The Ins & Outs of Employment: Labor Market Adjustments to Carbon Taxes

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Are environmental policies & labor market consequences connected?

- Environmental policies have swept the world for decades.
- They received increasing attention partly because of potential job & wage losses created by environmental policies.
Lengthy Debates; Mixed Results

Early Literature:

• Many find that environmental policies decrease employment in regulated firms (Greenstone, 2002; Walker, 2011; Kahn & Mansur, 2013)

• Some find the effect weak (Bergman & Bui, 2001; Martin et al., 2014; Azevedo et al., 2020)
Lengthy Debates; Debates Continue

Recent Literature:

• **Labor Reallocation**: Employment may shift to unregulated sectors (Hafstead & Williams, 2018; Castellanos & Heutel, 2019)

• **Innovation Effect**: The creation of green jobs may absorb unemployment (Vons et al., 2018; Marin & Vons, 2019)

The overall (un)employment effect of environmental policies remains unknown
What is missing between the public & prior literature?

- If labor market effects are weak, why is the public so concerned with environmental lawmaking?
- If the effects are strong, what hinders prior literature from identifying the unemployment & wage effects?
How do environmental policies shape labor markets?

- **Unemployment Effect?**
  - **Job-Loss Effect**: Layoffs become increasingly common
  - **Job-Finding Effect**: Finding a job becomes harder

- **Wage Effect?**
  - Wage adjustments through incumbent wages or hiring wages?
Who Cares? Why Cares?

- **The Public**: Address concerns on potential job & wage losses
- **Economists**: Enhance our understanding of how the labor market functions
- **Policymakers**: Provide guidance on labor market policy formulation
British Columbia’s Carbon Tax

- Provide Numerous Control Labor Markets
British Columbia’s Carbon Tax

- Implemented on July 1, 2008
British Columbia’s Carbon Tax

- Implemented on July 1, 2008
British Columbia’s Carbon Tax

- Provide Exogenous Variation in the Stringency of the Policy
Methodology

*Identification Strategy:*

- Coarsened-Exact-Matching Method
- Difference-in-Differences Method

*Treatment Group: BC*

*Treatment Period: July 2008-June 2015*
The Canadian Labour Force Survey

- Monthly Household Survey (~100,000 individuals)
- Similar in nature to the Current Population Survey
- Repeated Cross-Sectional Data
- Public-Use File
Preview of Results

- BC’s carbon tax increases the unemployment rate
  - The unemployment effect arrives without lags & decays

- BC’s carbon tax decreases the wage rate
  - The wage effect arrives with lags & grows
Parallel Unemployment Trends
Unemployment Effects
What makes the unemployment effect decay?

- **Job-Loss Effect**: Employed workers are more likely laid off?
- **Job-Finding Effect**: Unemployed workers find it harder to be hired?
Policy Impacts on Job-Finding Rates
Policy Impacts on Job-Separation Rates
Decomposition of Unemployment Effects
The Dynamics of the Unemployment Effect

- What makes the initial unemployment effect significant?
  - Both the job-loss & job-finding effects.

- What makes the unemployment effect decay?
  - The job-loss effect is short-lived.

- What makes a small unemployment effect persistent?
  - The job-finding effect is long-lived.
Average Wage Effects
Hiring Wage Effects

![Graph showing hiring wage effects from 2006 to 2015.](image)
Incumbent Wage Rigidity
Average wage continues to decrease with the gradual increase in the proportion of new hires
Key Results

- BC’s carbon tax increases the unemployment rate
  - The unemployment effect arrives without lags & decays

- BC’s carbon tax decreases the wage rate
  - The wage effect arrives with lags & grows
Why is the public so concerned?

- Recognize the public concern on potential job & wage losses created environmental policies
What hinders us from identifying unemployment effects?

- **DID Approach:**
  - Using prolonged post-policy periods will average out the effect, making the effect small
What hinders us from identifying unemployment effects?

- **Ferris et al. (2014):**
  - Little evidence on the employment effect over a prolonged post-policy periods
  - Strong but short-lived employment effect

- **Yip (2018):**
  - Strong unemployment effect in the first two years of a carbon tax policy

- **Azevedo (2020):**
  - Little evidence on the employment effect in the first six years of the same policy
What hinders us from identifying wage effects?

DID Approach:

- Using too short the post-policy periods may fail to find any average wage effect
What hinders us from identifying wage effects?

- I cannot find any average wage effect in the first two years
- Partly explain the paucity of evidence on the wage effect of environmental policies in the literature
Should the entitlement period of unemployment benefits be extended with environmental policies?

- Literature suggests to extend the entitlement period of unemployment benefits to smooth the consumption of unemployed in high unemployment
Strong Effect on Short-Term Unemployment
Weak Effect on Long-Term Unemployment
Unemployment Effect by Spells
Should the entitle period of unemployment benefits be extended with environmental policies?

- BC’s carbon tax increases unemployment mainly through the number of unemployment spells, not the duration of unemployment spells.

- Substantial extension of entitle periods is unnecessary.
Recycling Carbon Tax Revenues

- The compensation of incumbent workers is unnecessary.
  - Incumbent workers kept their jobs with wages unaffected.

- New hires lost jobs; once re-hired, they experienced wages cut.

- Carbon tax revenues can be used to provide hiring subsidies to firms to speed up hiring processes & to provide tax credits to new hires to reduce the after-tax wage losses.
Robustness Check

- Are the results driven by the 2008 recession?
The 2008 Recession

- If the 2008 recession affected BC’s labor market the same way it did to the ROC, the unemployment & wage effects will be eliminated by the DID approach.

- The estimated unemployment & wage effects are free from the recession effect.
## Labor Market Effects of Recession

<table>
<thead>
<tr>
<th></th>
<th>Unemployment Effect</th>
<th>Wage Effect</th>
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</thead>
<tbody>
<tr>
<td><strong>BC x 2008 x Mar-Jun</strong></td>
<td>-0.002 (0.004)</td>
<td>0.001 (0.010)</td>
</tr>
<tr>
<td><strong>BC x 2008</strong></td>
<td>0.006 (0.004)</td>
<td>-0.008 (0.008)</td>
</tr>
<tr>
<td><strong>BC x Mar-Jun</strong></td>
<td>0.004 (0.003)</td>
<td>-0.007 (0.007)</td>
</tr>
<tr>
<td><strong>2008 x Mar-June</strong></td>
<td><strong>0.004</strong>* (0.002)</td>
<td><strong>-0.006</strong>* (0.003)</td>
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Did the 2008 recession affect BC disproportionately?

- In the first half of 2008, the average wages are low & unemployment is high in Canada.
- These effects are NOT especially large in BC.
Robustness Check

- Are the results driven by migration?
Migration From BC

In(Migrants from BC) by Province

AB
ON
MB, QC, & SK
NB, NL, NS, & PE

Migration into BC

![Graph showing migration into BC by province from 2000 to 2018.](image-url)
Heterogeneous Effects Across Industries

- BC’s carbon tax may affect industries differently.
- High-energy intensive industries are affected more.
- Is the wage effect concentrated on high-intensive industries?
### Heterogeneous Wage Effects

<table>
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<tr>
<th>Term</th>
<th>Energy Expenditure/Shipments</th>
<th>Energy Expenditure/Value Added</th>
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<tbody>
<tr>
<td>( \ln(EI) \times BC \times \text{Post} )</td>
<td>(-0.026^{***}) ( (0.020) )</td>
<td>(-0.020^{**}) ( (0.009) )</td>
</tr>
<tr>
<td>( \ln(EI) \times \text{Post} )</td>
<td>-0.001 ( (0.003) )</td>
<td>-0.003 ( (0.003) )</td>
</tr>
<tr>
<td>( \ln(EI) \times BC )</td>
<td>(0.053^{***}) ( (0.010) )</td>
<td>(0.054^{***}) ( (0.010) )</td>
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Adverse wage effects are concentrated in carbon-intensive industries, consistent with tax incentives created by BC’s carbon tax.
This paper has no intention to support or object to any environmental policies. It calls for attention to labor market adjustments to environmental policies.