Sectoral Impacts

	All Manufacturing Sectors	EITE Sectors
Change in wages paid by firms (\$ millions)	\$7.6 (11.4) IQR: \$1.6 to \$8.2	\$6.6 (9.9) IQR: \$2.1 to \$5.3
Change in wages as a share of the value of shipments	0.07% (0.05) IQR: 0.03% to 0.11%	0.05% (0.02) IQR: 0.04% to 0.06%
Change in wages less carbon tax (\$ millions)	-\$46.6 (257.6) IQR: -27.2 to -1.1	-\$252.3 (410.4) IQR: -233.9 to -55.2
Change in wages per dollar of carbon tax	0.14 (0.25) IQR: 0.01 to 0.15	0.03 (0.02) IQR: 0.02 to 0.04
Number of sectors that gain/lose	84/387	0/34

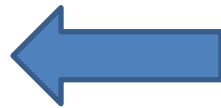


# Investment Incentives

- 10 percent investment tax credit on new machinery and equipment
- All firms eligible for credit, not just EITE firms
- EITE firms disproportionately capital intensive

# Sectoral Impacts

	All Sectors	EITE Sectors
Capital spending on machinery and equipment (\$ millions)	\$238.8 (658.3) IQR: \$30.0 to \$224.3	\$419.8 (609.1) IQR: \$66.6 to \$448.7
Capital spending on machinery and equipment per \$1,000 of shipment value	\$22.79 (13.27) IQR: \$15.43 to \$27.84	\$35.79 (16.25) IQR: \$27.84 to \$41.40
ITC per dollar of carbon tax	0.440 (0.594) IQR: 0.166 to 0.510	0.166 (0.100) IQR: 0.113 to 0.221
Sectors with ITC in excess of carbon tax	166	0



# Corporate Tax Rate Reduction

- Tax rate could be reduced by 7 to 8 percentage points
  - Depends on elasticity of corporate income with respect to tax price ( $1 - \text{tax rate}$ )
- Taxes of EITE sectors fall by more (as a share of taxable income)
- Corporate taxes on manufacturing fall by \$11.2 billion

# Sectoral Impacts

	All Sectors	EITE Sectors
Change in corporate tax before credits (\$ millions)	-\$77.8 (517.0) IQR: -\$45.1 to -\$5.6	-\$70.2 (120.6) IQR: -\$74.6 to -\$7.9
Change in corporate tax before credits as a percentage of income subject to tax	-8.5% (3.3) IQR: -8.1 to -7.3	-21.5% (9.5) IQR: -34.9 to -13.4
Net tax change (\$ millions)	-\$23.8 (327.1) IQR: -13.7 to 9.1	\$186.9 (321.2) IQR: 38.3 to 232.1
Net tax change as a percentage of income subject to tax	-2.6% (23.2) IQR: -6.6% to -4.4%	56.2% (127.6) IQR: 10.0% to 71.7%
Change in CIT per dollar of carbon tax	-1.44 (4.51) IQR: -2.22 to -0.35	-0.28 (0.16) IQR: -0.37 to -0.22
Number of sectors that gain/lose	240/232	0/34



# Summary

- Tax credit can address competitiveness concerns without diluting the carbon price signal
- Non-targeted tax reductions vary in benefits to EITE sectors
  - Payroll tax reduction less effective than corporate tax reduction or investment incentives
- Substantial efficiency cost to compensating certain sectors. Must be balanced against benefits (distributional or political economy)

# Thank you!



[gmetcalf@tufts.edu](mailto:gmetcalf@tufts.edu)