University of Idaho
College of Natural Resources

THE SPATIAL DISAGGREGATION OF FOREST PRODUCT DEMAND IN THE US

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DISAGGREGATING FOREST DEMAND

- Background
- Past approaches
- Data
- Methods
- Preliminary results
- Next steps

BACKGROUND

- Results will be the foundation for exogenous demand projections
- Projections are used by forest sector models (e.g. LURA, FASOM)
- Models can more accurately distribute supply

PAST APPROACHES

Core downscaling algorithms

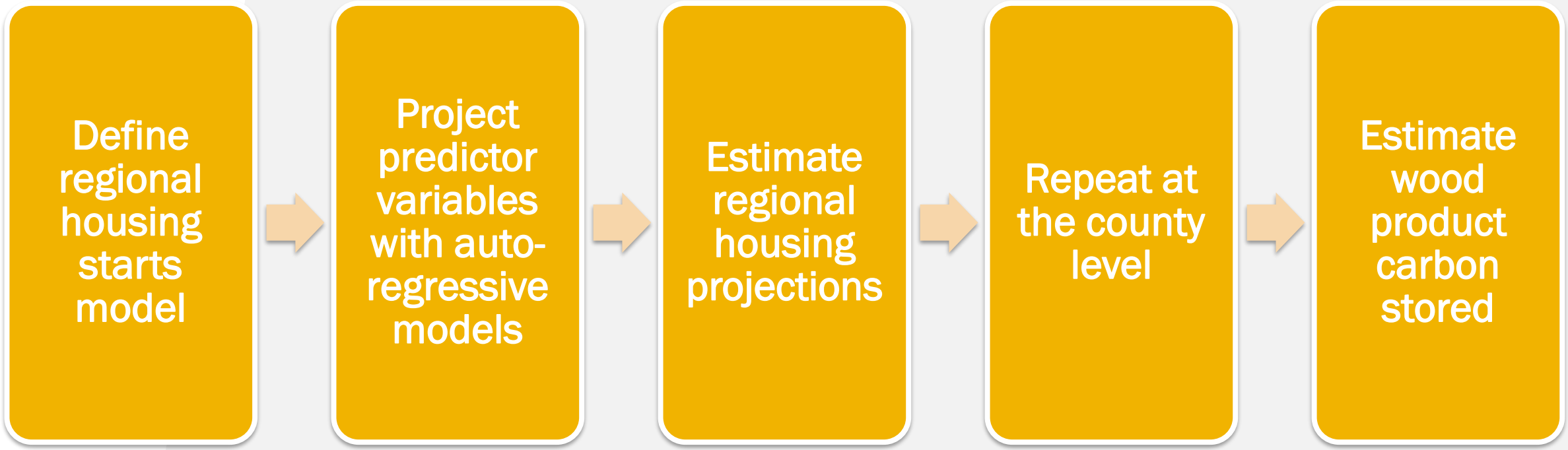
(van Vuren et al., 2006; Ha & Teng, 2013; Gütschow et al., 2020)

Linear	Convergence	External-input based
Defer to a larger unit's growth rate	Assume subunits converge at a larger unit's average	Uses a subunit's position within a larger unit of one variable to define a second variable relationship

PAST APPROACHES

Prestemon et al., 2022

"Projections of housing starts require projections of all exogenous variables that explain starts and wood products demands" (Prestemon et al., 2017)



PAST APPROACHES

- Prestemon et al., 2022

KEY DIFFERENCE:

Prestemon et al. disaggregate while estimating projections – our goal is to downscale AEO's national projections

starts model

regressive models

projections

level

carbon stored

DATA

Geographic Scale	Temporal Scale: Past	Temporal Scale: Future
County	Census: Building permits BEA: GDP	?
Country	Census: Housing starts BEA: GDP	AEO: GDP, Housing starts

METHODS – SOFTWOOD LUMBER EXAMPLE

- We need a disaggregated initial consumption/demand

At the Country Level

From FAOStat (1970-2022):

Apparent Consumption

=

Production

+

Imports

-

Exports

Break Softwood Lumber demand into two components: one part housing driven, and one part GDP driven

METHODS – SOFTWOOD LUMBER EXAMPLE

- Housing component of demand
  - Things we know
    - Housing starts per year
    - Average square foot per house
  - Things we assume
    - Softwood lumber bf *(sorry Canadians)* per square foot of housing
    - Softwood lumber bf per cubic meter

39 mil m^3 =**1436** *(starts/year)****2513***(ft2/start)****6.38***(bf/ft2)****0.0017***(m3/bf)*

METHODS – SOFTWOOD LUMBER EXAMPLE

- Housing component of demand
  - Things we know
    - Housing starts per year
    - Average square foot per house
  - Things we assume
    - Softwood lumber bf *(sorry Canadians)* per square foot of housing
    - Softwood lumber bf per cubic meter

The other important number to track here for later is:

39 mil m^3 =**1436** *(starts/year)****2513***(ft2/start)****6.38***(bf/ft2)****0.0017***(m3/bf)*

27.3 m^3/start =**2513***(ft2/start)****6.38***(bf/ft2)****0.0017***(m3/bf)*

METHODS – SOFTWOOD LUMBER EXAMPLE

- Non-Housing component of demand
  - Things we know
    - Apparent Consumption from FAOstat (**85.2** mil m^3 *avg 2018-2022*)
  - Things we assume
    - Softwood lumber consumption in housing (**39.0** mil m^3 *avg 2018-2022*)
    - The rest is a function of general economic output (GDP *avg 2018-2022*)
      - We need an estimate of softwood lumber demand per unit of GDP

2.4 $m^3/\$1000GDP$ $= (\mathbf{85.2}\ (mil\ m^3) - \mathbf{39.0}\ (mil\ m^3)) / 19437\ (\$GDP)$

METHODS – SOFTWOOD LUMBER EXAMPLE

- We need a disaggregated initial consumption/demand

At the Country Level

From FAOStat (1970-2022):

Apparent Consumption
=
Production
+
Imports
-
Exports

Break Softwood Lumber demand into two components: one part housing driven, and one part GDP driven

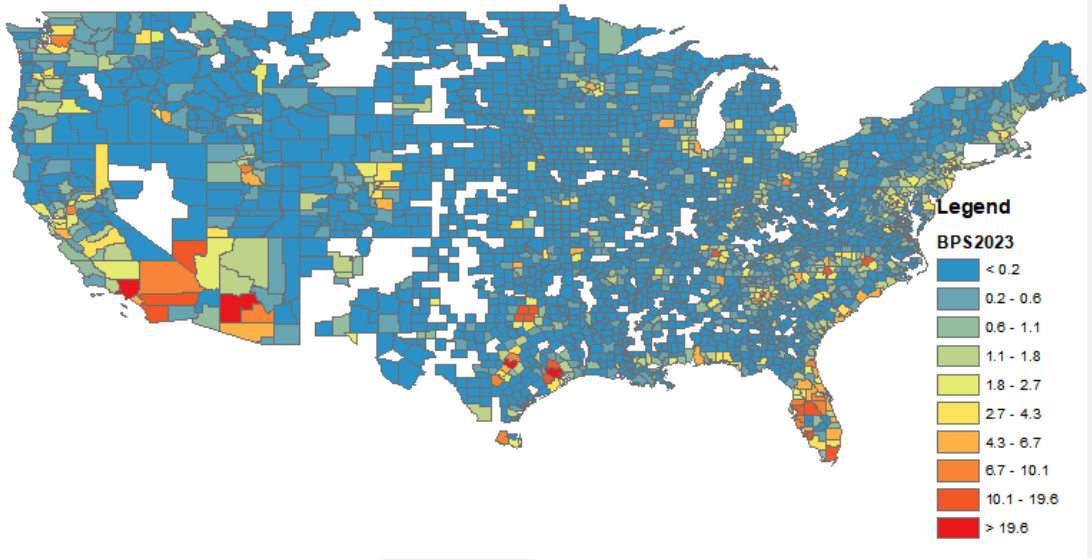
At the County Level

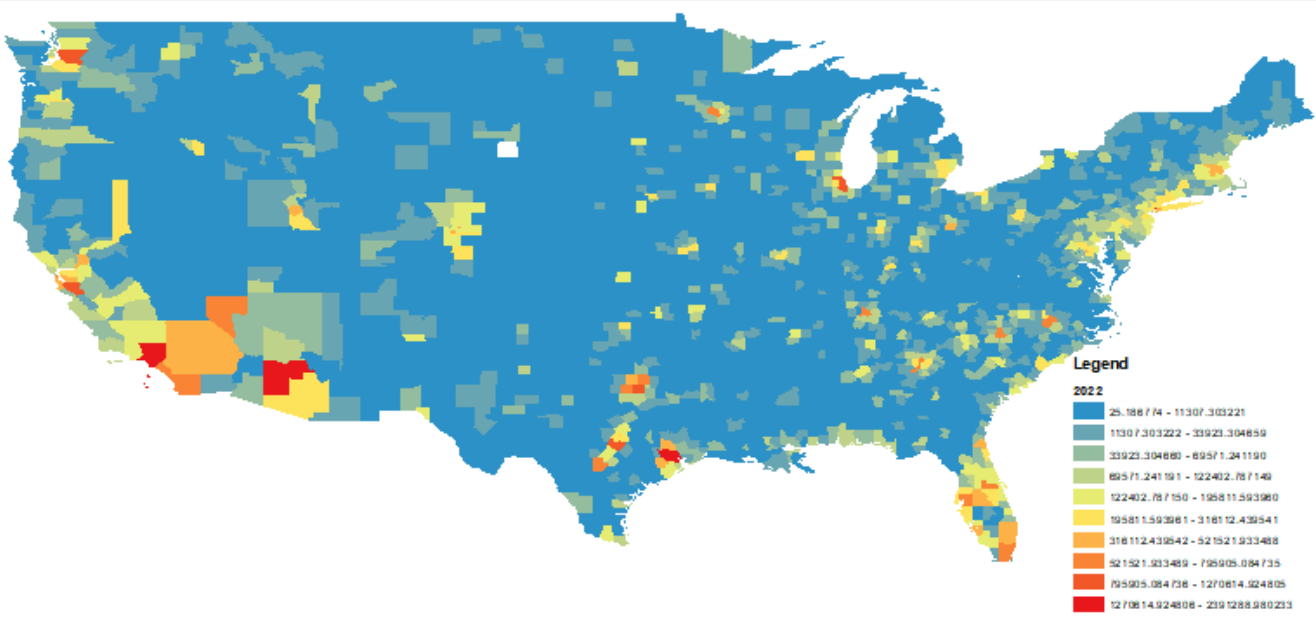
From FAOStat (1970-2022):

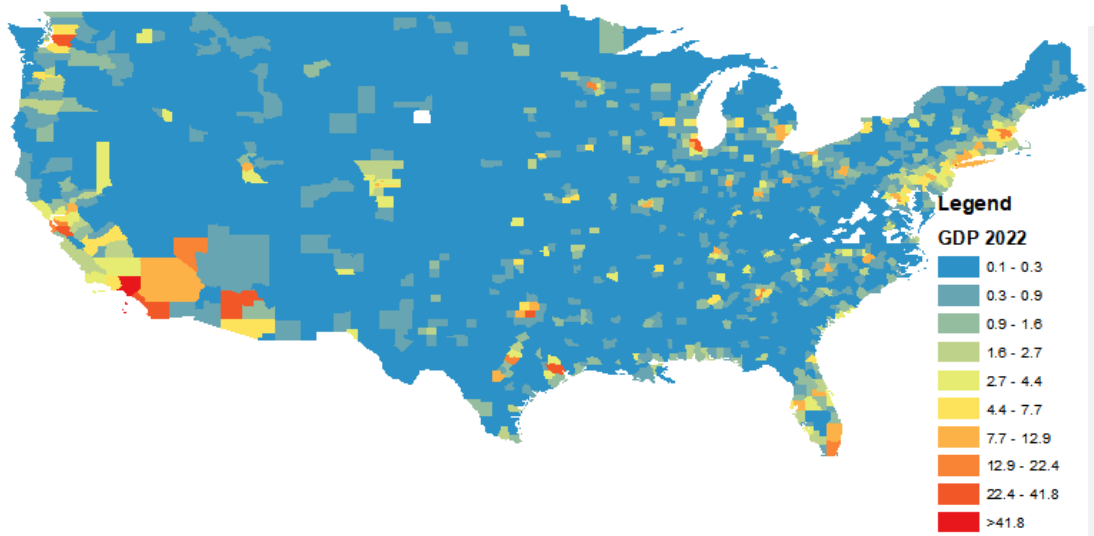
BPS Permits
x
27.3 m3 per start
+
BEA GDP
x
2.4 m3 per $1000GDP

METHODS – SOFTWOOD LUMBER EXAMPLE

- What does this look like?







METHODS – MOVING FORWARD

- We have national-level Housing Starts and GDP
  - From the Annual Energy Outlook *(through 2050)*

Table 18—U.S. demand elasticities for USFPM end products

Commodity	Price	GDP	Housing starts	Advertising spending in print media	Advertising spending in electronic media
Softwood (SW) lumber	–0.14	0.39	0.49	—	—
Hardwood (HW) lumber	–0.10	0.22	—	—	—
SW veneer/plywood	–0.65	0.55	0.69	—	—
HW veneer/plywood	–0.29	0.41	—	—	—
Oriented strandboard (OSB)	–0.65	0.55	0.69	—	—
Industrial particleboard	–0.29	0.54	—	—	—
Fuel feedstock	–0.50	X	—	—	—
Other industrial roundwood	–0.05	–0.58	—	—	—
Fiberboard	–0.46	0.35	—	—	—
Newsprint	–0.68	0.77	—	1.35	–1.00
Printing and writing paper	–0.42	0.60	—	1.00	–0.55
Other paper and board	–0.23	0.43	—	—	—

U.S. Forest Products Module

A Technical Document Supporting the Forest Service 2010 RPA Assessment

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New Demand

=

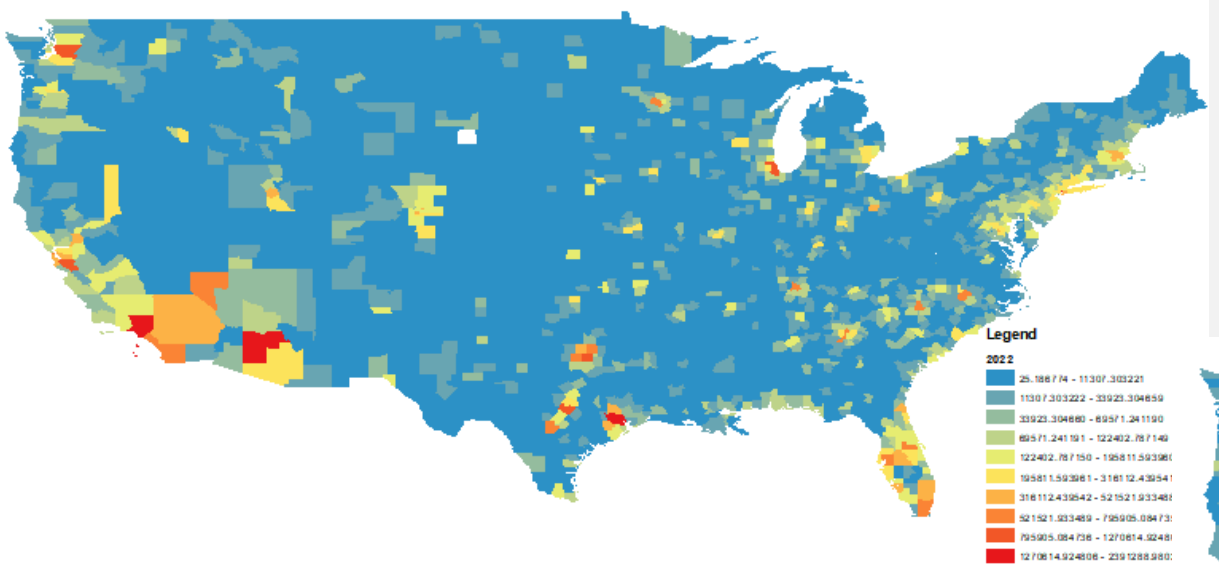
old demand

X

(1+0.39x%ΔGDP +0.49x%ΔStarts)

METHODS – SOFTWOOD LUMBER EXAMPLE

- Now the issue is the linearity of the projection
  - Basically - we are holding the current county proportions constant

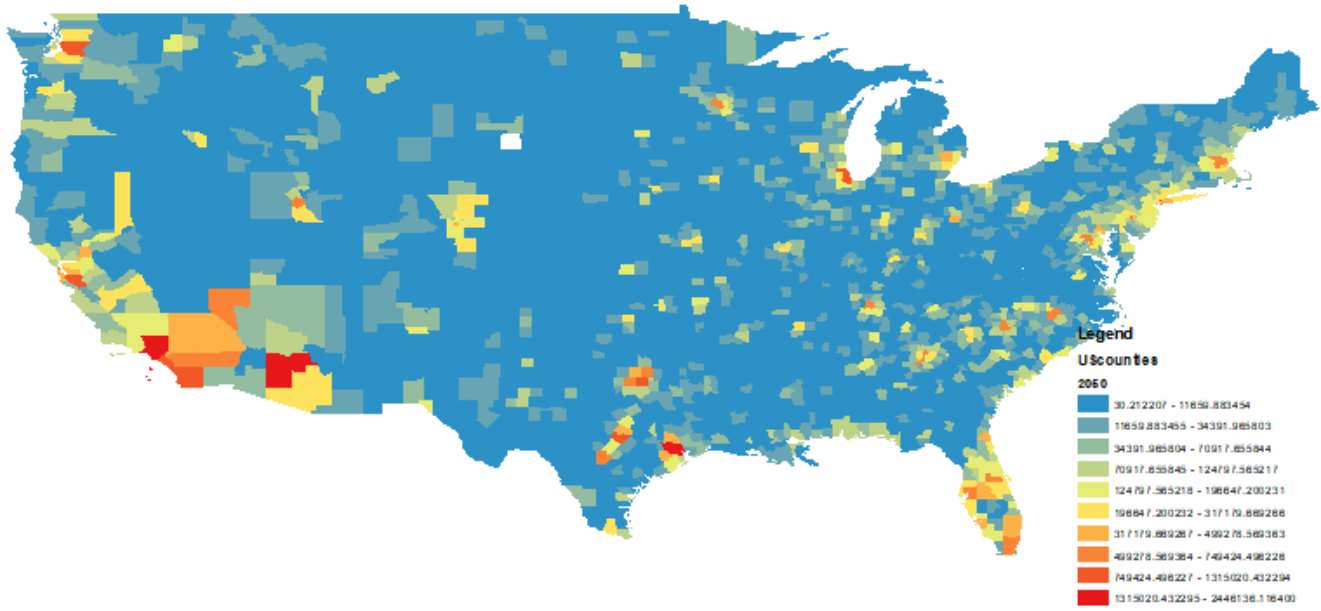


2022 Smaller numbers

~88 mil m^3

2050 Bigger numbers

~96 mil m^3



NEXT STEPS – *AND A PLEA FOR FEEDBACK*

- Other approaches we may take next…
  - We are toying with method 2 (Convergence)
    - Using either absolute or percentage changes and convergence
  - or maybe a modified method 2 (Econometric then proportioned to national total)

- Goal = simple and easily updated

- Thoughts?

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