

Impacts of the COVID-19 Pandemic on Forestry in the U.S. South

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The COVID-19 Pandemic & the Southern Forest Sector

“The overall goal of this integrated project is to evaluate the impacts of the Pandemic on forestry and the forest product industry throughout the supply chain, and identify, develop, and disseminate the strategies to revitalize the southern forest-based rural economy in the post-pandemic era.”

-Pandemic impacts on **timber markets**, **forest-based employment** including seasonal migrant workers, forest landowners, and the forest product industry including their corporate social responsibility.



United States Department of Agriculture
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Southwide Forest Landowner Survey: Currently Underway


The survey aims to evaluate the pandemic's impacts on landowner revenues, networks, land management, stewardship practices, and future plans.

Currently online via Qualtrics, but we are working on other survey modes including mail survey and research incentives

Please participate and/or spread the word!

<https://go.ncsu.edu/covid-survey>



 **Southern Forest Landowners:**

How did the COVID-19 pandemic impact you?



Do not miss the opportunity to share your experiences through this survey!

The survey is conducted as part of a study led by North Carolina State University in collaboration with the University of Georgia and Auburn University.

NC SU IRB Protocol #25008
Expiration Date:

NC STATE UNIVERSITY

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Four Objectives

1. Evaluate the impacts of pandemic-related policy interventions on forest-based **employment** in forest dependent counties in the U.S. South.
2. Quantify the causal effects of the COVID-19 lockdown on **roundwood prices** in the U.S. South to assess price changes.
3. Assess price effects of **varying** COVID-19 policies across the south.
4. Explore the impacts of COVID-19 at various levels of the **timber supply chain**.

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Presenters:

Dr. Stephanie Chizmar
Research Economist



Dr. Sonia Bruck
Research Economist

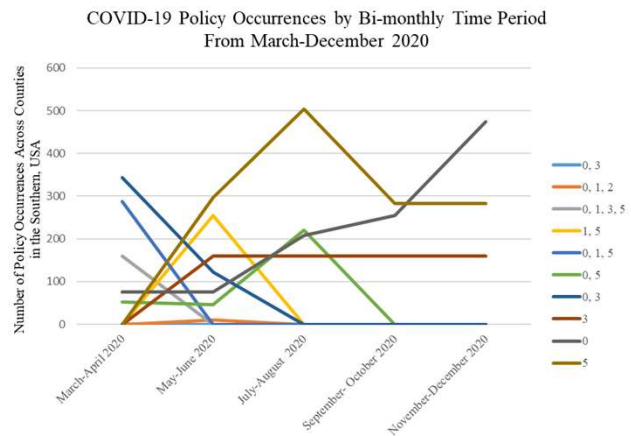


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Background

Policy Orders: Center for Disease Control (CDC)

Policy 0	No policy or order
Policy 1	Mandatory for all individuals to stay home (lockdown)
Policy 2	Mandatory only for all individuals in certain areas of the jurisdiction
Policy 3	Mandatory only for at-risk individuals in the jurisdiction
Policy 4	Mandatory only for at-risk individuals in certain areas of the jurisdiction
Policy 5	Advisory or recommendation to stay at home

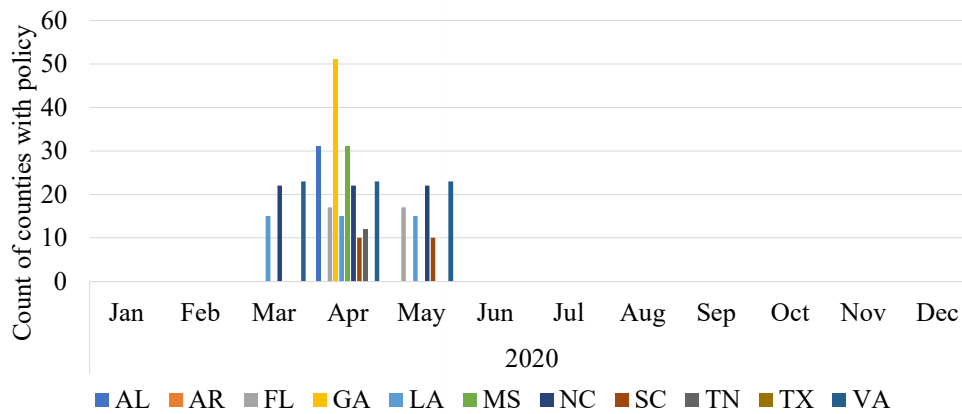


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Objective 1

Evaluate the impacts of pandemic-related policy interventions on forest-based **employment** in forest dependent counties in the U.S. South.

Mandatory Stay-at-Home Policies in the Study Area during 2020, by State



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Forest-based Employment

- Forest sector includes:
 - Forestry and logging
 - Wood product manufacturing
 - Pulp and paper manufacturing
 - Furniture manufacturing

- Aggregate: Summed employment across industries

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Forest Dependent Counties (Frey et al. 2022)

Environmental	Economic	Social
<ul style="list-style-type: none"> 75% or more of a county is in forest land use 	Forest sector <ul style="list-style-type: none"> Forestry and logging Hunting and trapping Support activities for forestry Wood product manufacturing Paper manufacturing 	<ul style="list-style-type: none"> County has an indigenous population of at least 5% of the total population and a minimum of 30% forest land use

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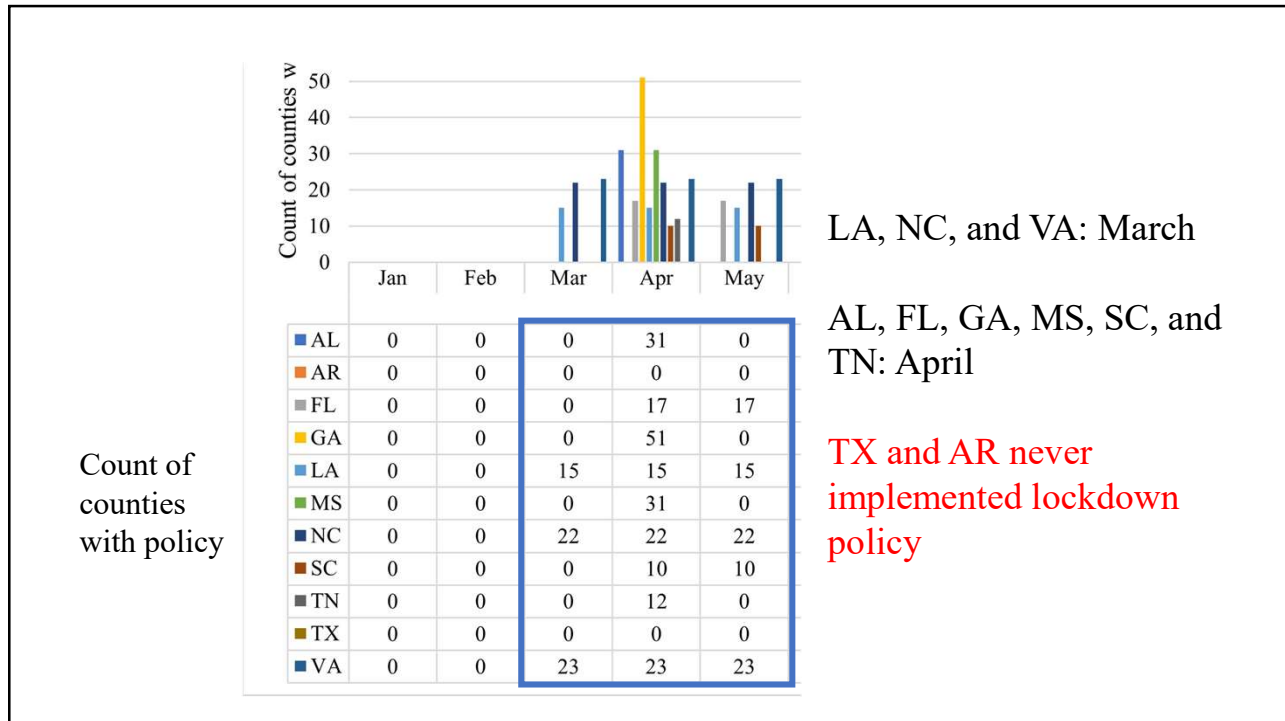
Two-way Fixed Effects (TWFE) or Difference-in-difference (DID)

Research Question: How did mandatory stay-at-home policies impact employment in forestry related industries and activities?

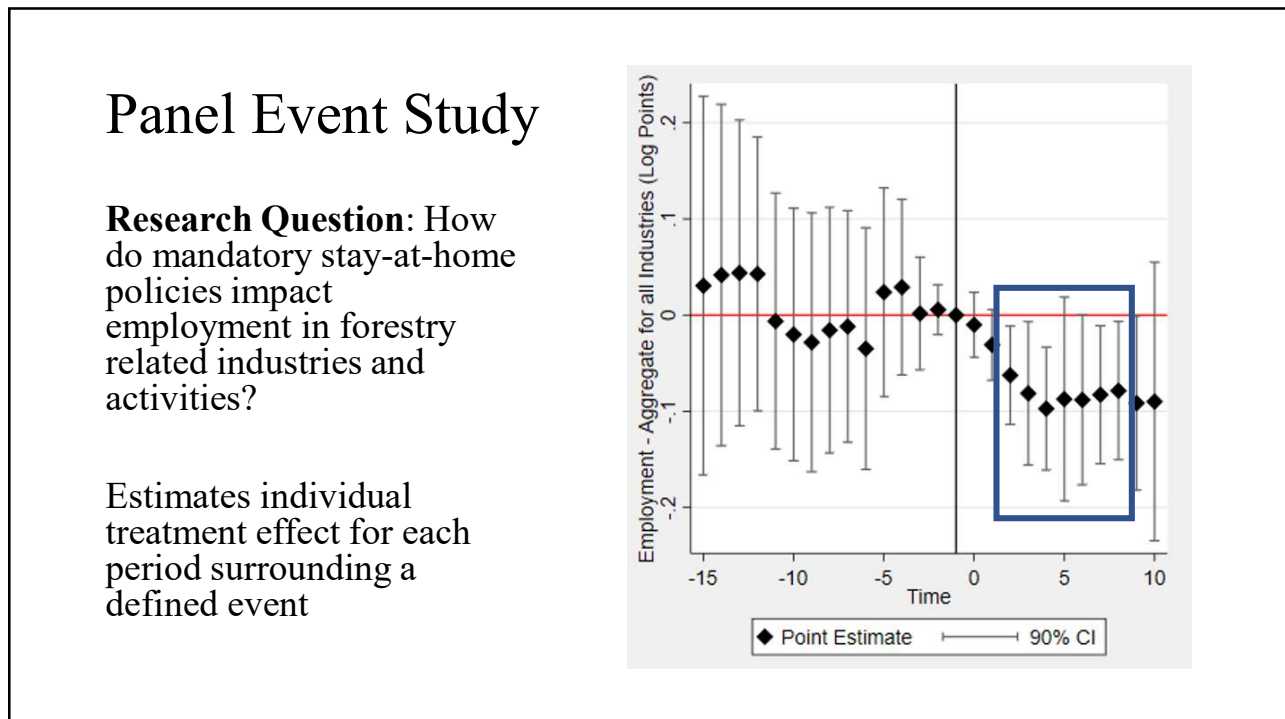
The TWFE or DID estimator captures the average effect of the lockdown policy on the treated group (counties under active lockdown)

	Pre-Treatment	Post-Treatment
Treatment Group	Not yet treated	Treated
Control Group	Never treated	Never treated

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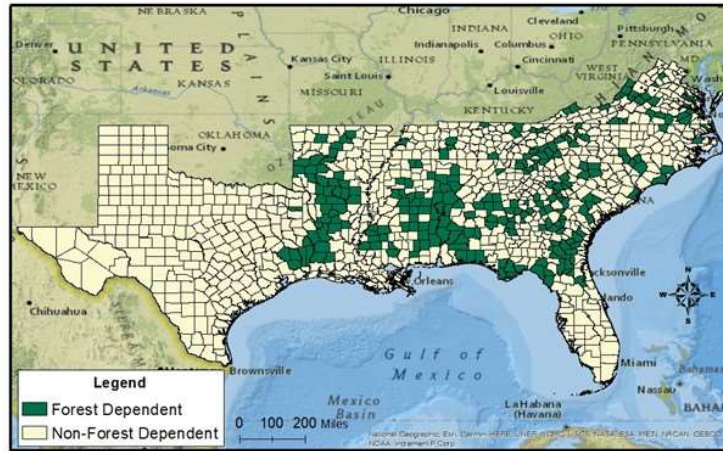


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Data and Study Area

- 11 southern states:
Alabama, **Arkansas**,
Florida, Georgia,
Louisiana, Mississippi,
North Carolina, South
Carolina, Tennessee,
Texas, and Virginia
 - 242 forest dependent counties

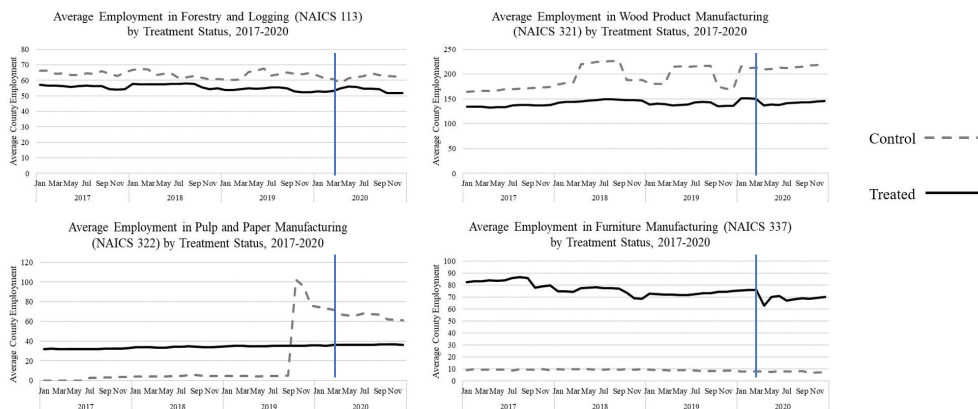
Forest Dependent Counties in Study Area



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Data and Study Area

- **Employment (filled jobs)** reported in US Bureau of Labor Statistics Quarterly Census of Employment and Wages (Jan. 2017 – Dec. 2020)



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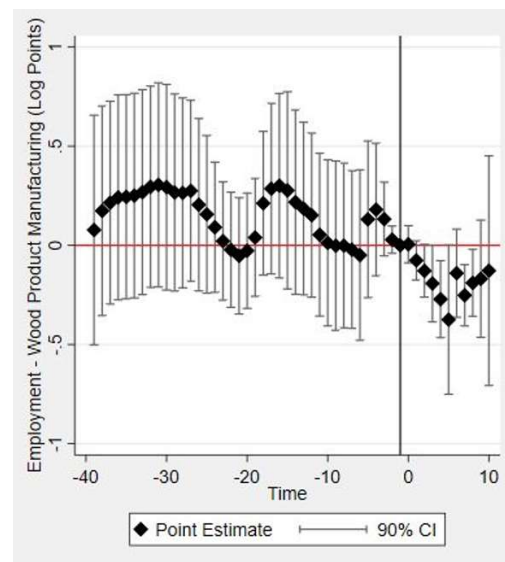
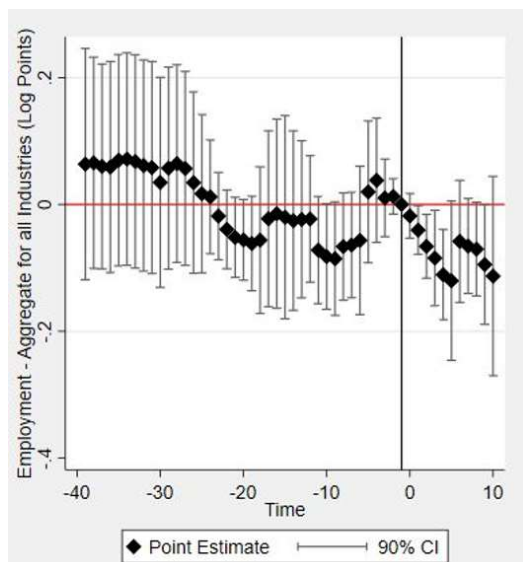
Results (DID)

	Aggregate Employment	Forestry and Logging	Wood Product Manufacturing	Pulp and Paper Manufacturing	Furniture Manufacturing
Average treatment effect on the treated					
Lockdown Policy	-0.04 (0.03)	0.12 (0.08)	-0.19* (0.11)	0.09 (0.08)	0.09 (0.08)
N	8721	10482	10383	4065	5622

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.001$

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Results: Panel Event Study



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Objective 1 Conclusions

- Lockdown policies had limited average impacts
 - Policies did not significantly impact employment in
 - Forestry and logging
 - Pulp and paper manufacturing
 - Furniture manufacturing
 - Policies led to a significant decrease in employment in
 - Aggregate forest sector
 - Wood product manufacturing
- Counties that experienced a lockdown policy
 - Aggregate employment was 4-11% less up to nine months after March/April
 - Employment in wood product manufacturing was 19-27% less up to 8 months after March/April

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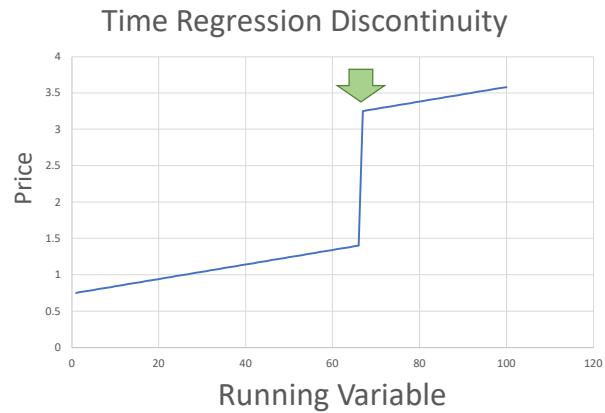
Objective 2

Quantify the causal effects of the COVID-19 lockdown on **roundwood prices** in the U.S. South.

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Time Regression Discontinuity (T-RD)

T-RD estimator is used to assess **causal impacts** of a treatment (for example, a new policy).



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Forest2Market southern micromarkets via forest2market.com

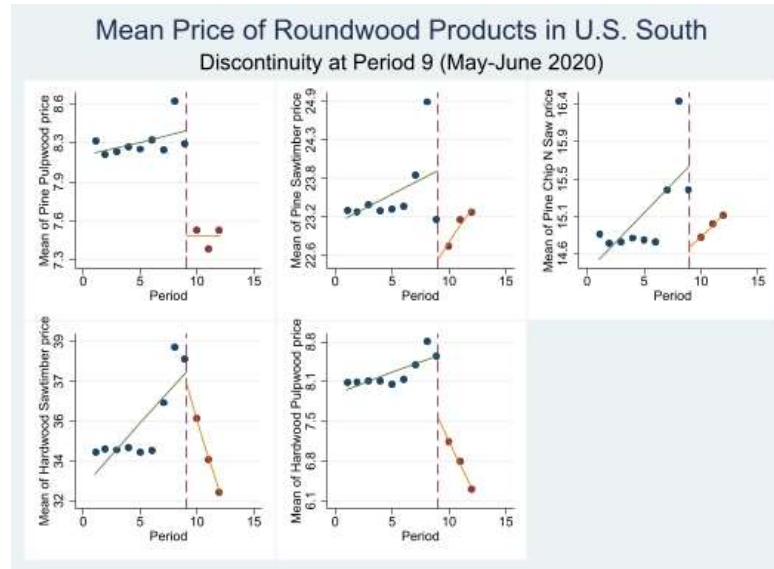
Data

N = 11,004 counties
n = 39 micromarkets

Forest2Market
Micromarkets
covering 11
southeastern states
from VA to East Texas

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Results (Visually Inspect the Discontinuity)



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Results (T-RD)

Time lag to assess behavioral and price changes (Liu et al. 2021).

Months	Year	Period
Jan-Feb	2019	1
Mar-April	2019	2
May-Jun	2019	3
Jul-Aug	2019	4
Sep-Oct	2019	5
Nov-Dec	2019	6
Jan-Feb	2020	7
Mar-April	2020	8
May-Jun	2020	9
Jul-Aug	2020	10
Sep-Oct	2020	11
Nov-Dec	2020	12

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Results (T-RD)

sensitivity analyses in manuscript

Product	Coefficient (statistical significance)
Pine Chip n' Saw	-0.0680***
Pine Sawtimber	-0.1179***
Pine Pulpwood	-0.2634***
Hardwood Sawtimber	-0.1409***
Hardwood Pulpwood	-0.2953***

* p<0.1, ** p<0.05, ***p<0.01

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Objective 2 Conclusions

- Overall lockdown policies had decreasing price effect on roundwood in the U.S. South
 - 7% for pine chip n saw
 - 30% for pine pulpwood
- Demand for wood products increased during the pandemic, so why a price decrease?
 - Reduction in capacity of sawmills during early lockdown (reduced demand by sawmills)
 - Worker illness increased, shrinking in workforce, 3% lower from April to March 2020 (Prestemon and Guo 2020) → *thus unable to return to higher level of production even with stronger consumer demand*
 - Initial demand decrease early in pandemic (*consumer uncertainty*) (Del Rio-Chanona et al. 2020).

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Objective 3

Assess price effects of **varying** COVID-19 policies across the south.

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COVID-19 Policies (CDC)

Policy 0	No policy or order
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Policy 5	Advisory or recommendation to stay at home

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Fixed Effects (FE)

- Quantify impact of varying policies, not just lockdown
- Fixed Effects Estimator
 - Used for time series data (*6 periods*)
 - Differences out independent variables that do not change in each county over time (*for example: elevation or yearly census count*).

Data: Proxies for Supply and Demand Determinants

- Apple Inc. Mobility
- Product Substitution
- Center for Disease Control (CDC)
 - Case counts
 - Policy days
 - Percent of population with COVID-19 per bi-monthly period

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Results (FE) – Policy Effects (*additional day of policy*)

See manuscript for full regression results

- Policies 3 and 5 did not have statistically significant effect
- Mandatory for all (Lockdown, **Policy 1**)
 - Decreased price by 0.7% per day
- Mandatory only for all individuals in certain areas of the jurisdiction (**Policy 2**)
 - Decreased price of pine pulpwood by 5.6% per day
 - Increased price of hardwood sawtimber by 4% per day

Manuscript:

Bruck, S. R., Parajuli, R., Chizmar, S., & Sills, E. O., 2023. Impacts of COVID-19 pandemic policies on timber markets in the Southern United States. Journal of Forest Business Research, 2(1), 130-167.

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Objective 3 Conclusions

Differentiate between different policies

- **Policy 1** (Lockdown) → continued to find a decrease in price for pine pulpwood
- **Policy 2** (Lockdown for certain jurisdictions) → decrease in price for pine pulpwood, increase in price for hardwood sawtimber
- When harvest locations are uncertain there may be slight decline in supply (landowner may decline face to face contact)
- Further research may be warranted to determine reason for price increase of hardwood sawtimber

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Limitations for Objective 2 and 3

Other factors that may have impacted roundwood prices:

- Inflation impacts and increased fuel costs (Coibion 2020)
- Ukraine War (Shahini 2022)
- Oligopsony power of roundwood purchasers (mills) (Kanieski da Silva 2019)
- Urban to rural housing demand increase (Liu and Su 2021)

These factors impact prices as we move further away from the point in which policies were put in place (discontinuity).

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Objective 4

Explore the impacts of COVID-19 at various levels of the **timber supply chain**.

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Qualitative Exploratory Analysis based on Focus Groups

Key informants from NC, GA, and AL

Focus Group	Participant Group	Number of Participants (N=15)
Group 1	Contractors and Consultants	3
Group 2	Landowners	2
Group 3	Agency and Association Employees (a)	5
Group 4	Agency and Association Employees (b)	5

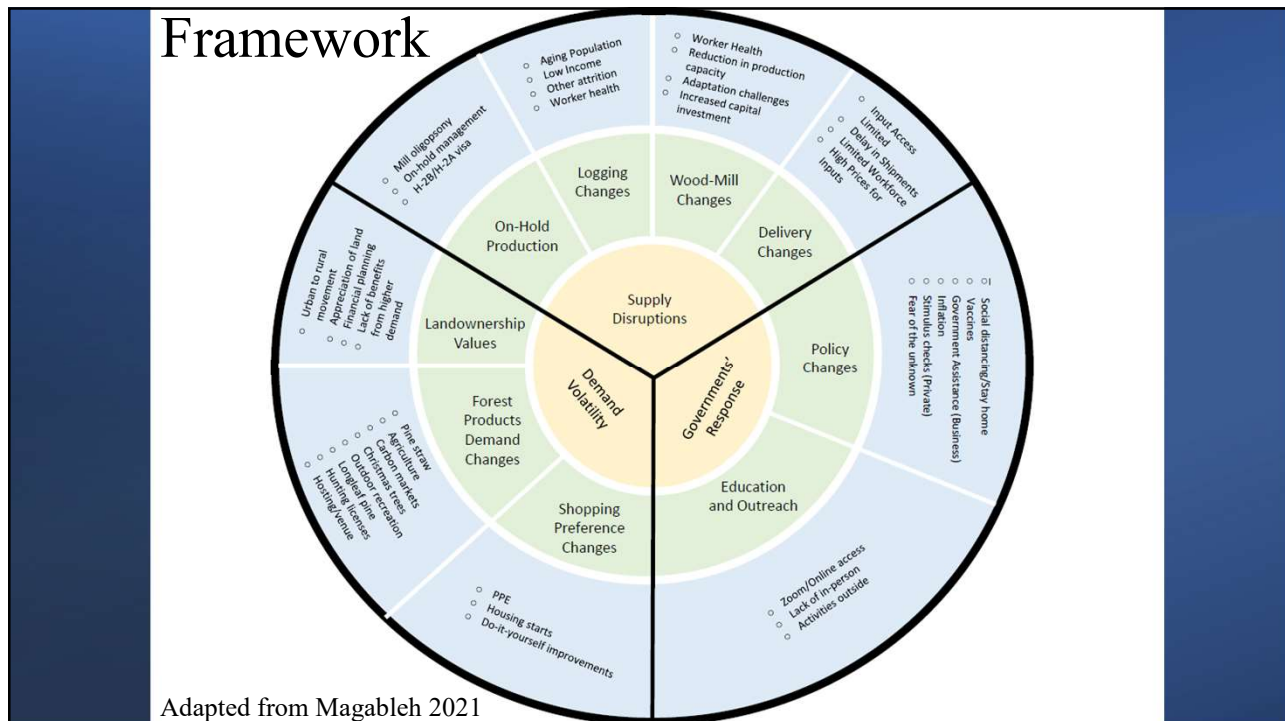
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Qualitative Coding

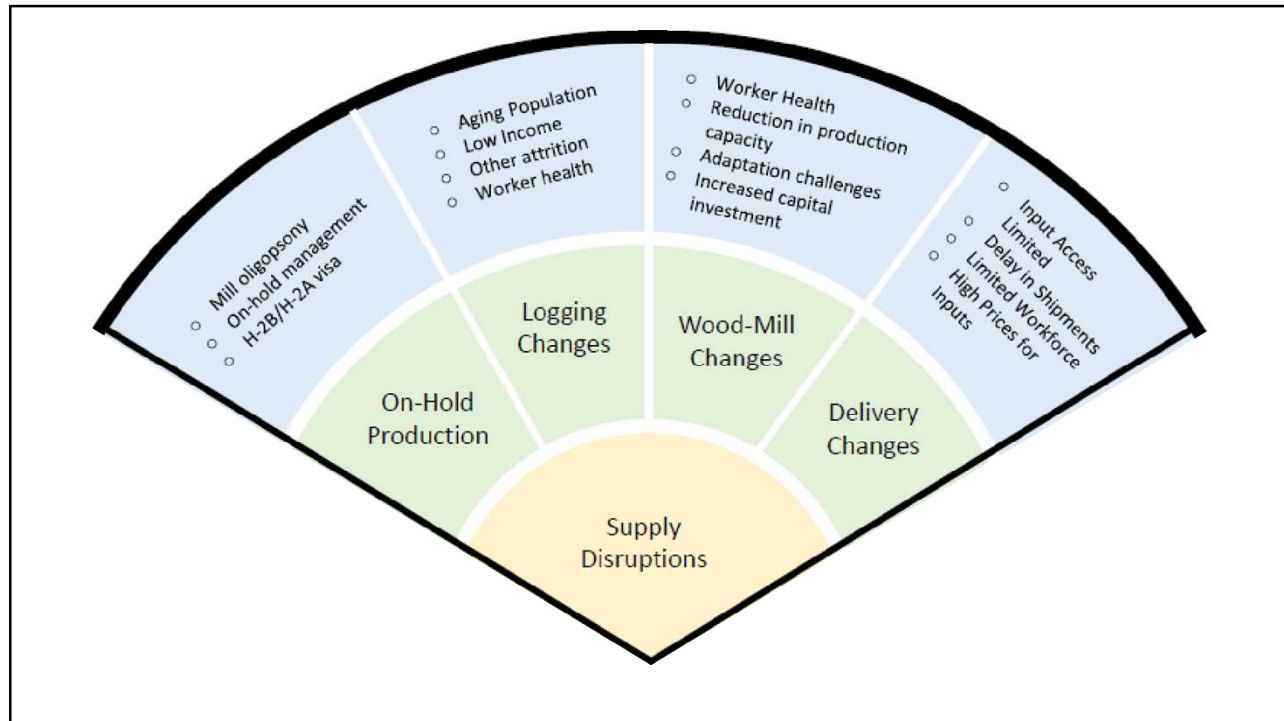
- Member checks of transcripts
- Based off the framework of **Magableh 2021: Supply Chains and the COVID-19 Pandemic: A Comprehensive Framework**
- Krippendorff's Alpha and Pairwise Agreement (reliability and validity of coding)
 - "Good Reliability" = 0.80
 - "Lower Bound" = 0.60 (De Swert 2012)

Participant Group	Pairwise Agreement	Krippendorff's Alpha
Contractors and Consultants	86.81	0.85
Landowners	94.29	0.93
Association and Agency Employees (a)	91.30	0.90
Association and Agency Employees (b)	95.77	0.95

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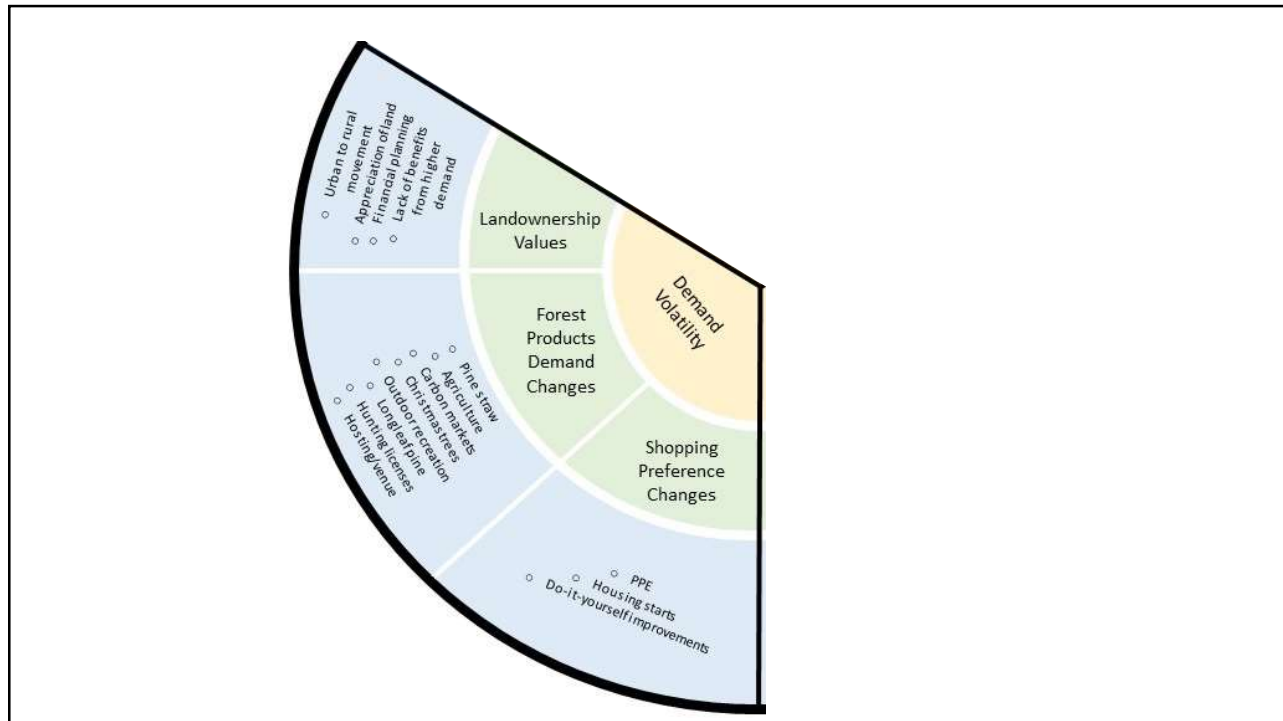
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Supply Disruptions → Logging Changes → Worker Health

“Also, the loggers and everyone else through the supply chain were forced to operate short-staffed. They had a worker out, that was quarantined or was affected, they didn’t want him around the other employees. So, they stayed home. And they would try to keep the same level of production with fewer people. And are they forced to hire folks that aren’t quite ready for the job yet, either experience-wise or having the adequate safety training. So, we highly suspect that COVID had an impact on that serious, or drastic increase in logging fatalities during that one-year period.”

→ 33% increase in logging fatalities from 2019 to 2020, over the same period (U.S. Bureau of Labor Statistics)

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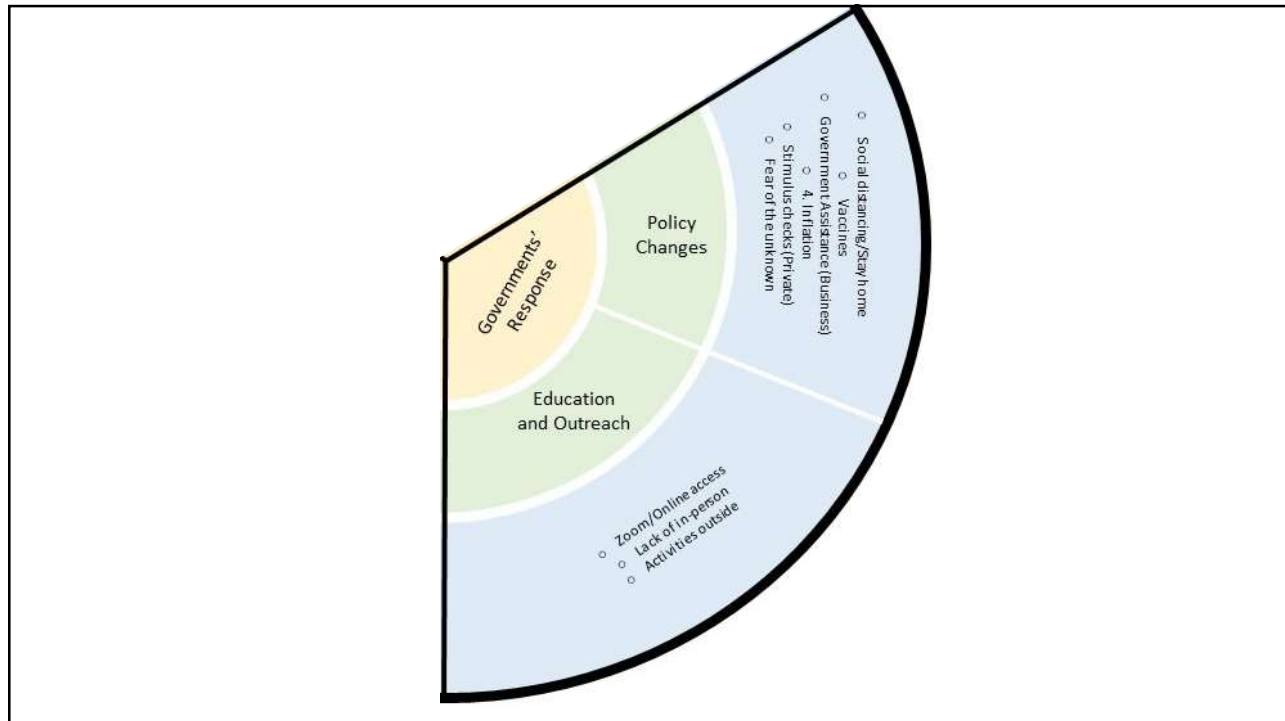
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Demand → Landownership Values → Appreciation of landownership

“...the wonders of the world, just taking a walk in [redacted] on a sunny day with your flip-flops and getting out of your flip-flops and putting your feet in the sand, and then smelling that longleaf is pretty incredible. I’ll just... that’s another thing to share about the value, and that didn’t stop during COVID, I assure you.”

- **Shopping preference and recreation demand** changes well documented in the literature (For example: van Kooten et al. 2021, Hilsenroth et al. 2021, Beery et al. 2021; Hansen 2021; Taff et al. 2021, Prestemon and Guo 2022).
- Not widely identified →
 - Recreation demand changes on private land (hunting, venue space)
 - Renewed appreciation of land ownership/ land management planning

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Gov. Response → Education and Outreach → Zoom/Online

"I and some others thought naively... well two or three weeks we'll be done with this. We can just get back to normal. I know that's what I was thinking. I couldn't imagine that years later we would still be doing this! Meaning remotely. It took us a while to accept that we were not going to be back in person, and once we accepted it... it took a while to put a new plan in place. But, in doing that, I think we actually reached more people."

- The change to online forums may have allowed for a greater diversity of participants and increase access to education (Pratama et al. 2020).
- Some technical obstacles → quality internet (rural), older landowners

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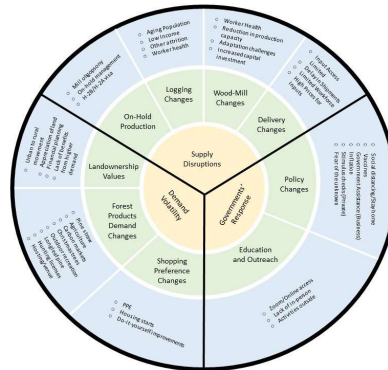
Overall Conclusions:

During COVID: Lockdown policies and partial lockdown policies had a **decreasing price effect** for most roundwood products in 2020 and **negative effect on employment in the Wood Products and Manufacturing industry.**

- Future analyses could look at recovery or the periods just prior to pandemic policies.
- Limitation for future expectations → wood products industry deemed essential after about ~1 week after mandatory lockdowns

After COVID: Landowners may benefit in the future from:

- Renewed appreciation of landownership
- New income opportunities
- Ability to gain new information via online educational tools



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Thank You! Questions?

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