Causal Impacts of COVID-19 Pandemic Policies on Timber Markets in the Southern United States

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Agenda

- Background
- Objectives
- Method
- Preliminary Findings
- Moving Forward
COVID-related Preference Changes

Effects on Forest Industry

- Logging and construction not “remote work” (supply side)
- Mill closures (demand side)
- Initial decrease in demand for wood (demand side)
- Stockpiling behavior and DIY home improvements (demand side)

(Greenville et al. 2020; Jones 2021; Dort 2020; Montenovo et al. 2020; Balleer et al. 2020; Hevia and Neumeyer 2020)
Study Question

How do COVID lockdown policies across counties in the Southern U.S. affect prices of various stumpage products?

Research method

Time Regression Discontinuity Design (T-RD): Causal Inference
Study Region

Southern Region

Forest2Market 39 Micromarkets
# COVID Policies by County

<table>
<thead>
<tr>
<th>Policy</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No Policy or Order to Stay Home</td>
</tr>
<tr>
<td>1</td>
<td>Mandatory for all individuals</td>
</tr>
<tr>
<td>2</td>
<td>Mandatory only for all individuals in certain areas of the jurisdiction</td>
</tr>
<tr>
<td>3</td>
<td>Mandatory only for at-risk individuals in the jurisdiction</td>
</tr>
<tr>
<td>4</td>
<td>Mandatory only for at-risk individuals in certain areas of the jurisdiction</td>
</tr>
<tr>
<td>5</td>
<td>Advisory or recommendation to stay at home</td>
</tr>
</tbody>
</table>
## Data Broken into Bi-monthly “Periods”

<table>
<thead>
<tr>
<th>Period 1</th>
<th>Jan-Feb 2019</th>
<th>Period 7</th>
<th>Jan-Feb 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period 2</td>
<td>Mar-April 2019</td>
<td>Period 8</td>
<td>Mar-April 2020</td>
</tr>
<tr>
<td>Period 3</td>
<td>May-June 2019</td>
<td>Period 9</td>
<td>May-June 2020</td>
</tr>
<tr>
<td>Period 4</td>
<td>July-Aug 2019</td>
<td>Period 10</td>
<td>July-Aug 2020</td>
</tr>
<tr>
<td>Period 6</td>
<td>Nov-Dec 2019</td>
<td>Period 12</td>
<td>Nov-Dec 2020</td>
</tr>
</tbody>
</table>
Counties in the U.S. South
(AL, FL, GA, LA, MS, NC, SC, TN, VA, AR, TX)
with Policies 1-5 that have occurred at least one time during
Period 8 or 9 (March-April, May-June 2020)

- Policy 1: 86% (Period 8), 42% (Period 9)
- Policy 2: 0% (Period 8), 1% (Period 9)
- Policy 3: 17% (Period 8), 17% (Period 9)
- Policy 4: 0% (Period 8), 0% (Period 9)
- Policy 5: 59% (Period 8), 60% (Period 9)
- No Policy: 100% (Period 8), 28% (Period 9)
Model
COVID Policy on Timber Price

Dataset is bi-monthly, starting Jan. 2019 and ending Dec. 2020 (Timber price data source: Forest2Market)

\[
\ln(\text{Price}_{i,t}) = \beta_0 + \beta_1 After + \theta_t Z_i + \phi f(\text{time}) + \chi After \ast f(\text{time}) + \lambda_i + \delta_t + \lambda_i \ast \delta_t + \epsilon_{i,t}
\]

Where B1 is the coefficient of interest → estimates the effect of COVID-policies on wood products prices

Model Assumptions:
1. The price discontinuity at the time period of COVID-policy implementation is the policy itself
2. The identification strategy is violated if there is self-selection at the cut-off
3. Serial dependence is a problem (prices are correlated to their prior value)
4. The time window chosen is important
Findings

Mean Price of Roundwood Products in U.S. South
Discontinuity at Period 9 (May-June 2020)
Regression Function Fit
Mean Price (In) of Roundwood Products in U.S. South

- Pine Pulpwood
- Pine Sawtimber
- Chip N Saw
- Hardwood Sawtimber
- Hardwood Pulpwood

Sample Avg, Polynomial Order 4
Example: Pine Pulpwood

<table>
<thead>
<tr>
<th>Pine Pulpwood</th>
<th>Left of Cutoff</th>
<th>Right of Cutoff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective Number of Obs.</td>
<td>2751</td>
<td>3668</td>
</tr>
<tr>
<td>Rho</td>
<td>0.612</td>
<td>0.612</td>
</tr>
<tr>
<td>Coefficient</td>
<td>Standard Error</td>
<td></td>
</tr>
<tr>
<td>Conventional</td>
<td>-0.2634***</td>
<td>-0.0678</td>
</tr>
<tr>
<td>Bias Corrected</td>
<td>-0.3126***</td>
<td>-0.0678</td>
</tr>
<tr>
<td>Robust</td>
<td>-0.3126***</td>
<td>-0.0905</td>
</tr>
</tbody>
</table>
## T-RD Estimates: Causal Inference for COVID-19 Policies in the U.S. South

<table>
<thead>
<tr>
<th>Regression Type</th>
<th>Product Type</th>
<th>Estimated Price Decrease per Ton (Cut Period 9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kink T-RD</td>
<td>Pine Pulpwood</td>
<td>26-31%</td>
</tr>
<tr>
<td>Kink T-RD</td>
<td>Pine Chip N Saw</td>
<td>5-7%</td>
</tr>
<tr>
<td>Kink T-RD</td>
<td>Pine Sawtimber</td>
<td>12-14%</td>
</tr>
<tr>
<td>Sharp T-RD</td>
<td>Hardwood Sawtimber</td>
<td>14-16%</td>
</tr>
<tr>
<td>Sharp T-RD</td>
<td>Hardwood Pulpwood</td>
<td>30-49%</td>
</tr>
</tbody>
</table>
Policy Combination #26: Policy 0, Policy 1, Policy 5

Policy Combination #9: Policy 1

Policy Combination #24: Policy 0, Policy 2, Policy 3, Policy 5
Conclusions & Moving Forward

- Hardwood Pulpwood most affected, Pine Chip N Saw least affected
- Assumptions Tested (not presented today)
- Future market shocks? Demand side shocks?
- Moving Forward → Individual Policies Examined
Thank You!

Questions or Comments?

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