

# REMI Analysis of the Infrastructure Bill

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# Outline

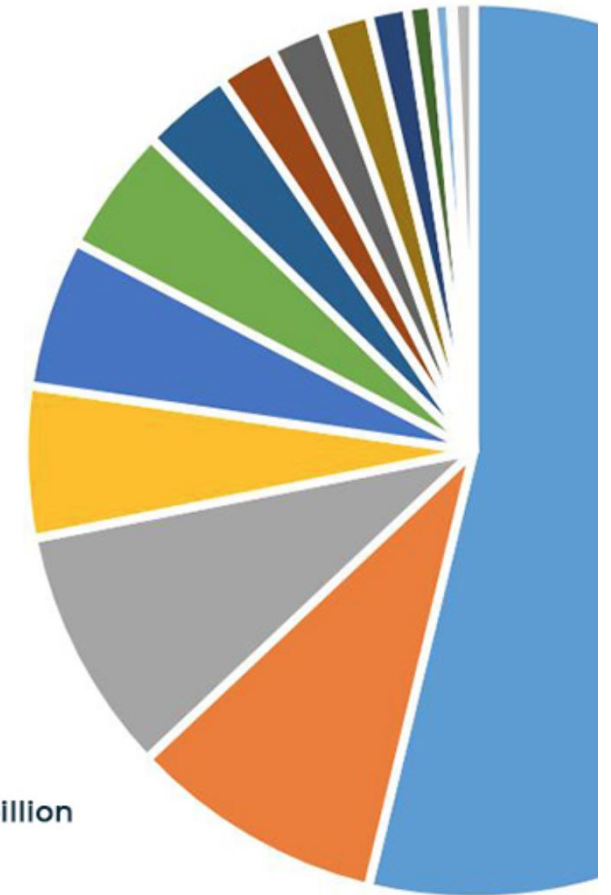
- The White House Infrastructure Bill
- What this Economist sees for REMI Analysis
- How we can use the REMI Toolkit (model and techniques)
- Discussion

# My Background

- 300 REMI analyses for almost 30 years (ouch)
- Academic and technical: civil engineering, economics, finance, agent-based modeling, data science, algorithm selection, software development
- Domains: economics of new technologies and homeland security disruptions/recoveries; supply chain impacts, recovery paths, and resilience.
- Analysis: NIST Industry economist; NISAC Chief Economist (Sandia); Industry Consultant for defense, transportation, chemical sector, design & construction industry.
- REMI-specific policy analysis: economic impacts of new-technology programs, new materials, small manufacturer programs, renewable energy, border disruptions, infrastructure disruptions, pandemics, terrorist attacks, nuclear attacks, ...
- REMI has taught me how the US economy works, adjusts, recovers, grows

# Infrastructure Bill

- Likely 10 years of funding (\$ **Trillions**)
- Federal, state, and local funding.
- Per-formula and competitive funding processes. REMI benefits both.
- Likely too much money to control efficiencies and its misuse. Go slower, using analysis?
- A perfect federal program for the the REMI model.



# Infrastructure Bill Goals



No More  
Lead Pipes



High-Speed  
Internet Access



Better Roads  
and Bridges



Investments in  
Public Transit



Upgrade Airports  
and Ports



Investment in  
Passenger Rail



Network of Electric  
Vehicle Chargers



Upgrade Power  
Infrastructure



Resilient  
Infrastructure



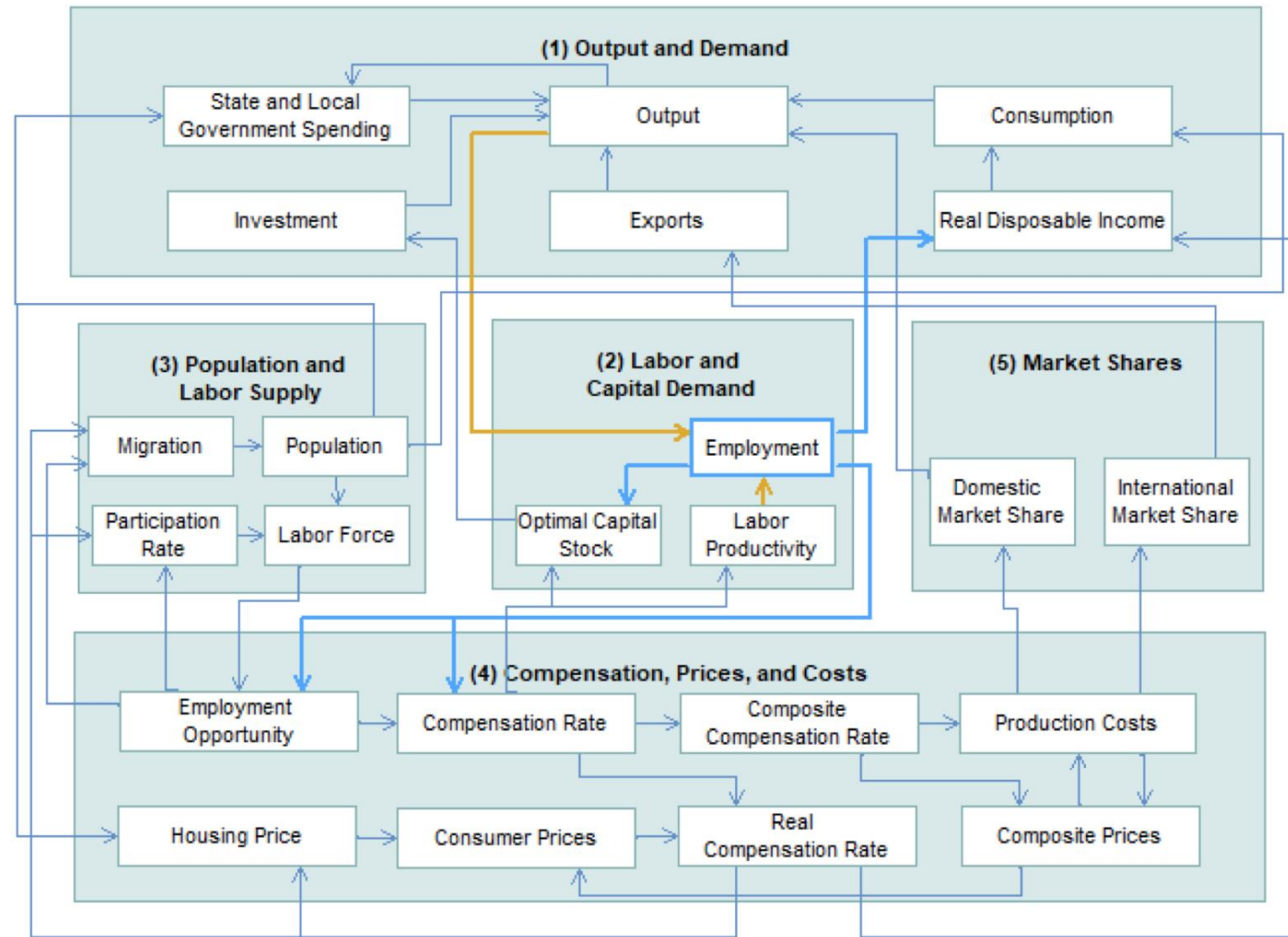
Investment in  
Environmental  
Remediation

# My Economics Analytical Approach

- Analytical strategy:
  - The actual impacts will be large, you just don't know exactly they will occur. Use REMI to 'checklist' potential levers and impacts.
  - Most of your estimates will be "off," but you can get many of the economic vectors right. Bound them with sensitivity analysis.
  - The vectors of economic growth are very different from the vectors of disruption. REMI disruption levers are different from growth levers.
  - The REMI levers of economic recovery are very different from the levers of disruption.
  - Longer-term, more aggregate disruption and recovery vectors can be REMI modeled; other more local and industry specific vectors cannot.
  - In my opinion, the successful national policy solutions are those where people are kept working.

→ REMI helps find policy solutions where people can work.

# Most parts of US (& REMI) economy impacted.



# IB-related changes alter national/regional economies

## Labor

- More people working higher paying jobs: all else equal, education and workforce training increase productivity, wages, and income; higher participation rates likely increase inflation and overall prices.
- Desirability of location: movement of population to other regions of the country. (climate change: go where the water is)

## Consumption

- Changes in purchase preferences → changes in the consumption basket. How does change in transportation and energy costs change

## Output

- Changes in sectoral output (food production, infrastructure usage, energy usage) → shift productive capacity, output, prices, and trade flows.

## Trade

- Changes in transportation types, routes, and costs fundamentally change the structure of output, trade, labor and capital usage.

## Prices

- Significant price changes affect sectors broadly, including production and sales prices.



# General Approach for Analysis of Infrastructure Bill

## Pre-Modeling

- Determine where and how there will be fundamental changes in human behavior (technology, non-economic migration, consumption basket, changes in energy sources, trade restrictions, cost-offsetting incentives)

## REMI Modeling Levers at National/State/Local Levels

- Capture changes in where people are.
- Capture changes in their consumption basket (what, where, how much)
- Capture changes in technology (cheaper/faster/better? Not now but in the future?)
- Capture structural changes in capacity levels and distribution.
- Capture non-market price effects.
- Capture changes in regional/national output, employment, income, prices
- Run sensitivity analysis.

## Example: EV Private/Public Transportation and Electric Power needed to Power it.

### REMI Modeling

- Consumption changes toward different product mix (cars, transport modes)
- Labor skills and quantities change; regional economic migration.
- Output: potentially radical changes in investment, production, and distribution of power.
- Trade: economic and non-economic (federal/state/local policies) change distribution of trade.
- Prices: source, downstream, systemic prices can go down (or up) depending on the economic vectors.
- National/regional/local sources and targets of economic impact, i.e., winners and losers.

# Summary

- Infrastructure Bill presents many opportunities for REMI analysis.
- REMI is a workhorse for national & state policy analysis
- Majority of own effort has been in capturing what is not included in model.
- Sensitivity analysis (values, REMI policy levers) gives me more confidence on the bounds of the estimates.
- For the new Infrastructure Bill, I see opportunities for effective REMI analysis that informs effective national and state Infrastructure-Bill-related policies