Unemployment and Environmental Regulation in General Equilibrium

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Resources for the Future

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**Outline**

- **Introduction and Background**
  - Job-Killing Regulation vs. Green Jobs
  - Regulated vs. Unregulated Sectors
  - Limitations of Existing Studies

- **A new (simple) model**
  - Initial Findings
  - Policy Takeaways
  - Limitations

- **Future Work**
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The Economist, Oct 29th, 2011. “The economics of incorporating employment considerations into regulatory policy is in its infancy. Mr. Sunstein calls it a ‘frontiers question’.”
## Employment by Sector, 2013

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<tr>
<th>Industry</th>
<th>Jobs</th>
<th>Pct. of Total</th>
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<tbody>
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<td>Logging</td>
<td>52,600</td>
<td>0.04</td>
</tr>
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<td>Mining</td>
<td>815,000</td>
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<td>Utilities</td>
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- Greenstone (2002): 590,000 jobs lost over 15 years in non-attainment counties due to Clean Air Act
- Curtis (2013): 151,000 jobs lost as result of NOx Budget Trading Program

Problems:
- These studies look only at effects on regulated industry
- Can't measure overall effect (sees direct "job destruction" but misses downstream spillovers and "green jobs")
- Some studies use unregulated sector as control group, which could lead to dramatic overestimation of effects
- Ignore dynamics of job creation and job destruction – Curtis (2013) is exception
Does (Environmental) Regulation Kill Jobs?

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Computed General Equilibrium Models

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Problems:

- Assume full employment: everyone who wants a job finds one
- Can say something about labor demand and supply, but not jobs or unemployment
- Voluntary changes in employment are *very* different from changes in involuntary unemployment
Empirical Macroeconomics Literature: Vector Autoregressions (VARs)

Variety of results: some find job losses, others find gains

Problems:

- Usually no theoretical basis
- Large-scale VARs are too complex to understand
- Work well for near-term forecasting without policy changes
- But Lucas Critique showed problems with using VAR’s for policy analysis
A New Approach to Jobs and the Environment

Need for a new approach that:

- Takes whole economy into account
- Recognizes that people don’t find jobs immediately (and unemployment is never zero)
- Has a solid economic foundation
- Permits rigorous cost-benefit analysis that includes effects on jobs
Hafstead-Williams Model

- Includes labor market dynamics such as:
  - Prospective workers must find jobs
  - Employers face costs of finding and hiring workers
  - Employee turnover (quits and other separations)
  - Unemployment compensation

- Uses BLS data on job openings, hires, and quits (JOLTS)

- Currently models 2 industry sectors, expanding to 22 sectors
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Regulated sector loses jobs
  - Loss is through attrition without replacement

Unregulated sector gains jobs

Substitution away from goods produced by regulated sector

Decrease in wages due to increased labor market slackness

Unemployment unchanged or slightly increased

0% - 0.28% increase depending on revenue recycling

Earnings decrease slightly in both sectors
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Hafstead and Williams (2015)
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$20 Carbon Tax: Aggregate Unemployment

Unemployment Rate vs. Time (Months)

- Lump-Sum Rebates
- Payroll Tax Reductions

Hafstead and Williams (2015)
$20 Carbon Tax: Employment Change by Sector

-0.008 -0.006 -0.004 -0.002 0.000 0.002 0.004

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23

Clean

Dirty

Hafstead and Williams (2015)

Unemployment and Environmental Regulation
$20 Carbon Tax: Vacancies by Sector

Hafstead and Williams (2015)
$20 Carbon Tax: Earnings by Sector

Hafstead and Williams (2015) | Unemployment and Environmental Regulation
Policy Implications

- Effects on jobs are mostly reallocation, not net job loss
  - Job losses in regulated sector largely offset by gains in unregulated sector
- Costs of policy should not be measured in jobs
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- Policy design can lower costs of job losses/shifts
  - Phase-in of policy over time
  - Provide money for buyouts
  - Worker retraining
Model does not yet include:

- Geography
  - geographical concentration of regulated industries
  - ability/inability of labor to move across regions
- Skill levels or occupational specialization
- Unionization of affected industries
- Industry-specific capital investment
- Other frictions that would affect transition
Next Steps

- Expand model from 2 to 22 sectors
- Include wider range of regulatory policies, such as rate-based standards
- Business cycle analysis
- More accurately measure job transition costs
- Include international trade