REMI RESEARCH & DEVELOPMENT

2025 Review and 2026 Preview

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what does REMI say?[sm]

Agenda

- **Data Notes**
- Model Changes
- Looking into 2026

Bureau of Labor Statistics Employment Projections

- Bureau of Labor Statistics (BLS) 2023-2033 Employment Projections reduced the number of sectors from 192 to 166
  - The remaining sectors are not enough to support the REMI 160 sector model
  - Federal Military and Federal Civilian combined into single category which would affect all models
- We decided to not to use updated input-output tables and waited to see if there would be more sectors in 2024-2034 projections.
  - Prior to 2017, BLS only released employment projections for even years, so we are accustomed to not using new tables every year
- We still considered the final demand growth rates from the employment projections when we calibrated the national forecast

Bureau of Economic Analysis (BEA) Changes

- BEA made some major changes to their datasets last year
  - Discontinued Employment datasets
  - Discontinued county Personal Current Transfer Receipts datasets
  - Removed Employment data from Economic Profile

Personal Current Transfer Receipts

- CAINC35: Personal Current Transfer Receipts was discontinued
  - Contained county level data without suppressions
- REMI used existing data to fill in missing values
  - SAINC35 : Personal Current Transfer Receipts still provides complete state level data
  - CAINC30: Economic Profile contains three subcategories for each county
    - Income maintenance benefits
    - Unemployment insurance compensation
    - Retirement and other
- Used historic data, state data, and county subtotals to estimate missing points

Economic Profile

- CAINC30: Economic Profile had 8 lines remove that showed employment data or were calculated using employment data
- The model now displays fewer lines in the economic profile
- This is only displayed for history years in the regional control for reference purposes

Employment Data Series

- BEA discontinued several employment series
- BEA only produces estimates of total employment, employees, and proprietors at the national and state levels
- REMI needs estimates of employment by sectors at the national, state, and county levels that are consistent with the compensation, wages, and earnings data published by the BEA
- REMI has experience filling in missing values in the BEA datasets and used this system to produce the necessary employment estimates

Estimating Employment

- REMI using a constrained optimization solver to find a solution for missing values from BEA datasets
  - All constraints are satisfied, and all values fall within their possible bounds
  - Solution is as close to initial values as possible
  - There is low volatility in time series for compensation rates and earnings rates
- Needed to modify our system to handle the unique situation where there are no known county values. Some sectors have never had missing values before.
- Made further improvements to overall system to produce better estimates
- Introduced Quarterly Census of Employment and Wages (QCEW) data from Bureau of Labor Statistics (BLS) to provide some minimum values for each sector

General Strategy for Estimating Data

Calculate the bounds for each missing data point

Make an initial estimate for each missing data point

Solve optimization problems for each state to get a solution that is as close as possible to our estimates

RAS solution to make sure constraints are met (since we solved multiple separate optimization problems)

Solve for Compensation, Earnings, and Employment

Minimize:

$$\sum_{i=1}^{n} \sigma_i^1 \left|Comp_i - Comp0_i\right|$$

$$+ \sum_{i=1}^{n} \sigma_i^1 \left|Comp_i - CompRate * Emp_i\right|$$

$$+ \sum_{i=1}^{n} \sigma_i^2 \left|Earn_i - Earn0_i\right|$$

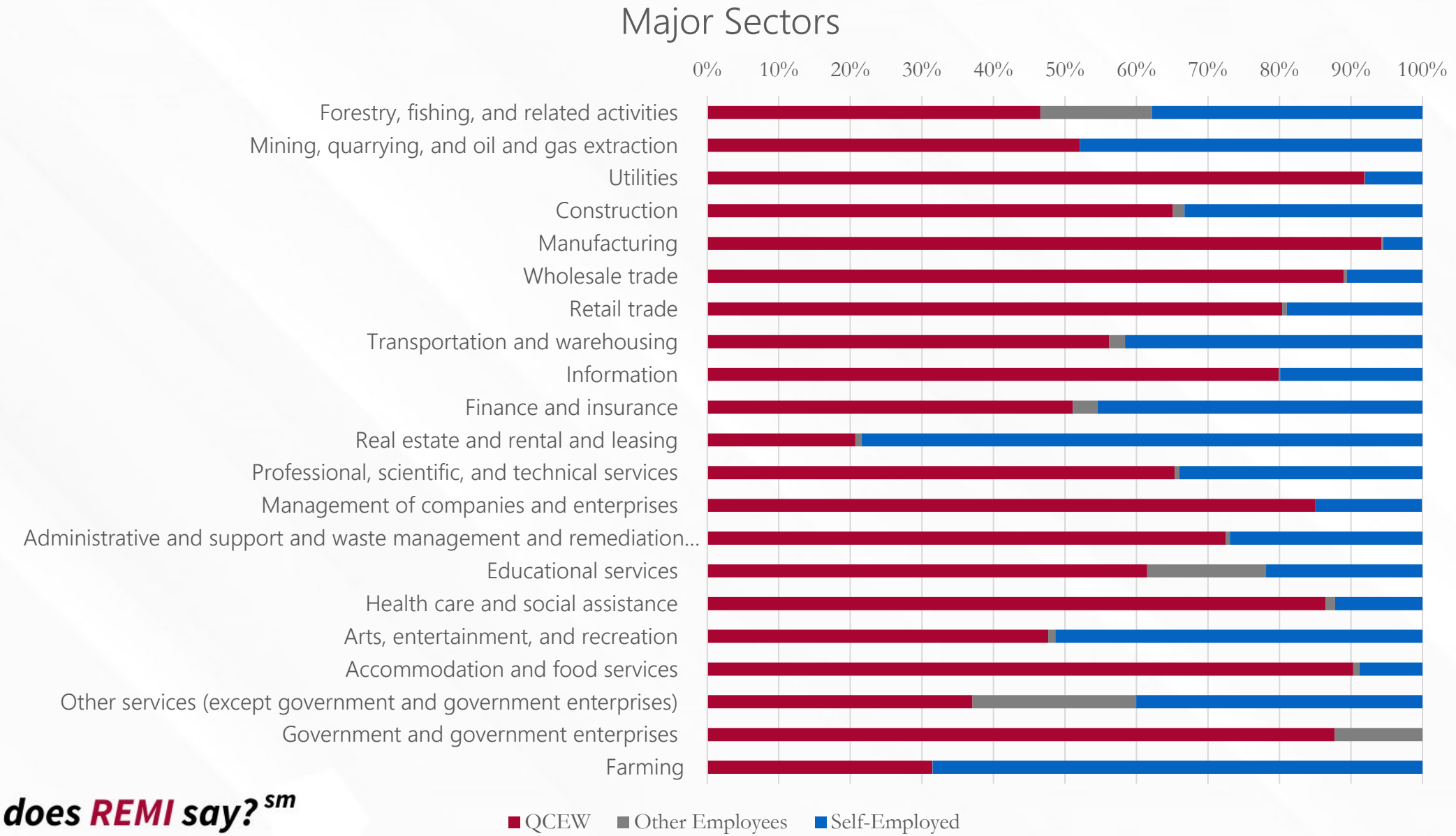
$$+ \sum_{i=1}^{n} \sigma_i^2 \frac{1}{10} \left|Earn_i - Comp0_i\right|$$

- Difference between compensation and initial compensation estimate
- Difference between Employment and Compensation * Compensation Rate
- Difference between earnings and initial earnings estimate
- Difference between compensation and earnings

QCEW Employment Data

- Quarterly Census of Employment and Wages (QCEW) contains data on employees, payroll, and establishments for workers covered by the state and federal unemployment insurance (UI) systems
- Accounts for 94.5 percent of wages and salaries as estimated by the U.S. Bureau of Economic Analysis (BEA).
- The data is tabulated by county and by NAICS six-digit industry.
- May provide information when BEA does not
  - Unsuppressed values, partial sector values, or establishments

How much does the QCEW data help?



Validation Testing

Test #1 – 2021 BEA employment predicted with support from 2020 tables

Mean Absolute Percent Error	2017	2018	2019	2020	2021
All Counties	0.8%	0.9%	0.9%	2.3%	3.9%
All States	0.5%	0.5%	0.6%	1.4%	2.1%

Test #2 – 2019 BEA employment predicted with support from 2018 tables

Mean Absolute Percent Error	2015	2016	2017	2018	2019
All Counties	0.9%	1.0%	1.2%	1.8%	3.2%
All States	0.5%	0.6%	0.7%	1.0%	1.6%

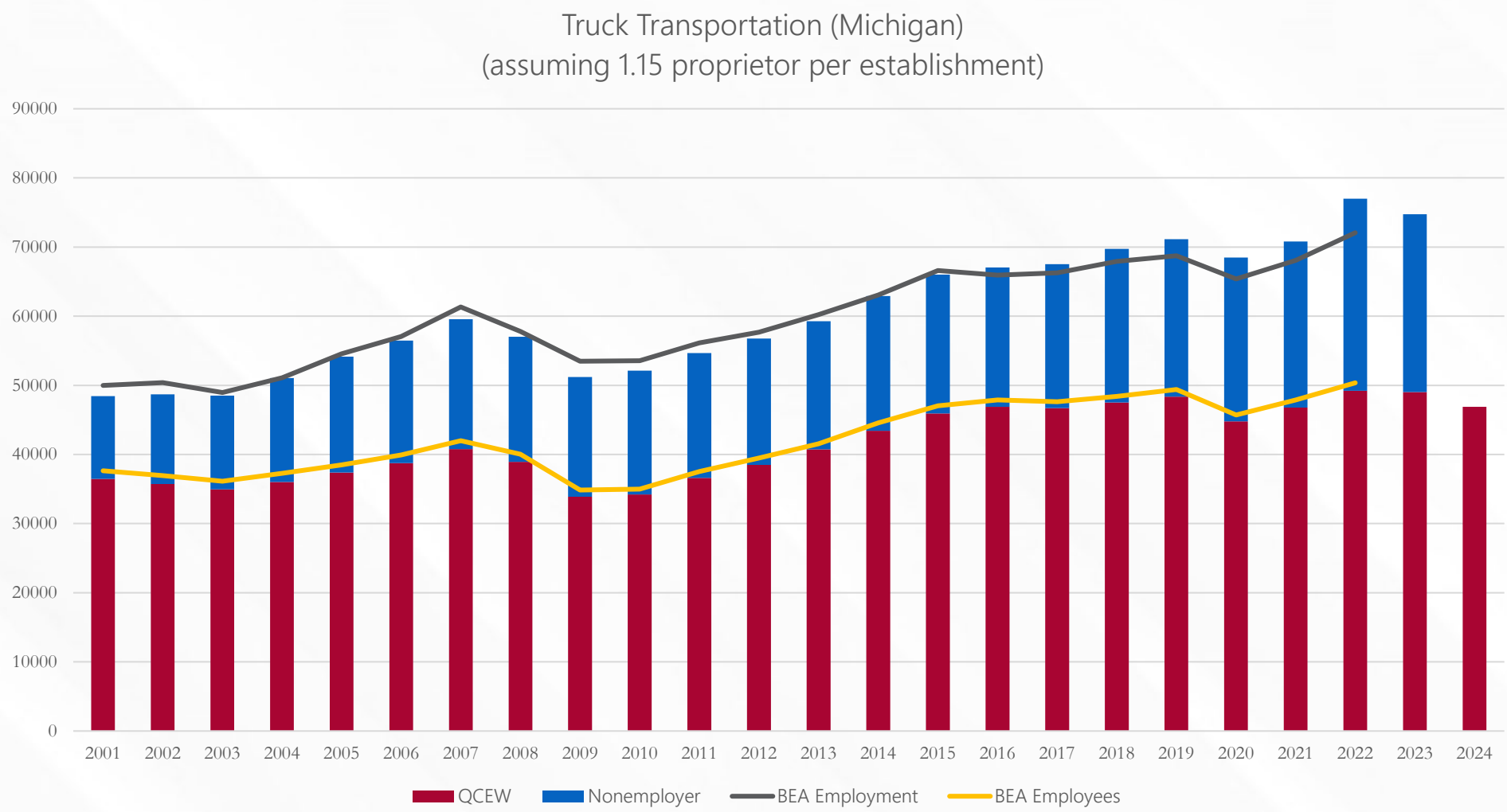
Plan for Additional Improvements

- Narrow the bounds around each missing data point by trying to approximate BEA estimates
  - Use additional datasets to supplement QCEW data for making employee estimates
  - Use Census Nonemployer Statistics to try to estimate the number of proprietors
    - QCEW data covers about 95% percent of employees, however, only about 75% of total employment is employees

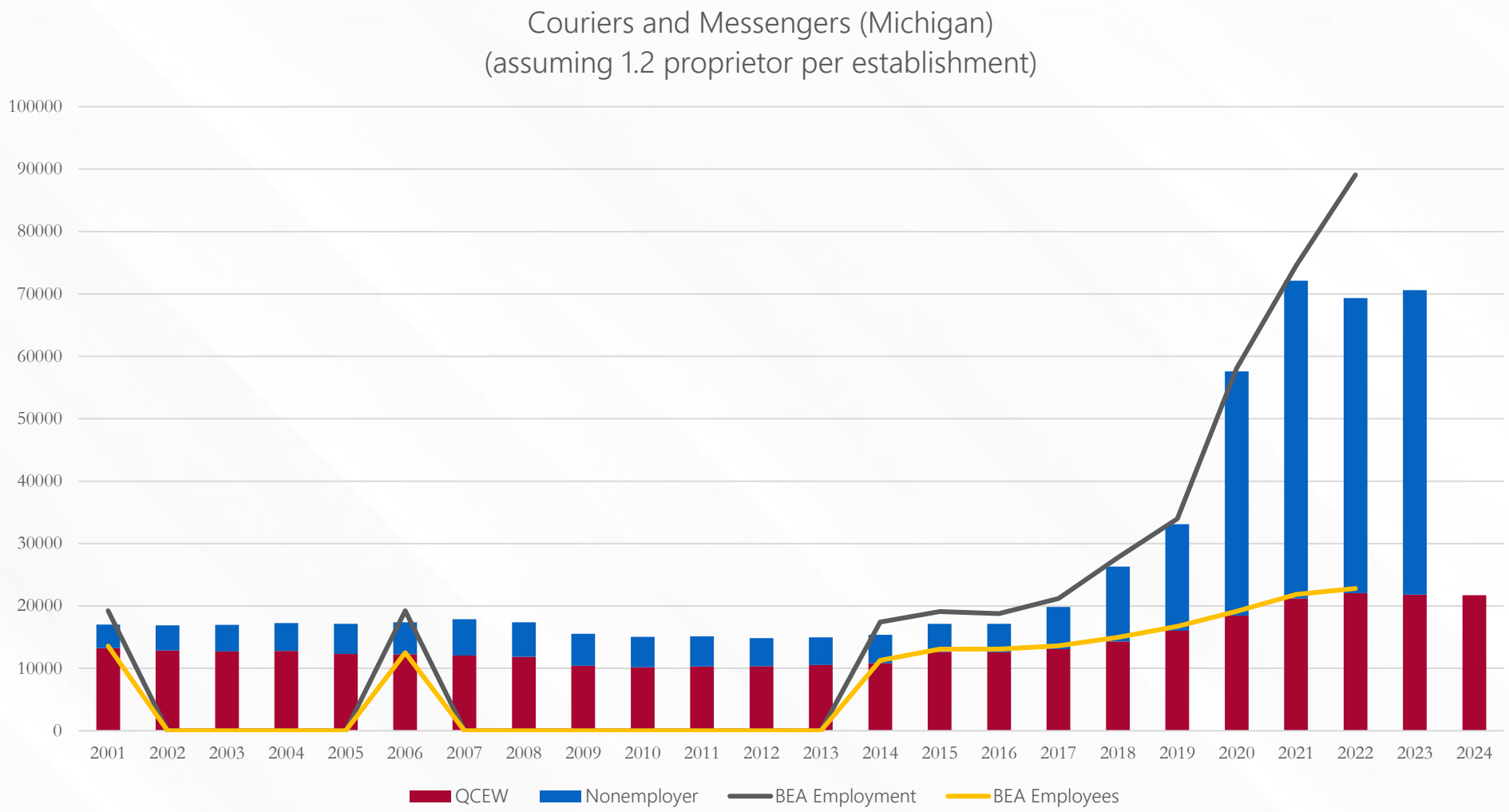
Census Nonemployer Statistics

- Contains number of establishments and total receipts for establishments without paid employees
- Data originates from tax records that IRS provides to Census Bureau, similar to IRS Statistics of Income (SOI) data that is used by BEA to estimate proprietors
- Available at 5-digit sector level
- Available for nation, states, and counties
- Using a historically observed number of proprietors per establishment, the number of proprietors can be estimated for each sector at the county level

Using QCEW and Nonemployer Data



Using QCEW and Nonemployer Data



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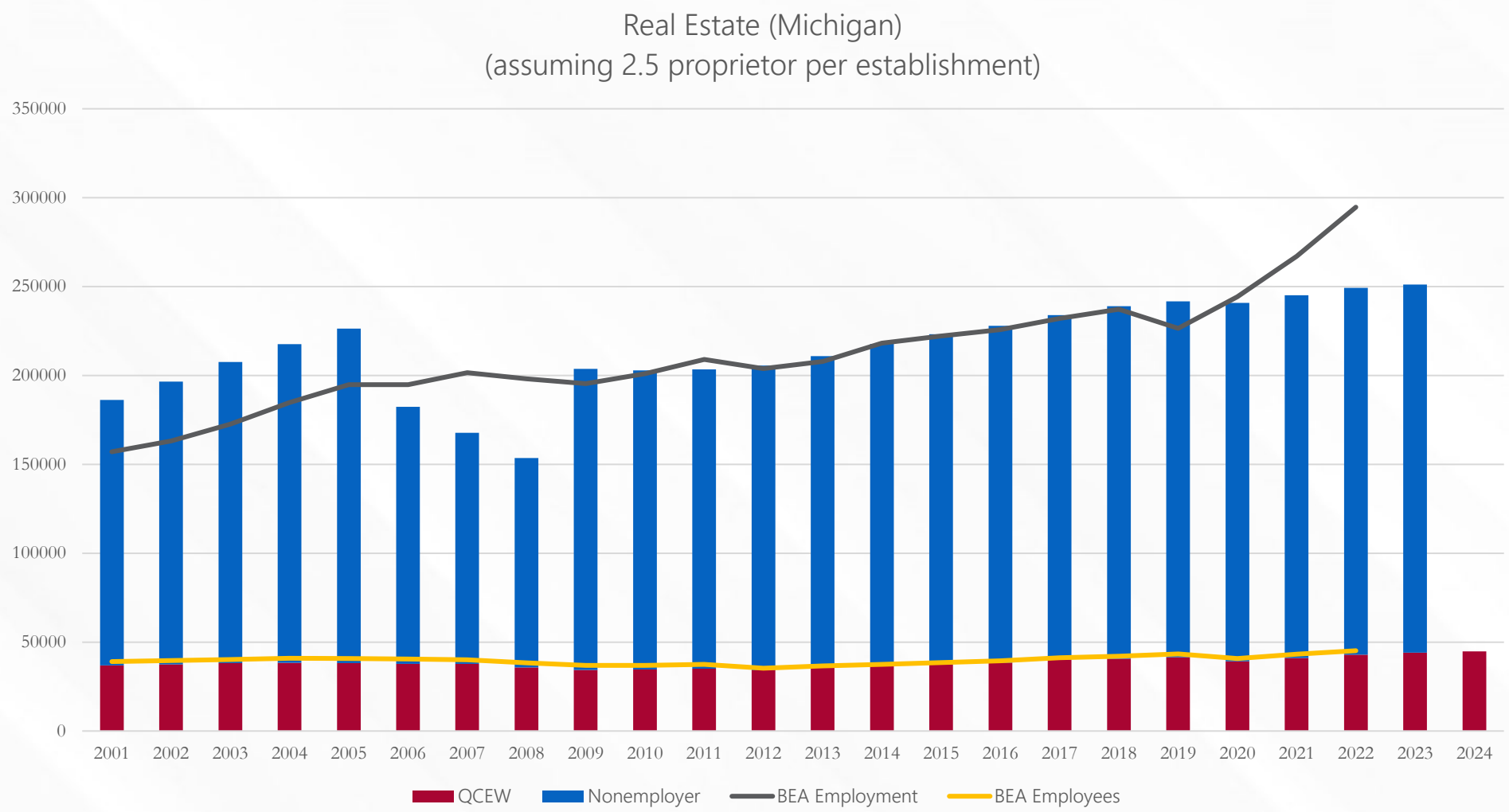
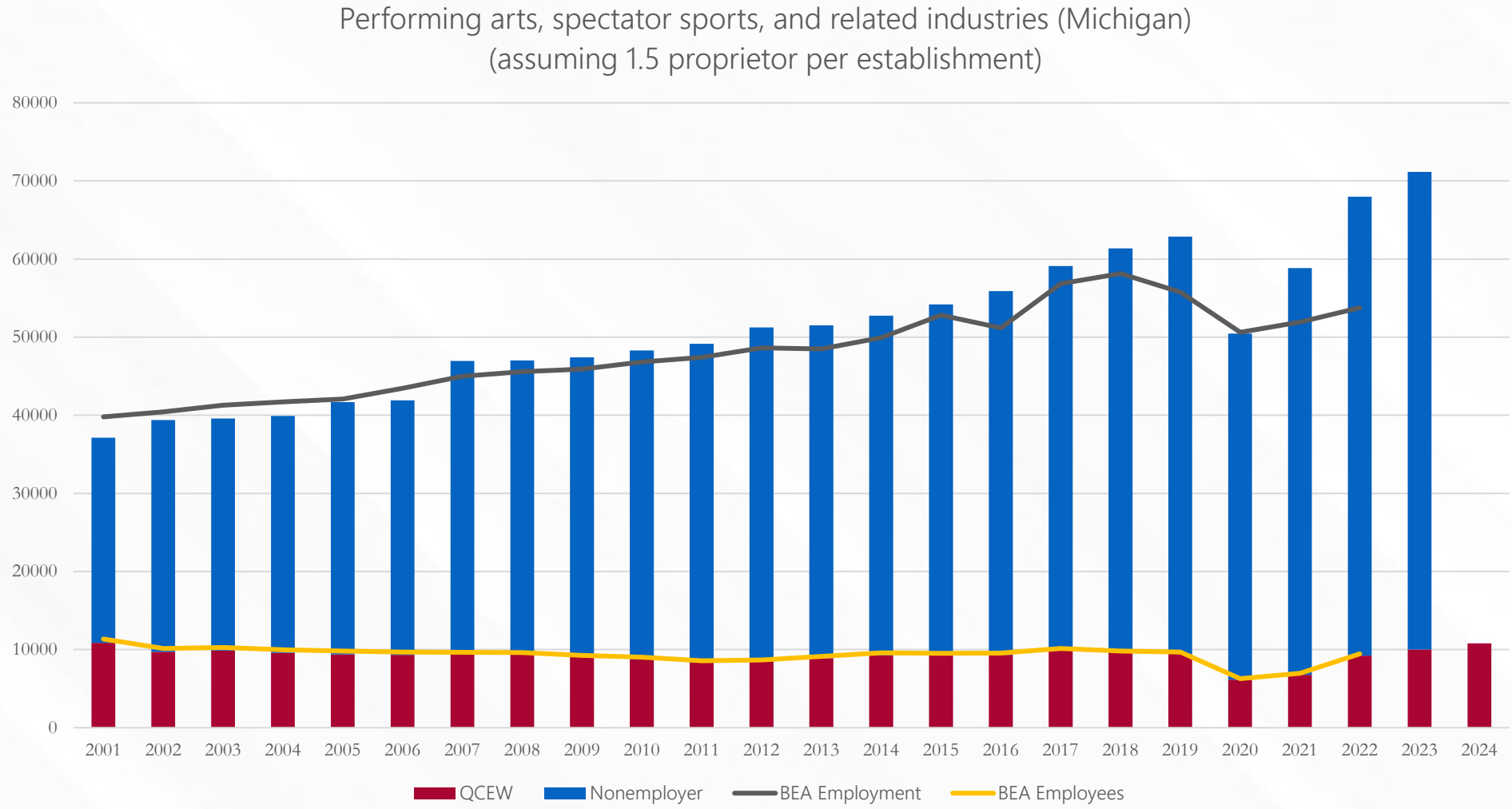


Using QCEW and Nonemployer Data



Supplementing QCEW Data

- QCEW data does have missing points, and some sectors may not be well covered because they are exempt from paying unemployment insurance
- Additional datasets may be used to supplement the QCEW data
  - Quarterly Workforce Indicators (QWI)
  - County Business Patterns (CBP)
  - Railroad Retirement Board (RRB)

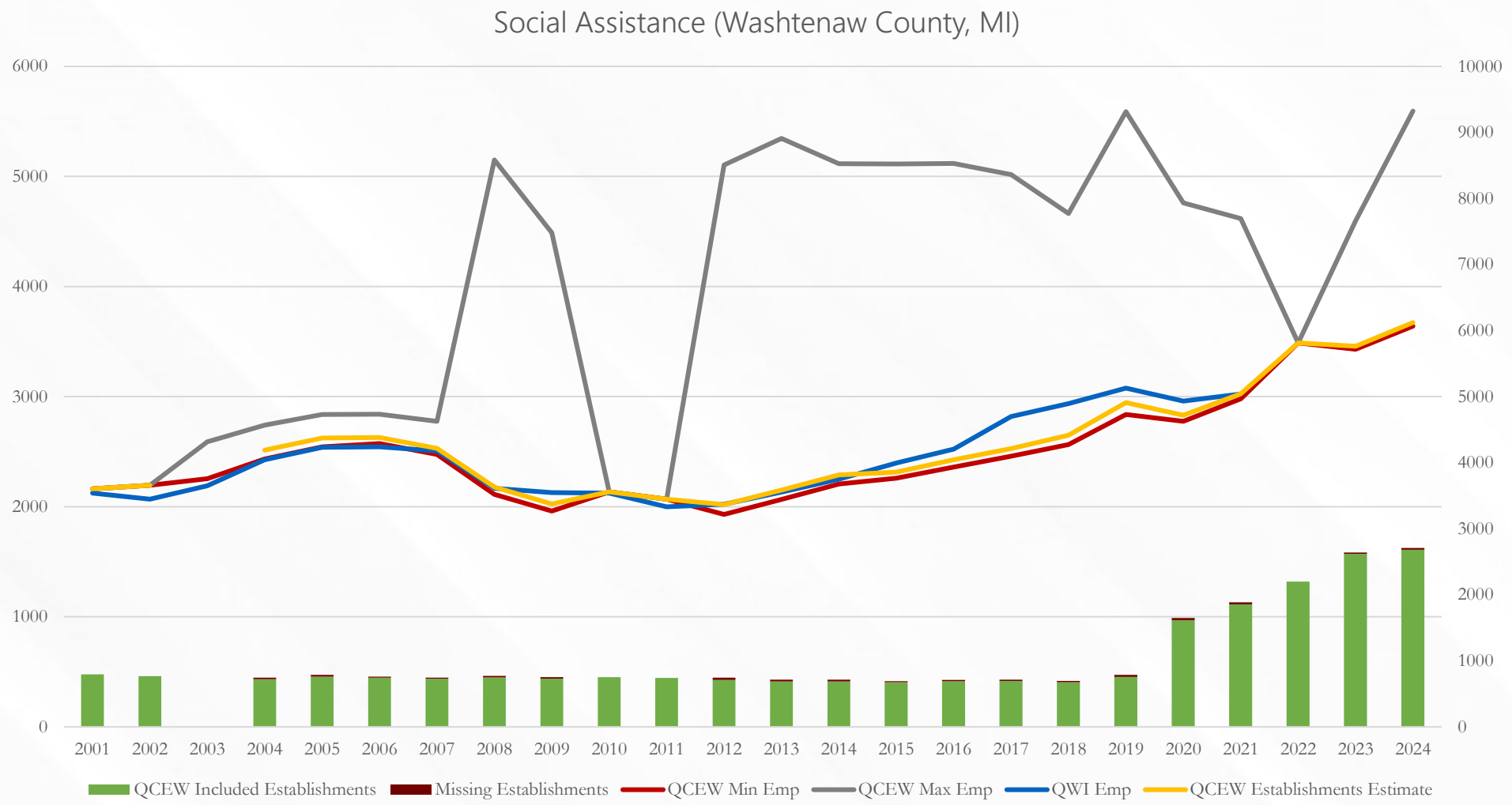
Quarterly Workforce Indicators

- BLS Quarterly Workforce Indicators (QWI) uses Longitudinal Employer-Household Dynamics (LEHD) linked employer-employee microdata
- Similar to QCEW data (and derived from QCEW data), but is worker-job-level data instead of establishment level data
- County data available for 4-digit sectors
- Data voluntarily supplied by state and may not exist for all states for all years
- Can be used to try to fill in gaps in QCEW data

County Business Patterns

- Different than QCEW data because it is based on Census Business Register and payroll tax data from IRS and is estimated for March 12
- County data available for 6-digit sectors
- Does not include a record when a sector has 2 or fewer establishments in a county, so cannot tell if employment is suppressed or does not exist
- Does not rely on unemployment insurance, so provides a better estimate for sectors that are exempt from unemployment insurance (mostly religious exemptions)
  - BEA uses CBP data instead of QCEW data for a few sectors
    - Education
    - Religious, Grantmaking, Civic, Professional, and Similar Organizations

Filling in QCEW Gaps - Example



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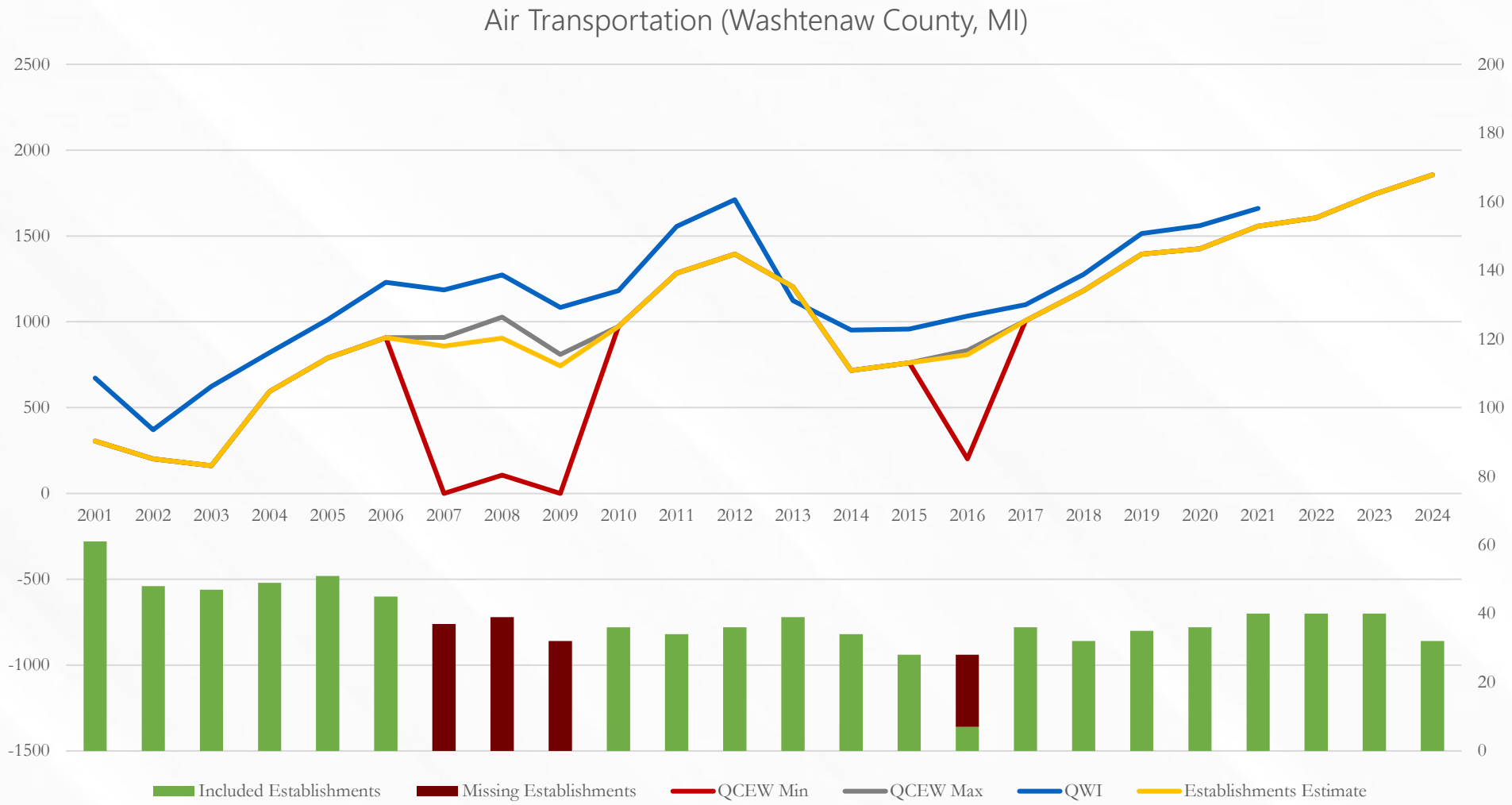


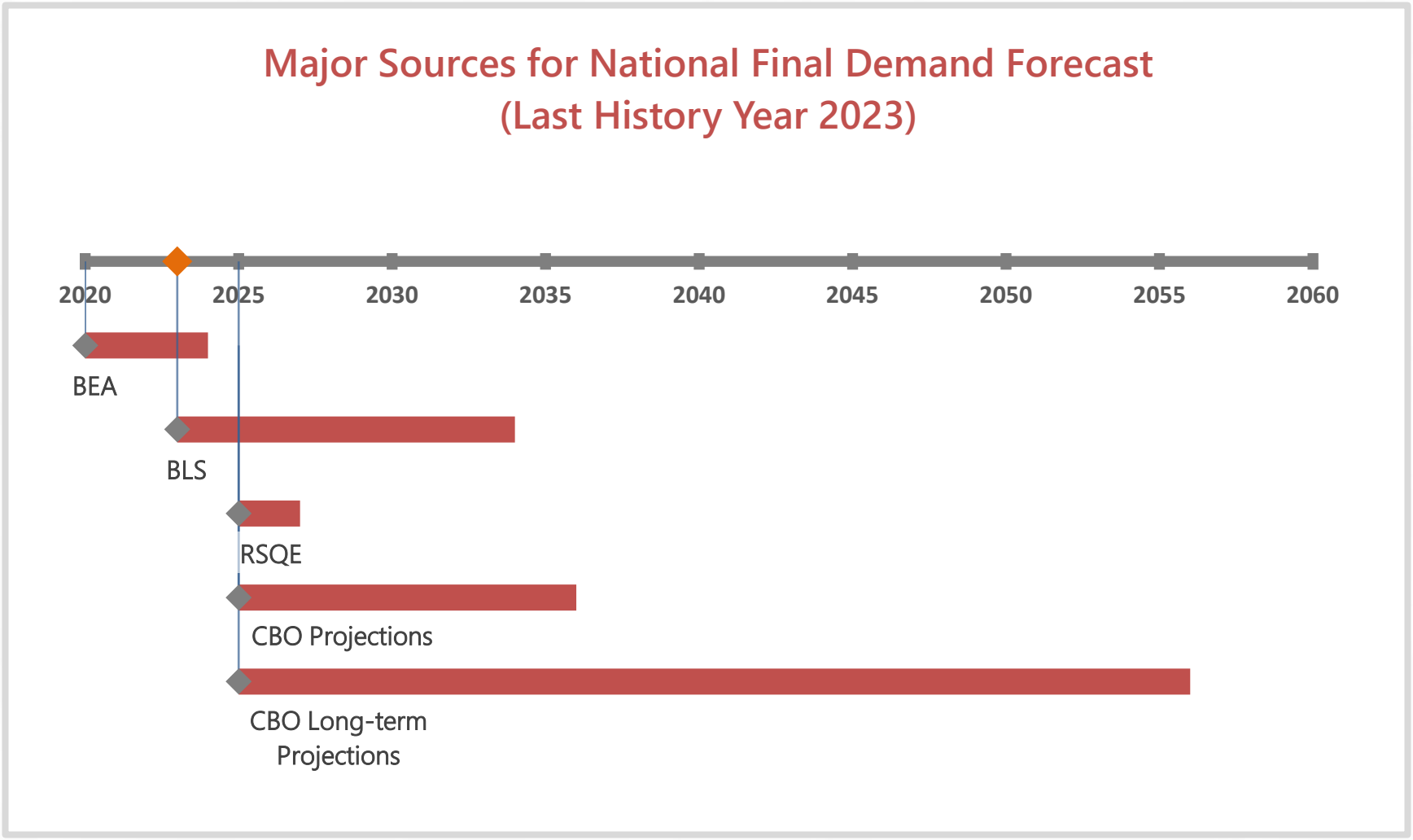
Employment

- The QCEW and Nonemployer Establishment data can be used to help approximate the BEA employment values for years without estimates and should help improve estimates for suppressed years for most sectors
- County Business Patterns data can be used to estimate certain sectors
- Railroad Retirement Board can provide Railroad Employment (at least at the state level)
- BEA adjusted some of the data that they received from other agencies, so it is difficult to exactly recreate their estimates

Retired Migration Estimates

- Updated retired migration estimates to use 5-year ACS survey data from 2010-2023 which asks where people lived in the previous year
  - Tabulated for ages 65-70, 70-74, 75+
- Old estimates were based on the 2000 Census survey that asked where people lived 5 years earlier
  - Tabulated for ages 65-70, 70-74, 75-79, 80-84, 85+

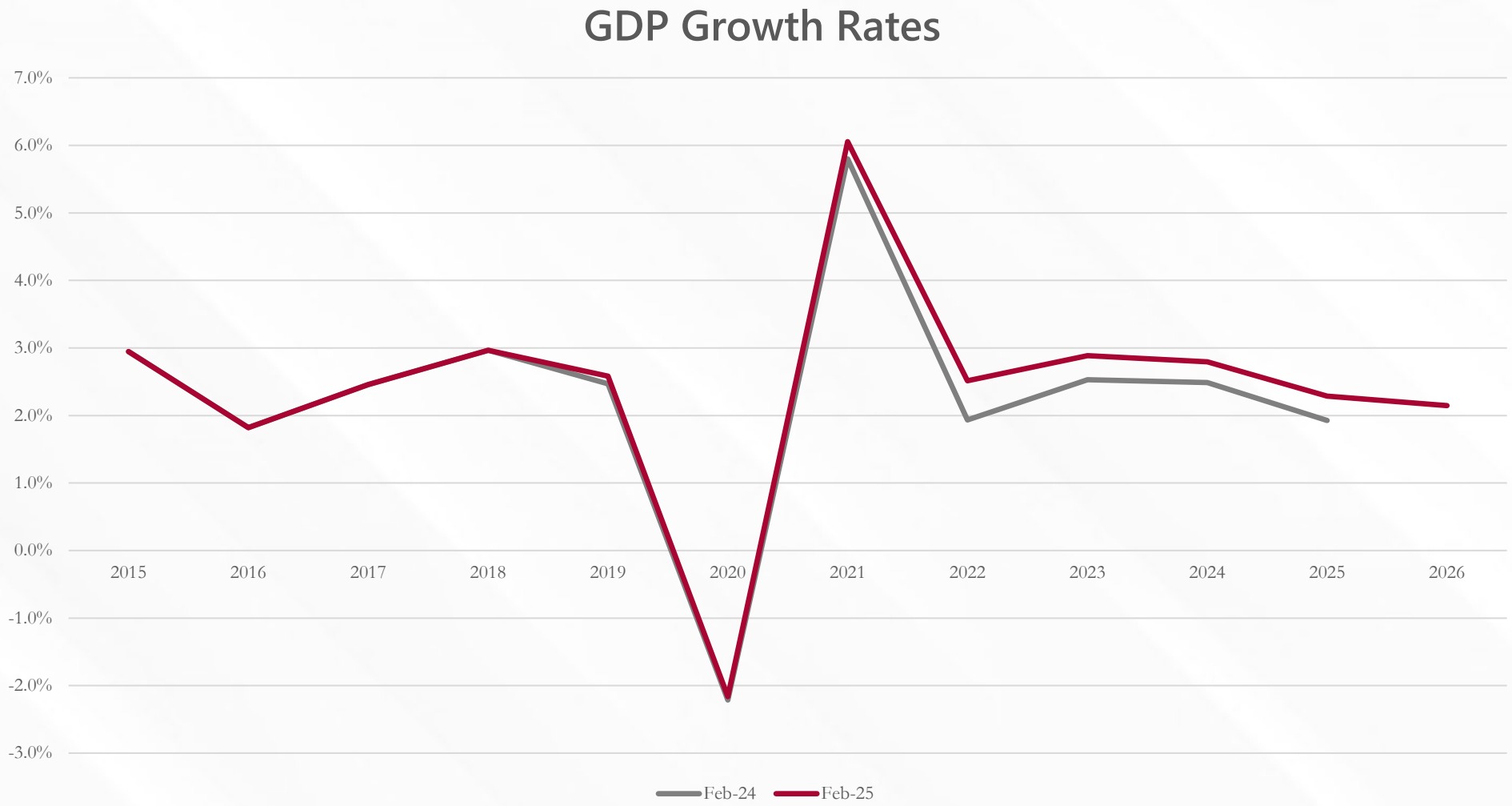
National Final Demand Forecast



RSQE Considerations (February 2025)

- Uncertainty with President Trump's second term but believe more 'business than usual' than headlines suggest
- Do not envision sudden jumps in broad tariffs, would inflict pain on Trump's base, might be used to force negotiation on other issues
- Higher tariffs keep inflation elevated, expect two Fed rate cuts
- Tariff uncertainty may cause equipment investment to slow
- Labor market strong enough to absorb federal layoffs, however massive layoffs with funding cuts to nonprofits could upend stability in labor market
- Expect participation rate to hold steady as baby boom generation retires and share of recent immigrants increases
- Generally, forecasting moderate GDP growth

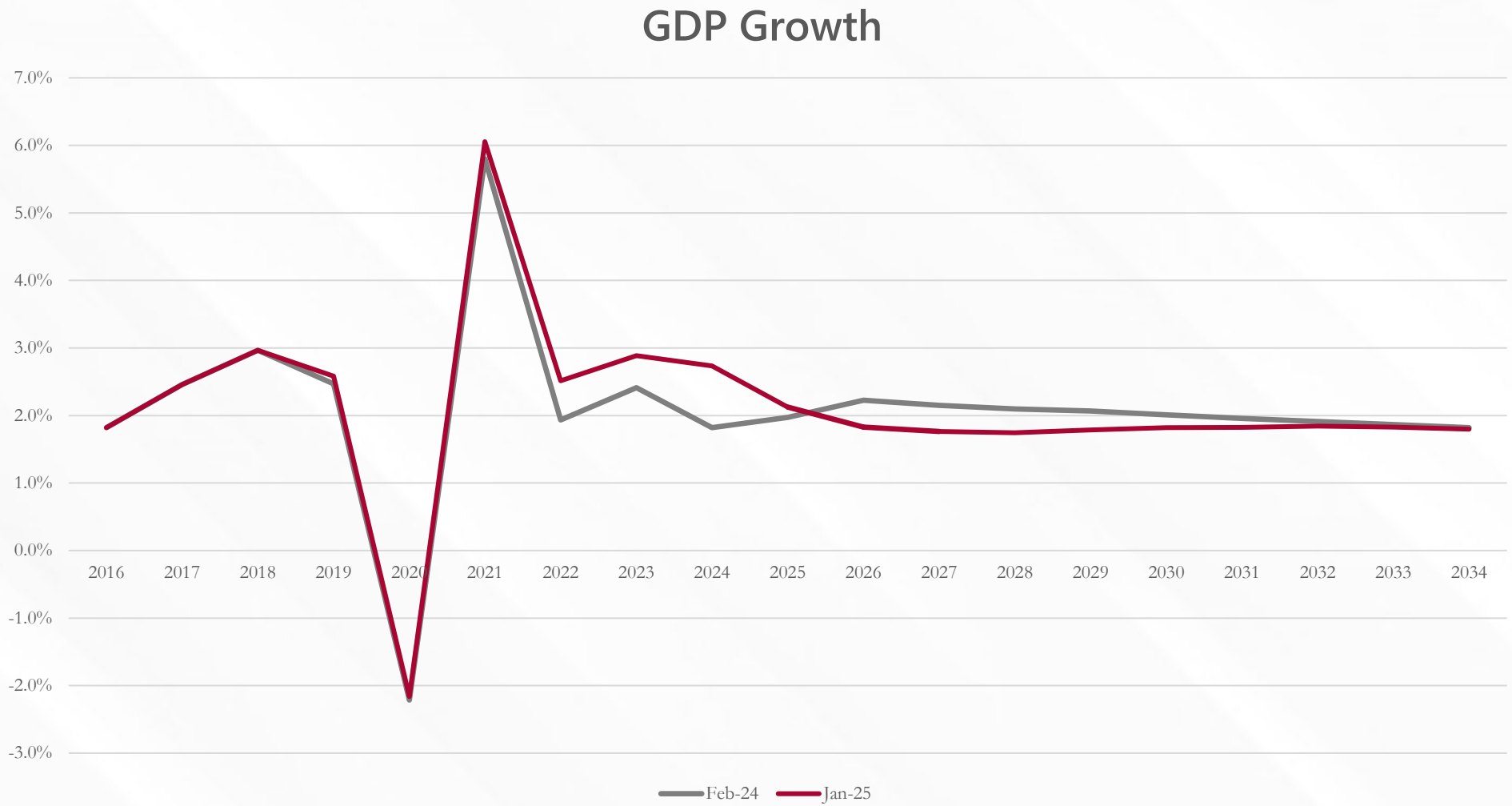
GDP Comparison



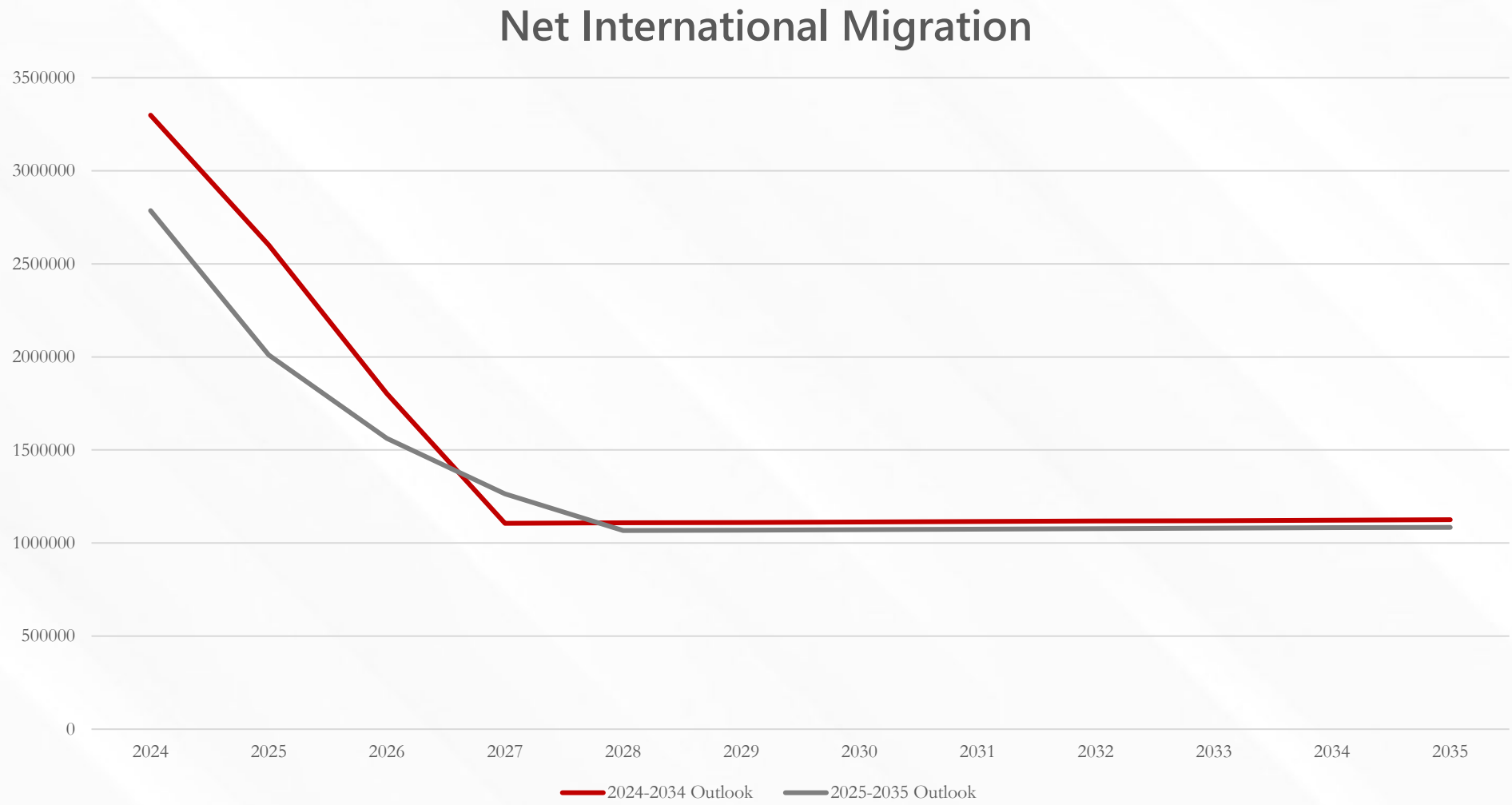
Changes in CBO's Economic Projections

- The growth of economic output, as measured by the nation's GDP, is expected to moderate in 2025, reflecting slower growth in consumer and government spending. CBO expects that more moderate economic growth to continue in 2026 as consumer spending slows further and investment in private nonresidential structures declines.
- The slowdown in economic growth raises the unemployment rate to 4.3 percent at the end of 2025 and 4.4 percent at the end of 2026. In later years, the unemployment rate declines gradually, reaching 4.3 percent at the end of 2035.
- Weaker demand for labor and falling inflation slow the growth of nominal wages over the next year. Wage growth declines gradually after 2025 but remains above the rate it averaged from 2015 to 2019—before the coronavirus pandemic—through 2035.

Comparison of CBO's Forecasts of GDP Growth



Net International Migration Comparison



Agenda

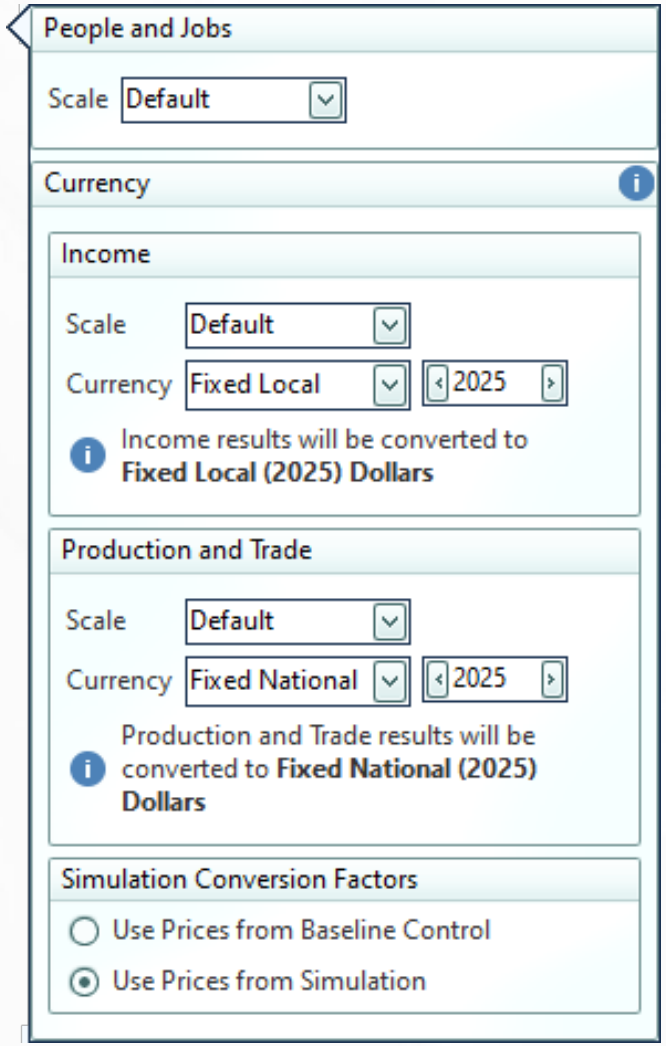
Data Notes

Model Changes

Looking into 2026

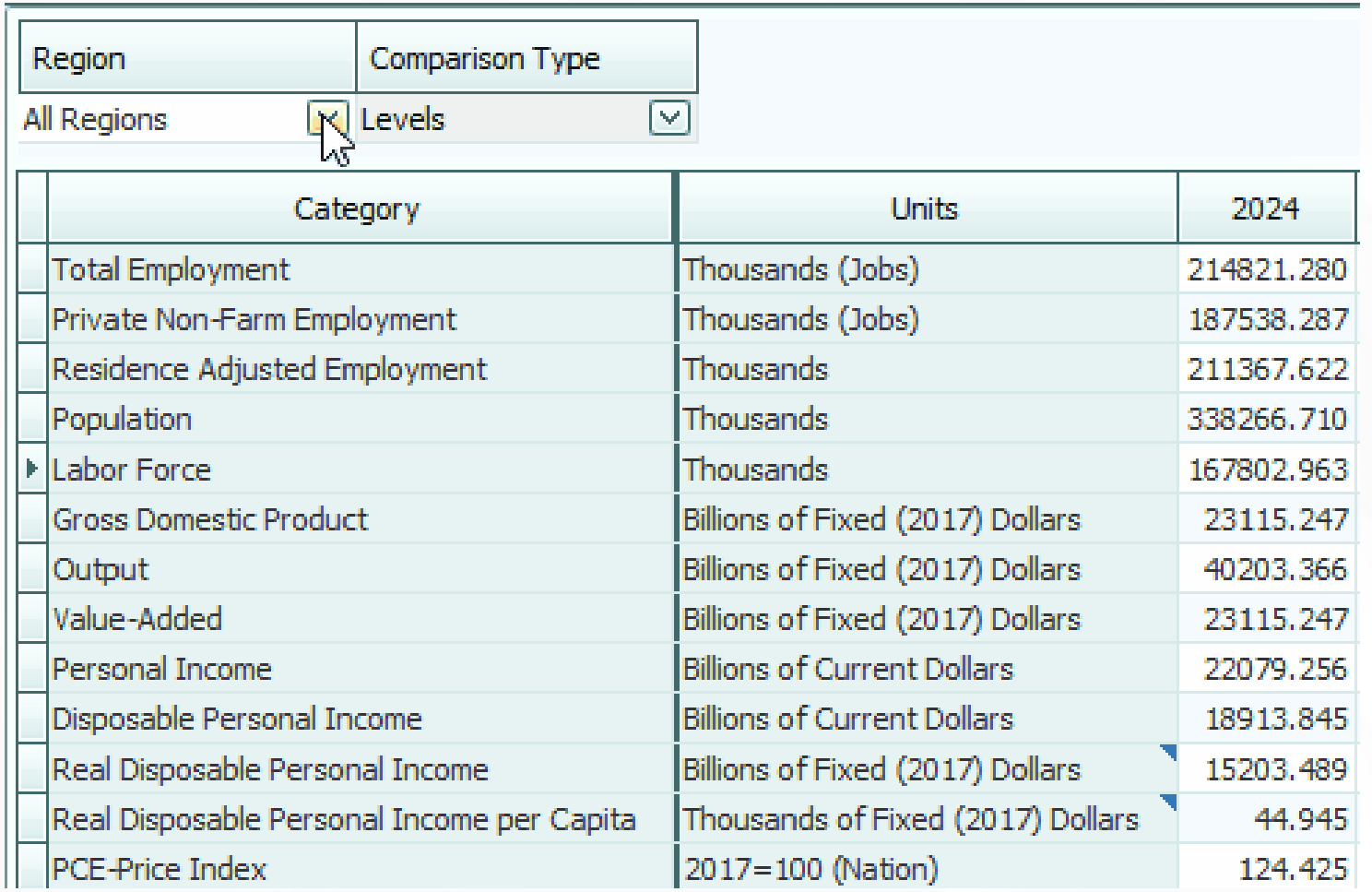
Currency Unit Conversion Options

- The unit conversion options for currency results has been separated for **Income** results and **Production and Trade** results
- **Production and Trade** results in Fixed (2017) dollars will be converted to Fixed (2025) dollars by default.
- **Income** results will be converted from Nominal dollars to Fixed Local (2025) dollar by default.
- The default units for displaying results can easily be set under User Preferences.



New Search in Filter

Improved search box functionality for result filters. The displayed list is reduced when typing begins instead of jumping to an item that starts with the typed letter



Region	Comparison Type
All Regions	Levels

Category	Units	2024
Total Employment	Thousands (Jobs)	214821.280
Private Non-Farm Employment	Thousands (Jobs)	187538.287
Residence Adjusted Employment	Thousands	211367.622
Population	Thousands	338266.710
Labor Force	Thousands	167802.963
Gross Domestic Product	Billions of Fixed (2017) Dollars	23115.247
Output	Billions of Fixed (2017) Dollars	40203.366
Value-Added	Billions of Fixed (2017) Dollars	23115.247
Personal Income	Billions of Current Dollars	22079.256
Disposable Personal Income	Billions of Current Dollars	18913.845
Real Disposable Personal Income	Billions of Fixed (2017) Dollars	15203.489
Real Disposable Personal Income per Capita	Thousands of Fixed (2017) Dollars	44.945
PCE-Price Index	2017=100 (Nation)	124.425

AI Integration

- AI assistant to help understand model
- Report generation

Agenda

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Model Changes

Looking into 2026

Planned Changes

Annual updates

- Historical period 2001-2024
- BLS 2024-2034 employment projections, etc.

Data Improvements

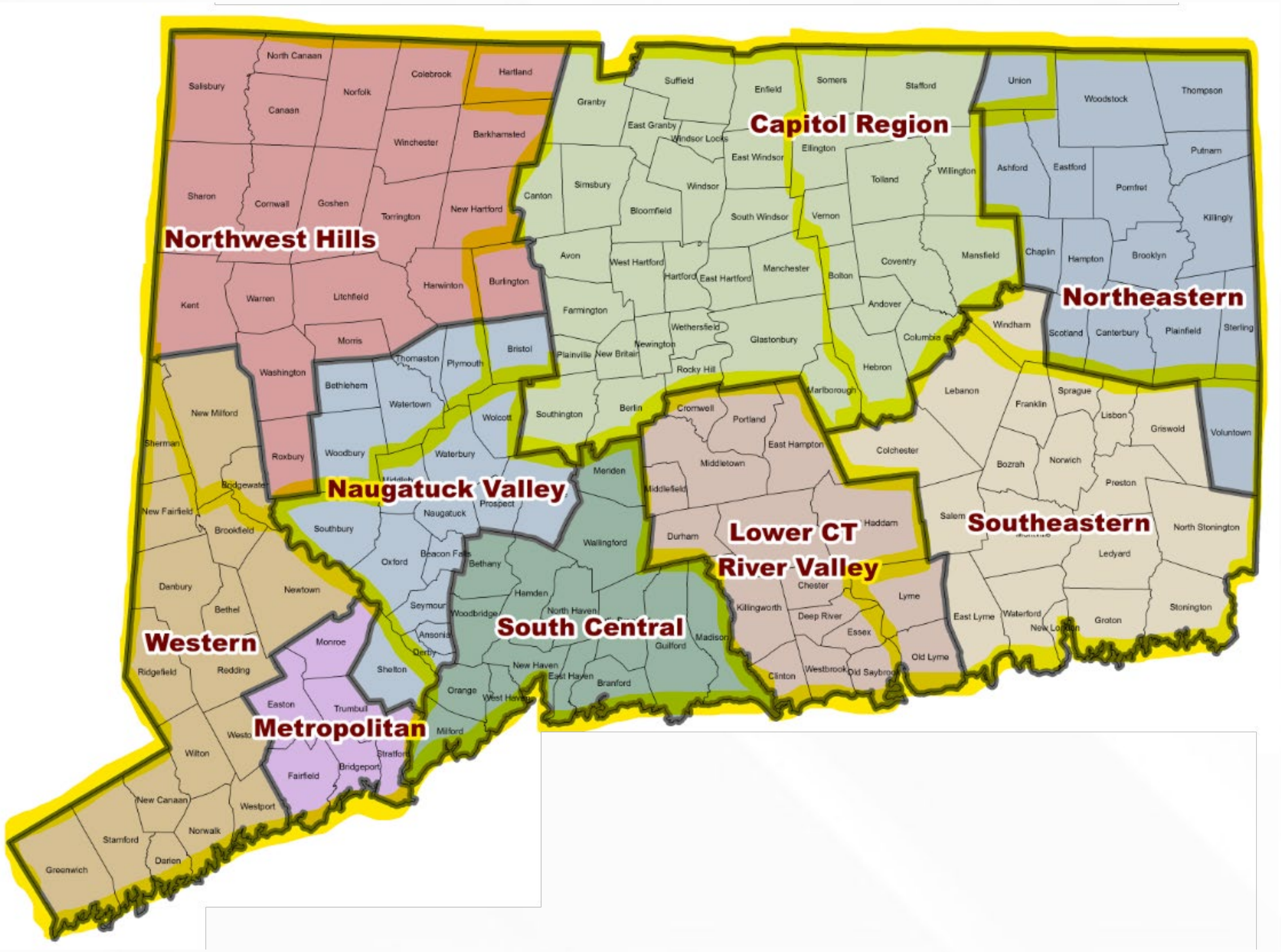
- Improving methodology for estimating employment
- Handle Connecticut geographic changes

Software updates

- Additional AI improvements
- Other improvements and optimizations

Connecticut Counties

BEA will incorporate the Connecticut's planning region geographic definitions, replacing county geographic definitions starting in 2024.



Thank you for attending!

Users' Roundtable Discussion

If you have questions, comments, or suggestions for Friday's Users' Roundtable Discussion, please use this QR code to submit them

Adapting SIC to NAICS, where do we stand?

Sherri Lawrence, Vice President REMI

REMI Users' Conference

October 8, 2003

The University of Michigan, Ann Arbor

Comparative Simulation Analysis: Using the REMI Model Before Economic Geography and With Economic Geography

Sherri Lawrence, Vice President REMI

REMI Users' Conference

October 9, 2003

The University of Michigan, Ann Arbor

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