DYNAMIC MODELING AND BORDER EFFECTS

REMI Presenters

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Session Agenda

REMI

REMI Backdrop

REMI Methodology

Residence Adjustment

Model Software

Pollution Taxes

About Us

Research and Data

- Services related to regional modeling, forecasting, and economic impacts
- Began as an offshoot of the University of Massachusetts-Amherst in the 1970s and 1980s and still is an ongoing research project

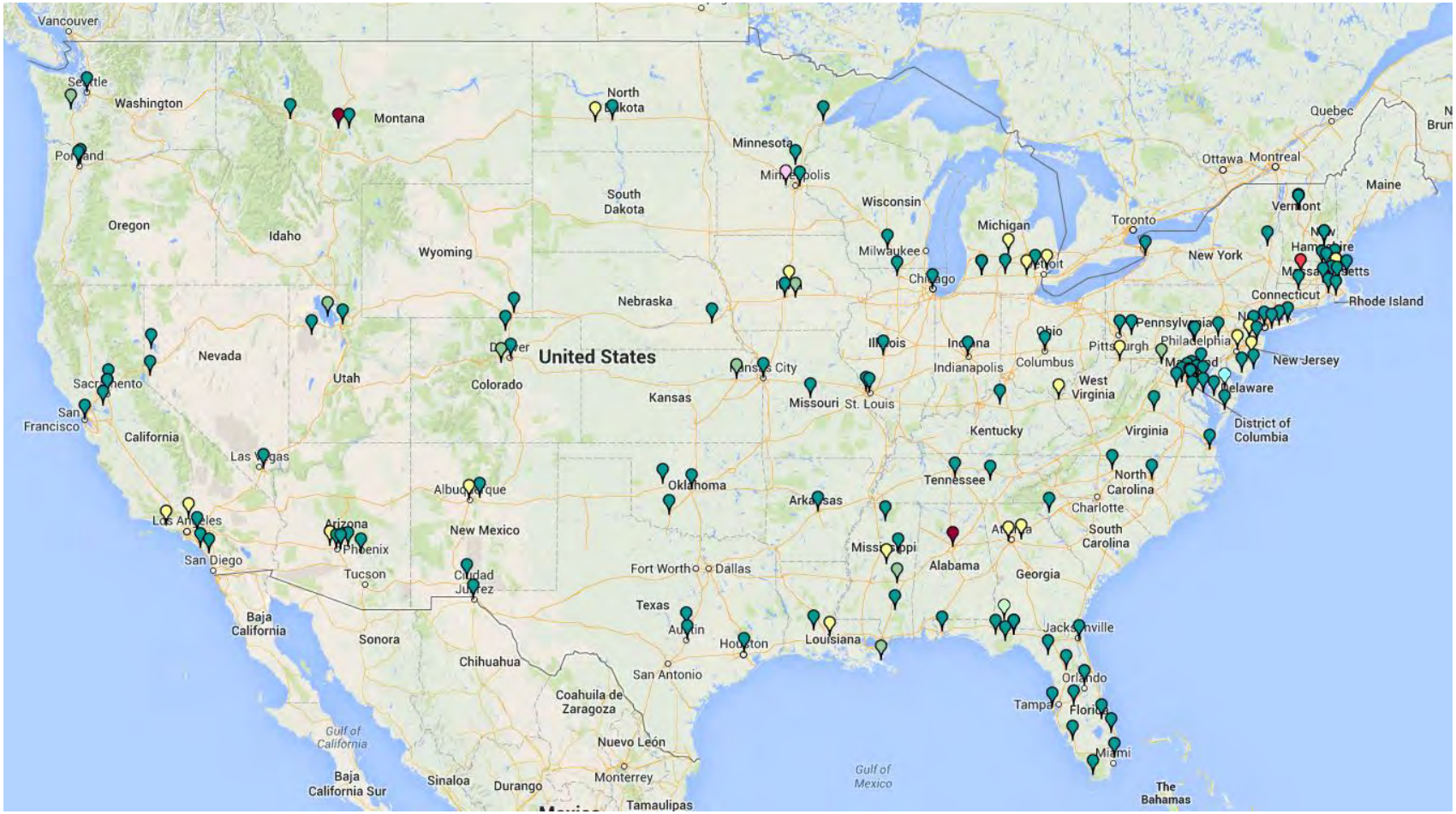
Customized Software

- Full service, “off-the-shelf,” Windows-based software and websites for economic and demographic research at the regional-level
- Model regions and capabilities customized to the users’ specific requirements

Services and Support

- Unlimited training and technical support for all software and website users from a dedicated team of economists and software technicians
- Issue-oriented policy research, consulting reports, and expert testimony

Client Base



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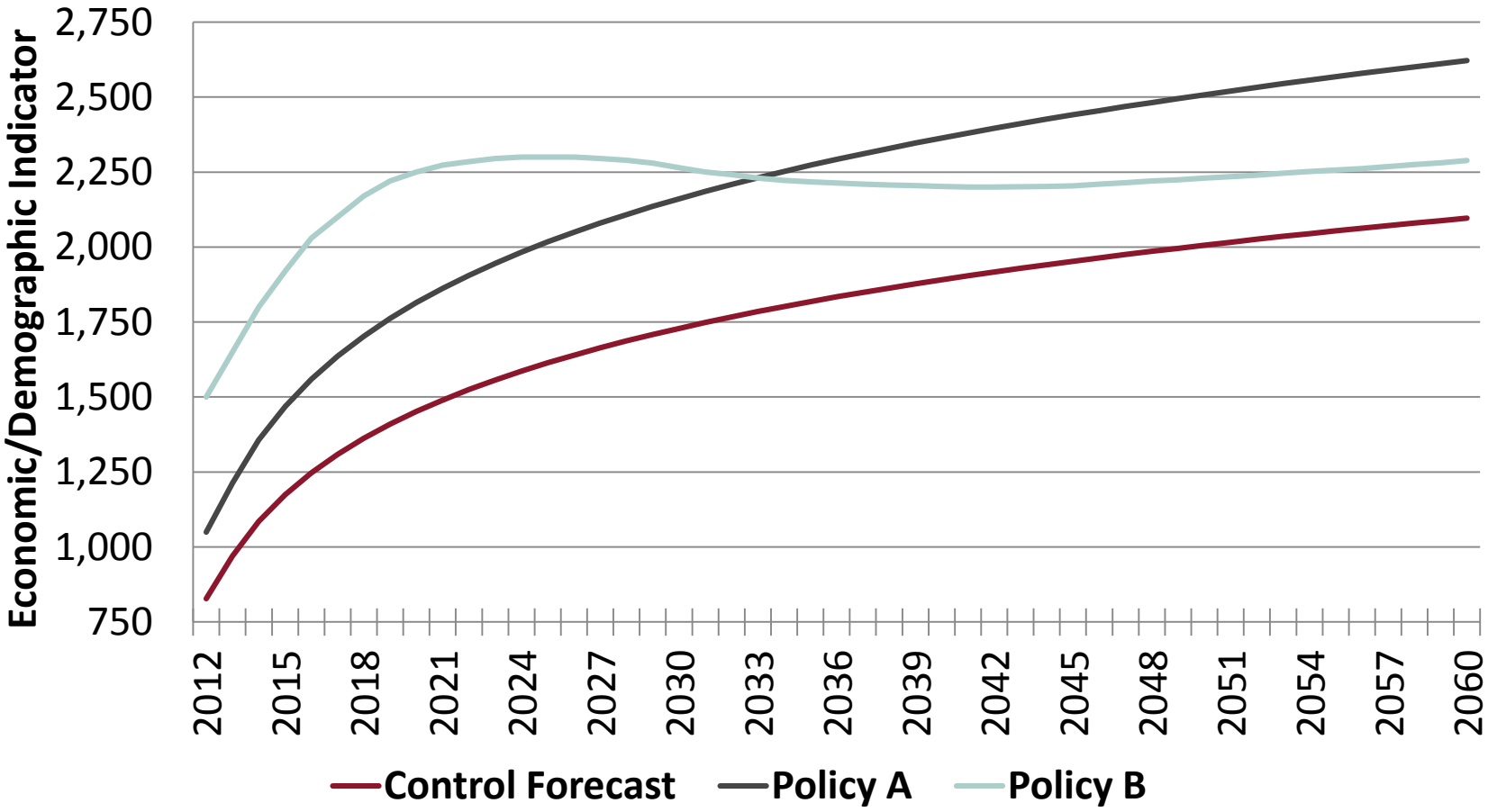
Analytical Framework



Regional Customizations

- How REMI defines model regions:
  - A county (or equivalent statistical unit) or…
  - A collection of counties
    - e.g. an MSA or a state
    - Can cross state borders
  - Multiple regions
    - No requirement for contiguousness
  - Customized by needs

Four Methodologies

Input-Output (IO) Tabulation

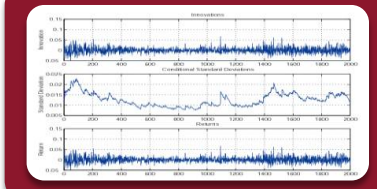
- Industry-to-industry transactions and social accounting matrices (SAM)
- Supply-chains, regional purchase concepts (RPCs), and multipliers

Computable General Equilibrium (CGE)

- Long-term effects after markets "clear" back to a new equilibrium
- Dynamic adjustments to population, market shares, fuel mixtures, etc.

New Economic Geography

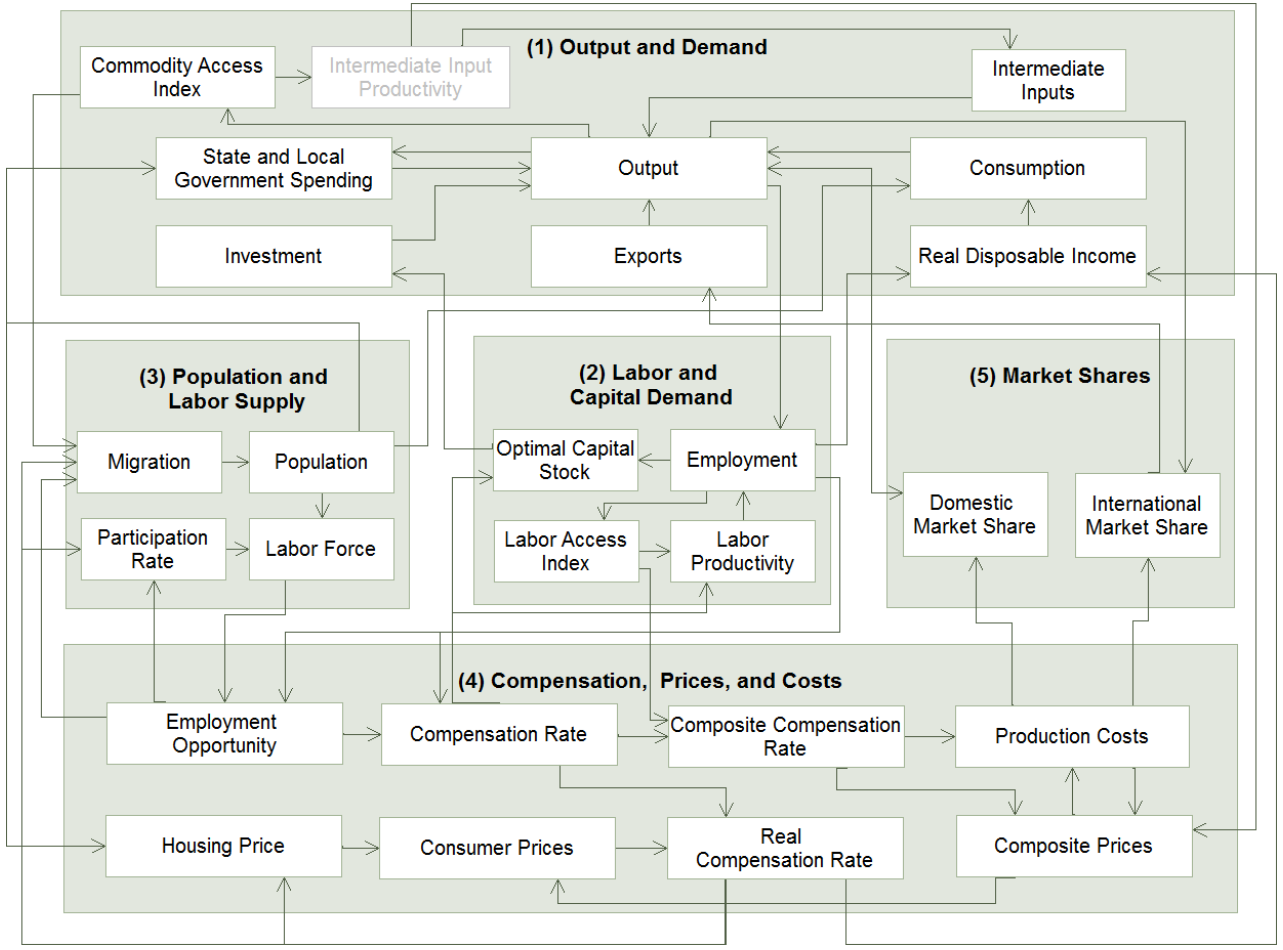
- Endogenous productivity adjustments from industry/labor clustering
- Full trade-flows by industry and interregional competitiveness



Econometrics

- Estimation of statistical parameters from observable data
- Strength of responses, elasticities, preferences, and "time-lags"

Model Structure



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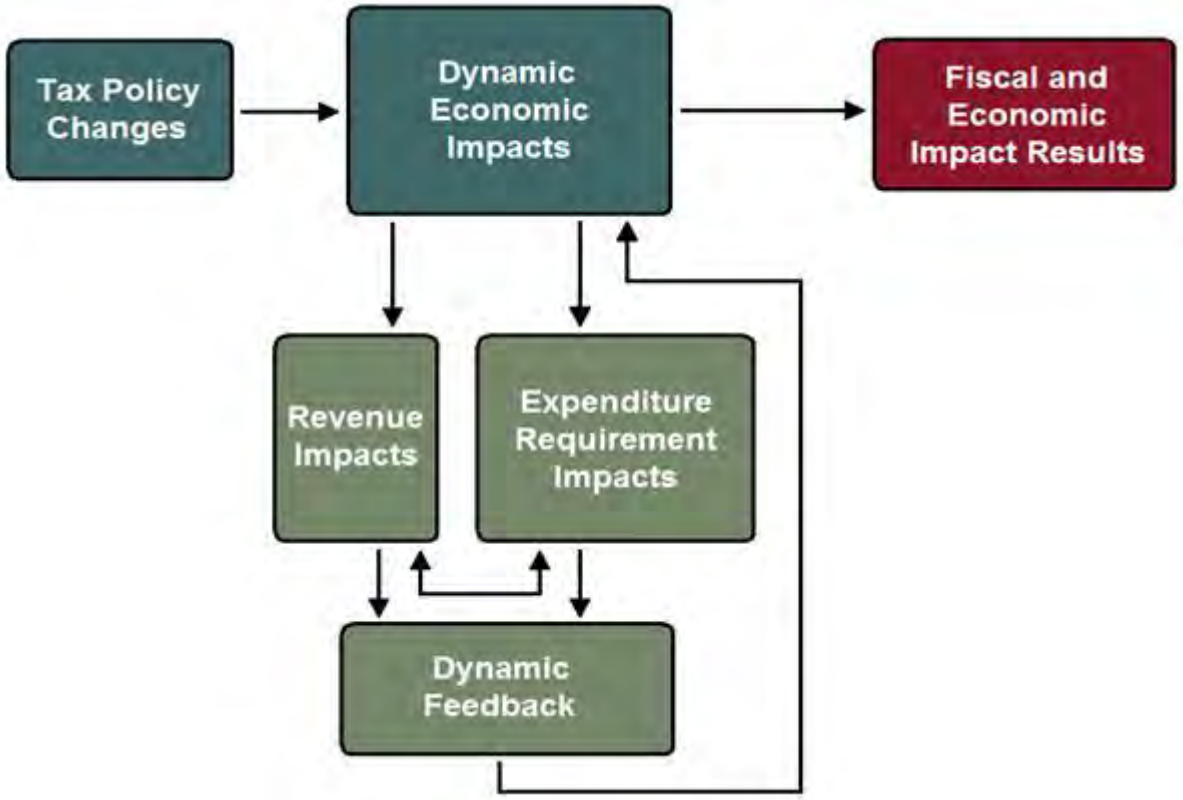
Dynamic Scoring



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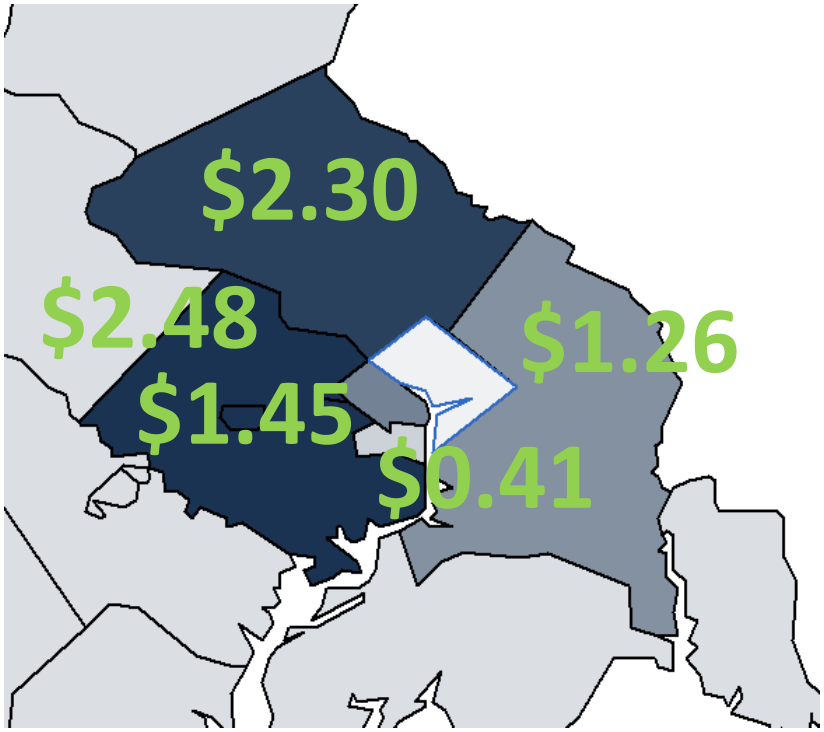
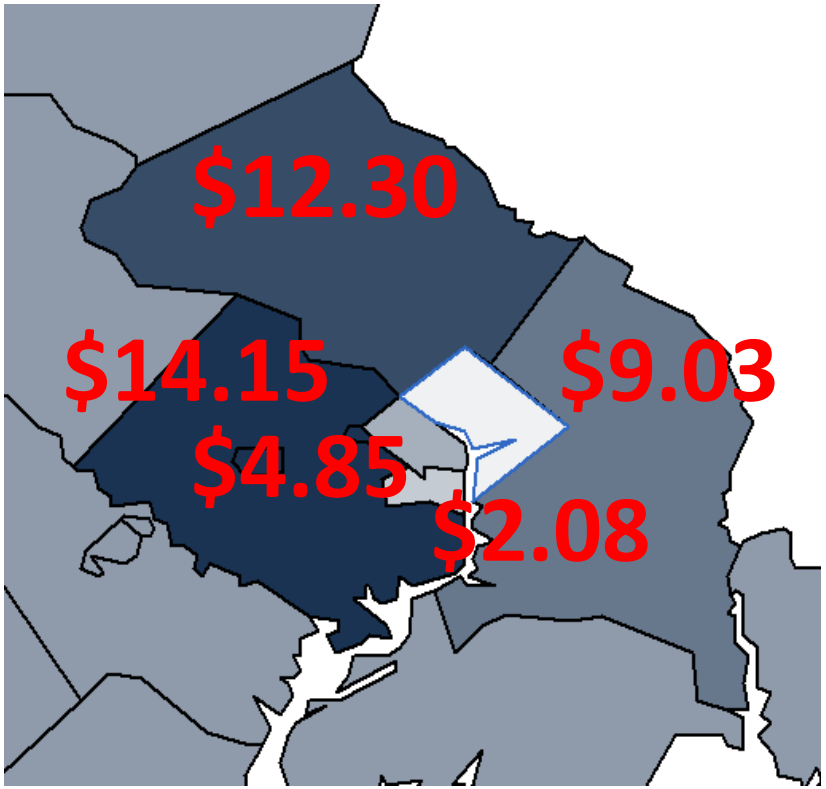
Washington, DC





Motivating Factors

- Previous methodology uses the Journey-to-Work (JTW) data on commuting from the U.S. Census
  - Historical with periodic updates
  - Relied on "fixed-shares"—no internal adjustments to changing consumer prices or transportation costs
  - Tended to overestimate "downtown" growth and underestimate aggregate housing supply
- New methodology makes commuting shares adjust endogenously to economic conditions
  - More accurate reflection of location decisions
  - Allows for novel simulations on transportation and taxes

Commuting Equation

$$rs_t^{k,l} = \frac{LF_t^l * (P_t^l)^{(1-\sigma)} * (D^{k,l})^{-\beta}}{\sum_{k \neq l}^{n} LF_t^j * (P_t^j)^{(1-\sigma)} * (D^{j,k})^{-\beta}} \qquad (4)$$

$rs_t^{k,l}$ = the share of commuters who live in region l and work in region k in time period t.

LF_t^l= labor force in region l in time period t.

P_t^l= the consumer price index including housing price in region l in time period t.

$D^{k,l}$= the commute distance from region l to region k.

σ= Sigma value, the estimated parameter for consumer price.

β= Beta value, the estimated parameter for distance decay.

Commuter Volumes

$$C_t^{l,k} = CI_t^{k,l} * \frac{(EMPT_t^k - EMP_t^{nFM,k})}{(COMPT_t^k - COMP_t^{nFM,k} - TWPER_t^k - EGSI_t^k)} \quad (7)$$

Where

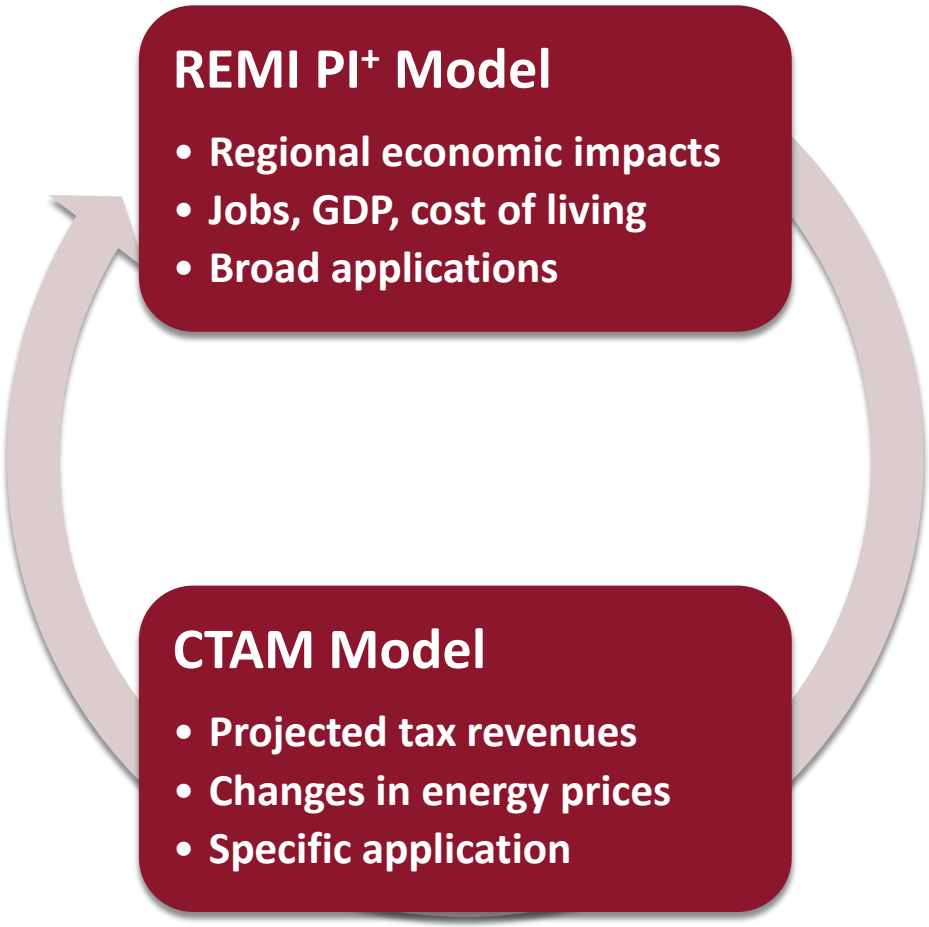
$C_t^{l,k}$ = the commuters who live in region l and work in region k in time period t.

$EMPT_t^k$ = total number of jobs in region k in time period t.

$EMP_t^{nFM,k}$ = number of military jobs in region k in time period t.

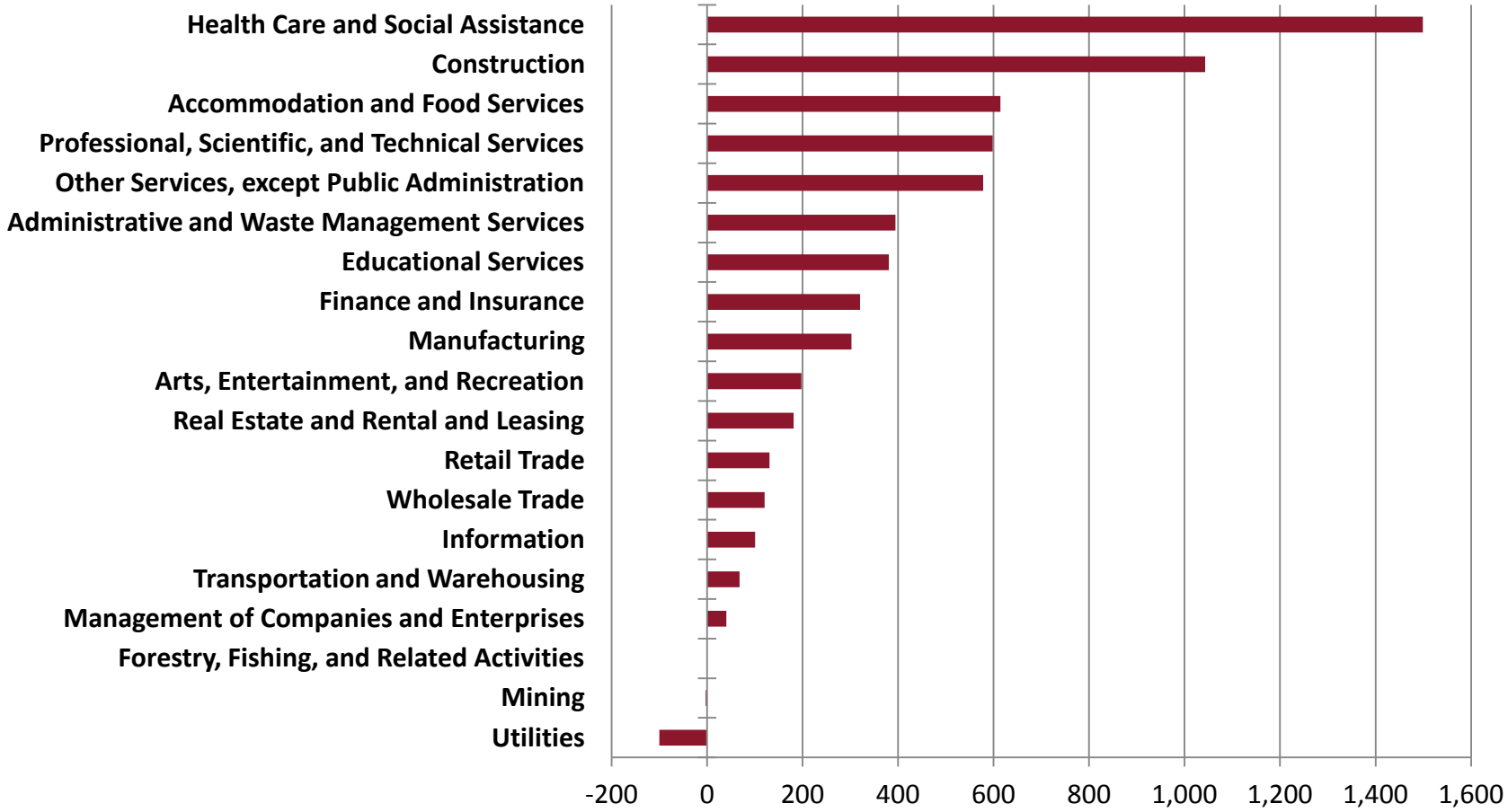
MA Carbon Tax

- Linking two models
- Three scenarios
  - $5/ton initial rate
  - Increased $10/year
  - Peaks at either:
    - $15/ton, $30/ton, or $45/ton
- How does this impact the economy and emissions?

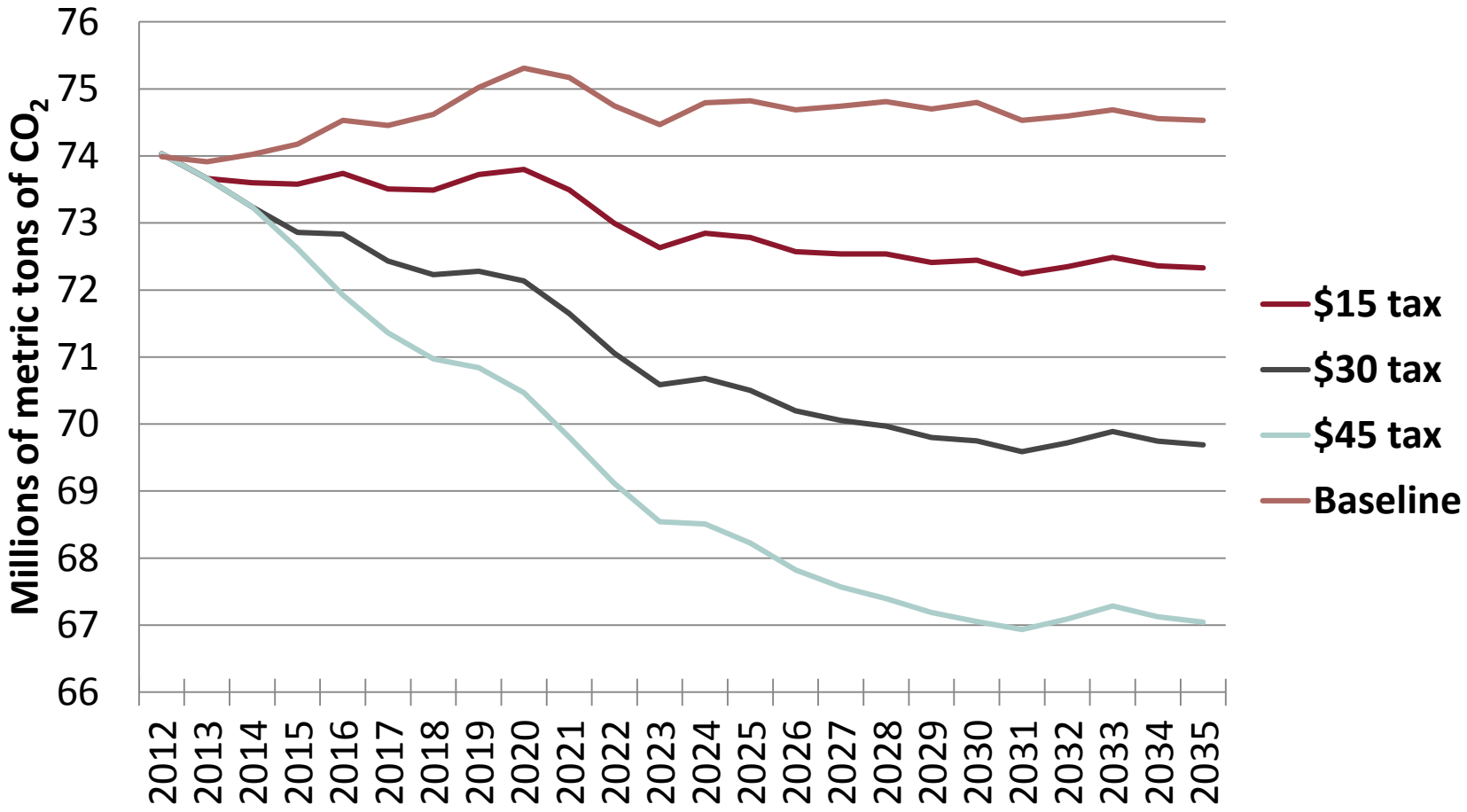


Employment by Industry

(average year under $30/ton carbon tax)



Carbon Emissions



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