UNIVERSITY AT ALBANY
State University of New York

Economic Outlook for NY Tax Revenues

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UALBANY FORECASTING MODEL

- We have developed a New York State revenue forecasting model with many predictors related to New York State, US and the adjoining states.
- It s mixed frequency model in that we forecasts year-over-year growth in revenues using monthly and quarterly observations
- We pay special attention to probability of recessions during the period.
- We start predicting y-o-y revenue growth 18 months before the end of the fiscal year and the forecasts are updated on a monthly basis till March.
- We use two dynamic factors for NY and US using many predictors and a variable capturing experts' published evaluation of enacted or future policies on the tax revenue from NASBO, DOB, Senate finance, Ways & Means etc. .
- The time series dynamics of some of these variables are presented first.
- The important aspect of our model is the forecasts for the FY tax revenues in real time as new data arrives in upcoming months with changing uncertainty depending on the horizon and the economy.

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Boosting tax revenues with mixed-frequency data in the aftermath of COVID-19: The case of New York

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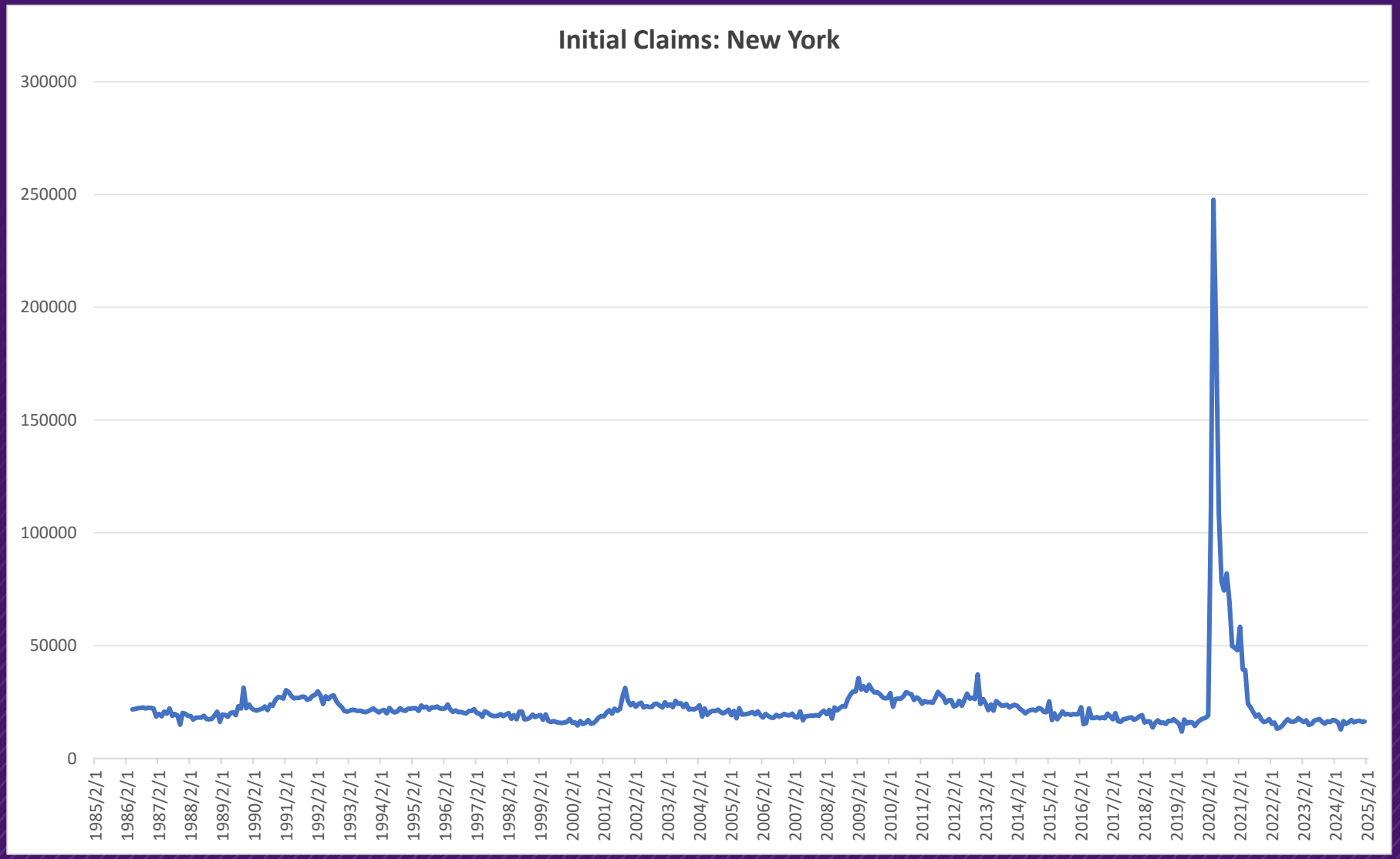
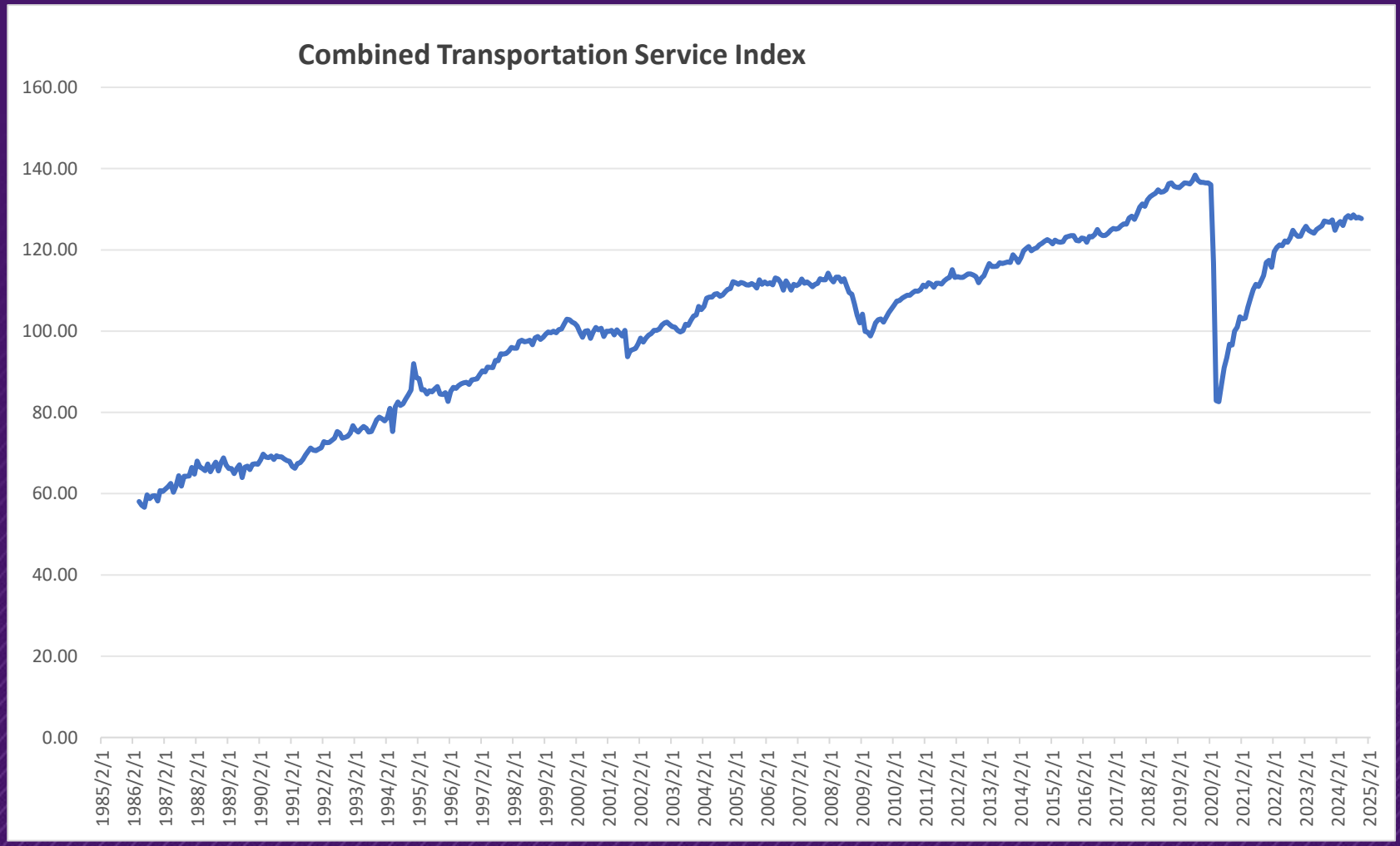
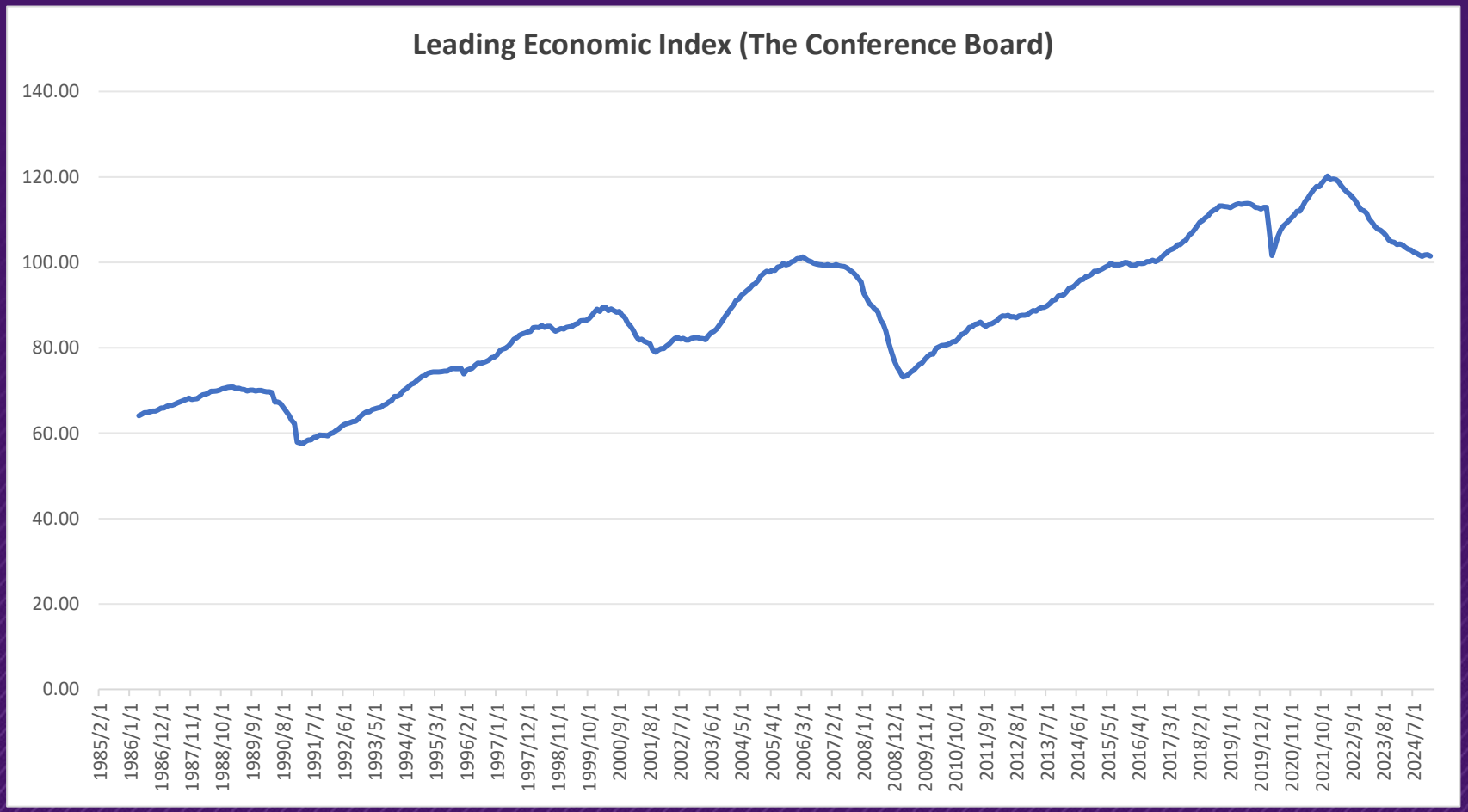
- The value of initial claims is stable.



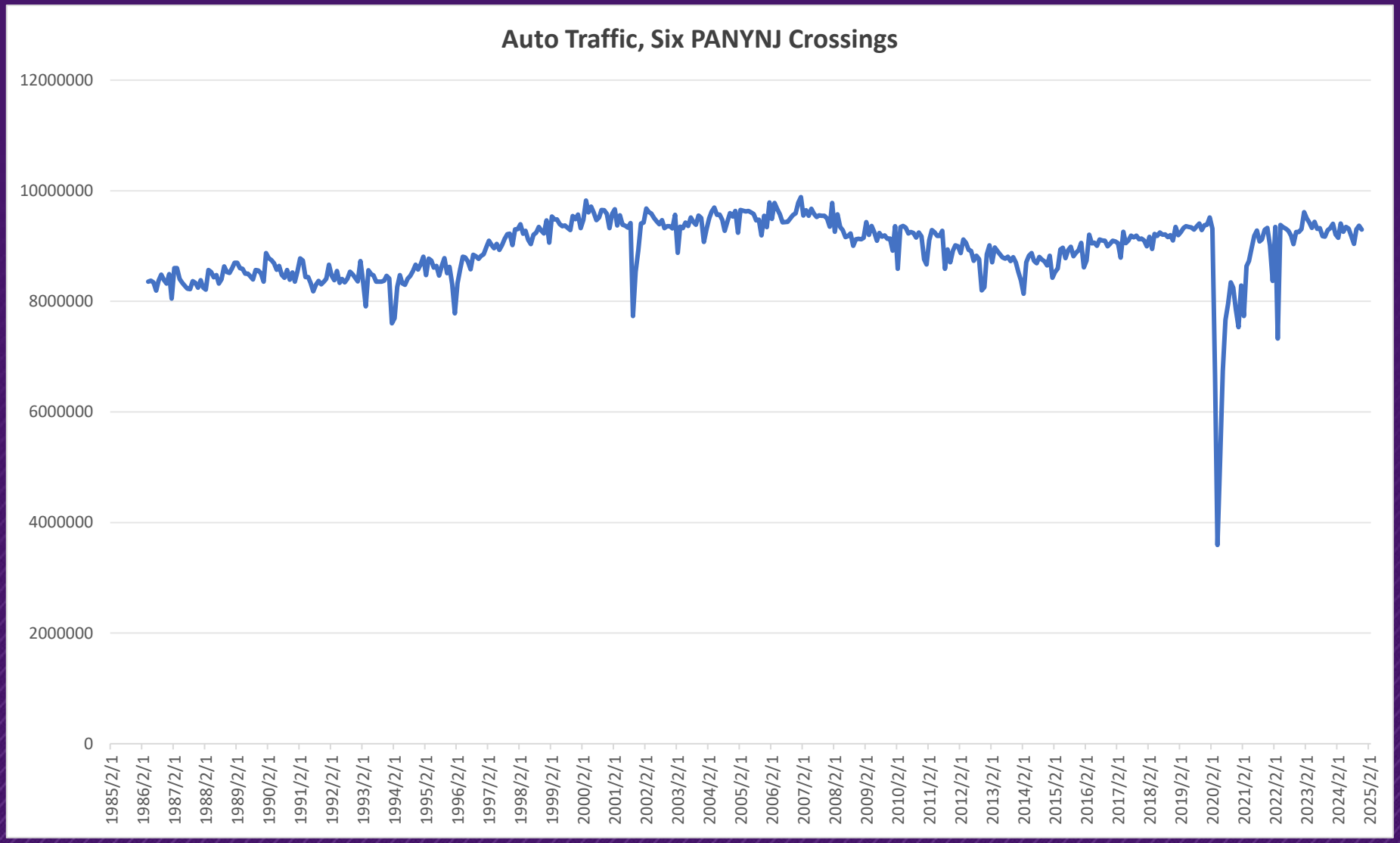
- The transportation service index is still not fully recovered yet.



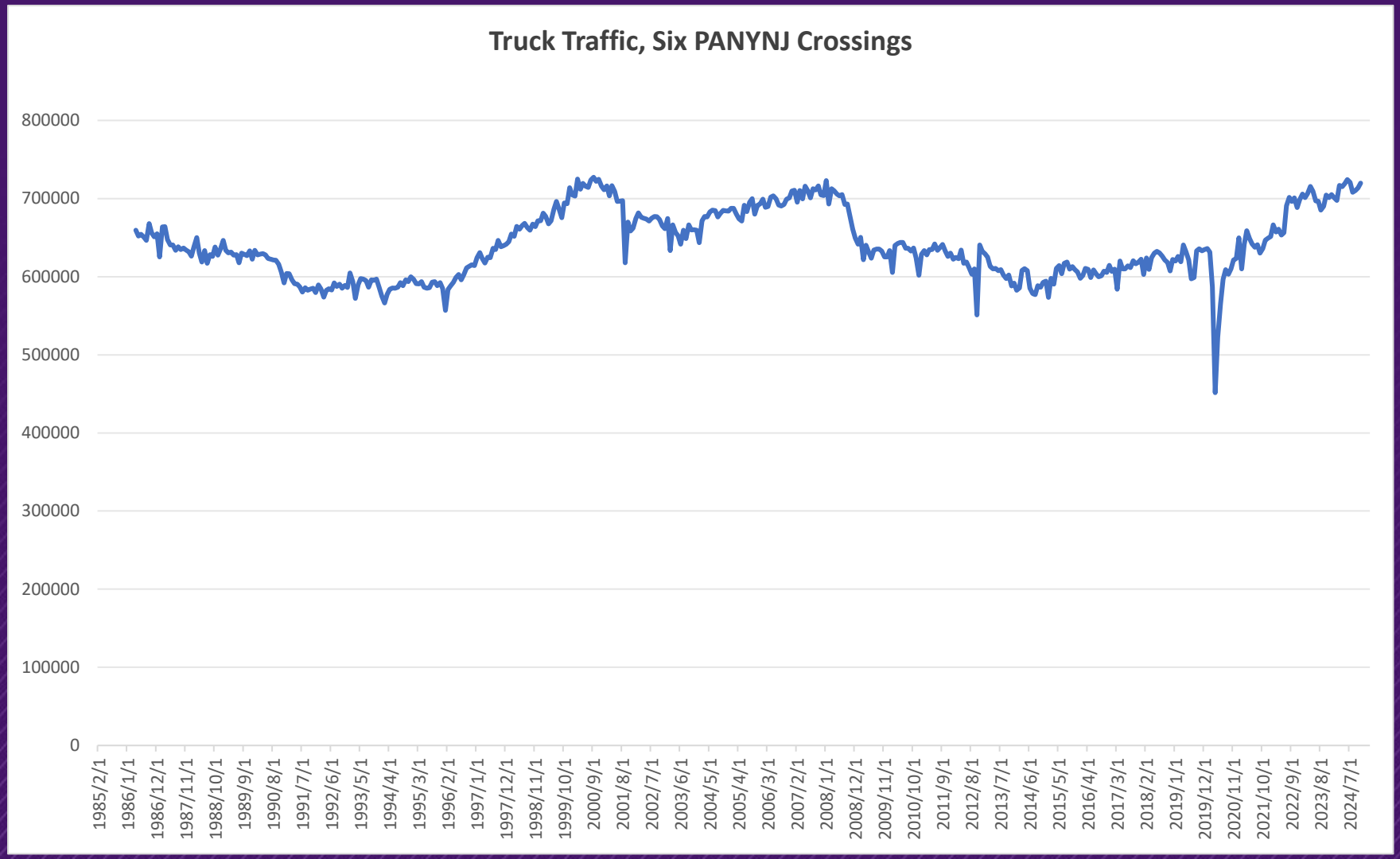
- The U.S. Leading Economic Index from the Conference Board has been dropping again at the beginning of 2024



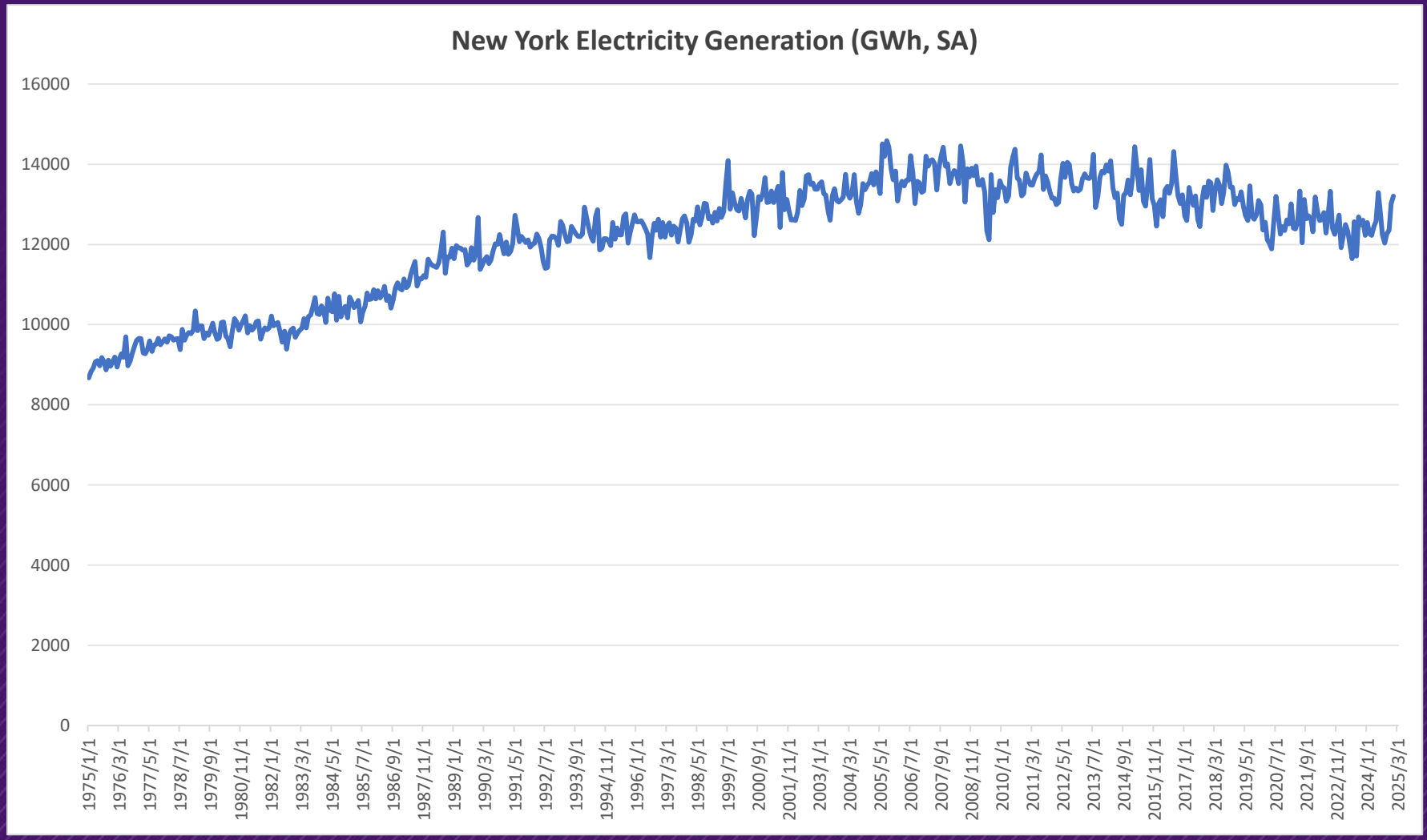
- Auto traffic is stable at pre-pandemic level.



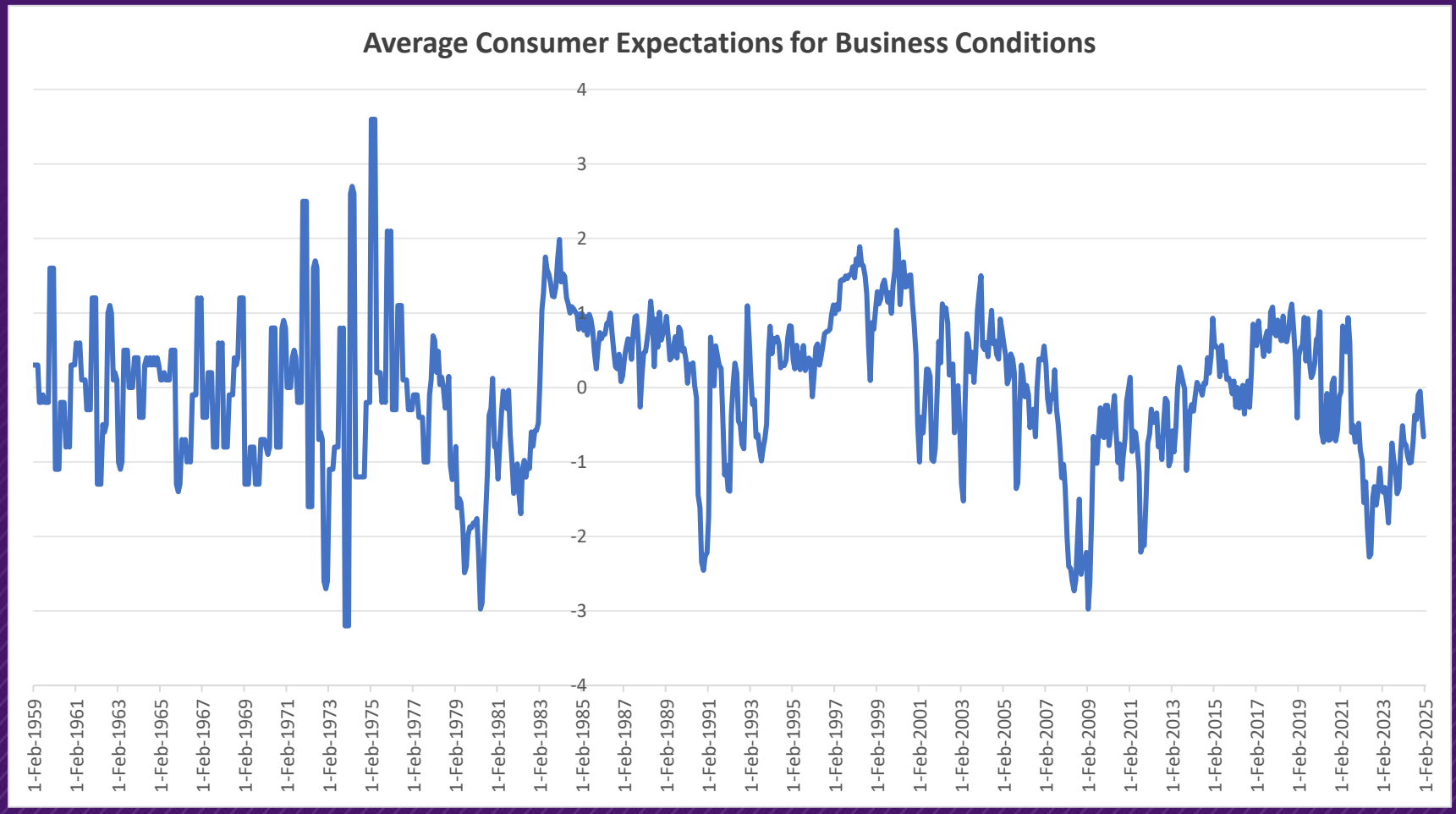
- Truck traffic keeps increasing.



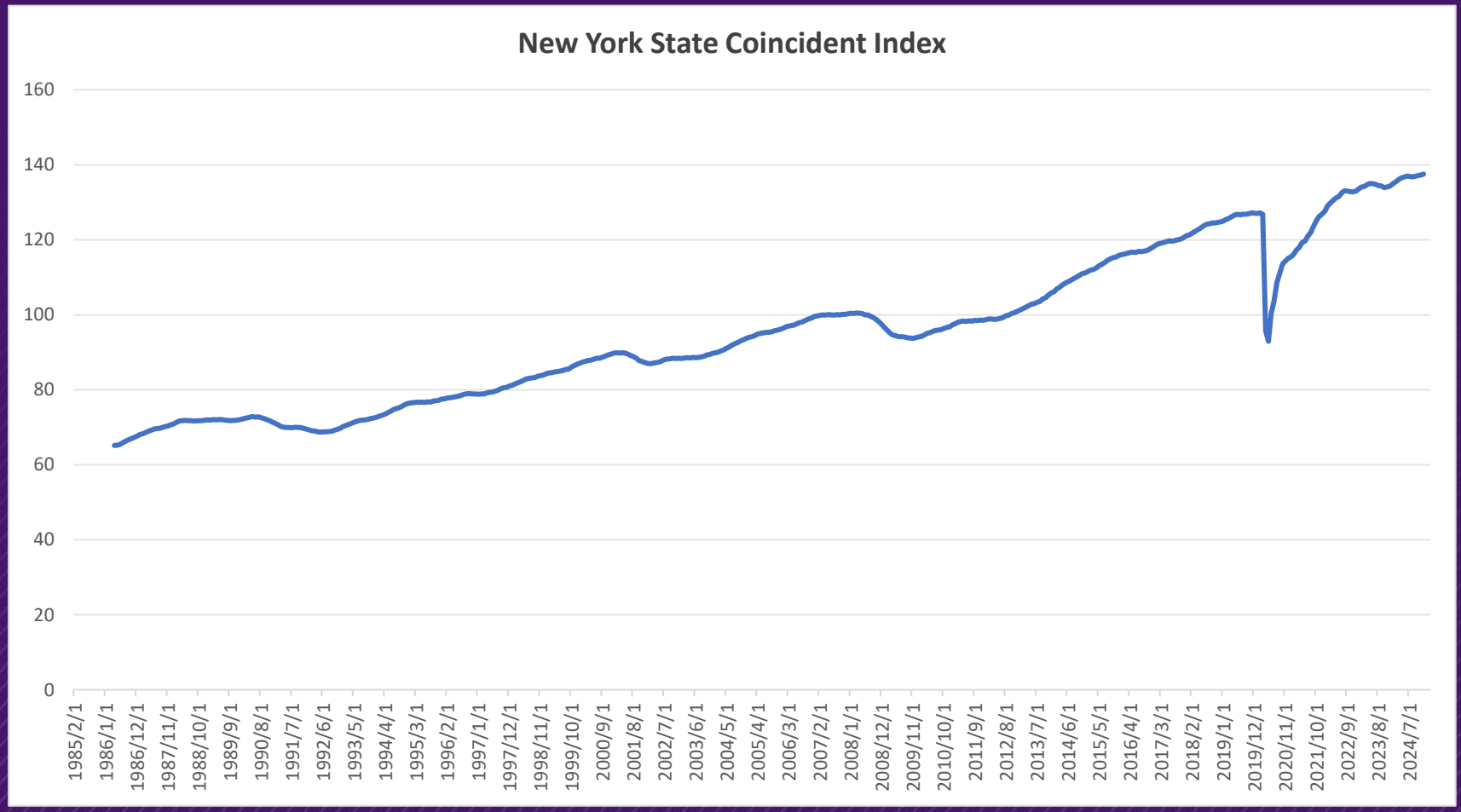
- Electricity generation is stable



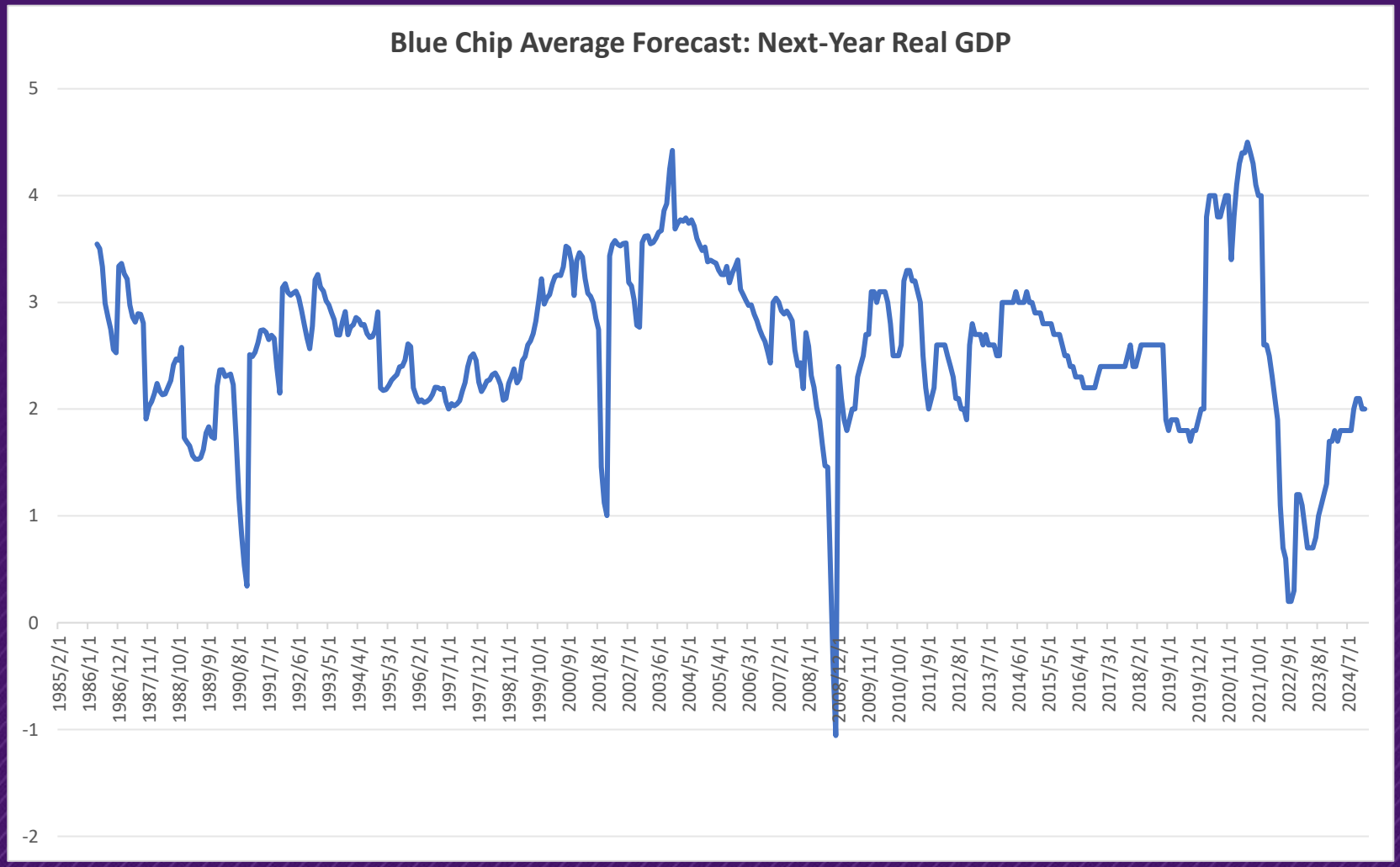
- Average consumer expectation for business condition (Michigan consumer sentiment) is recovering.



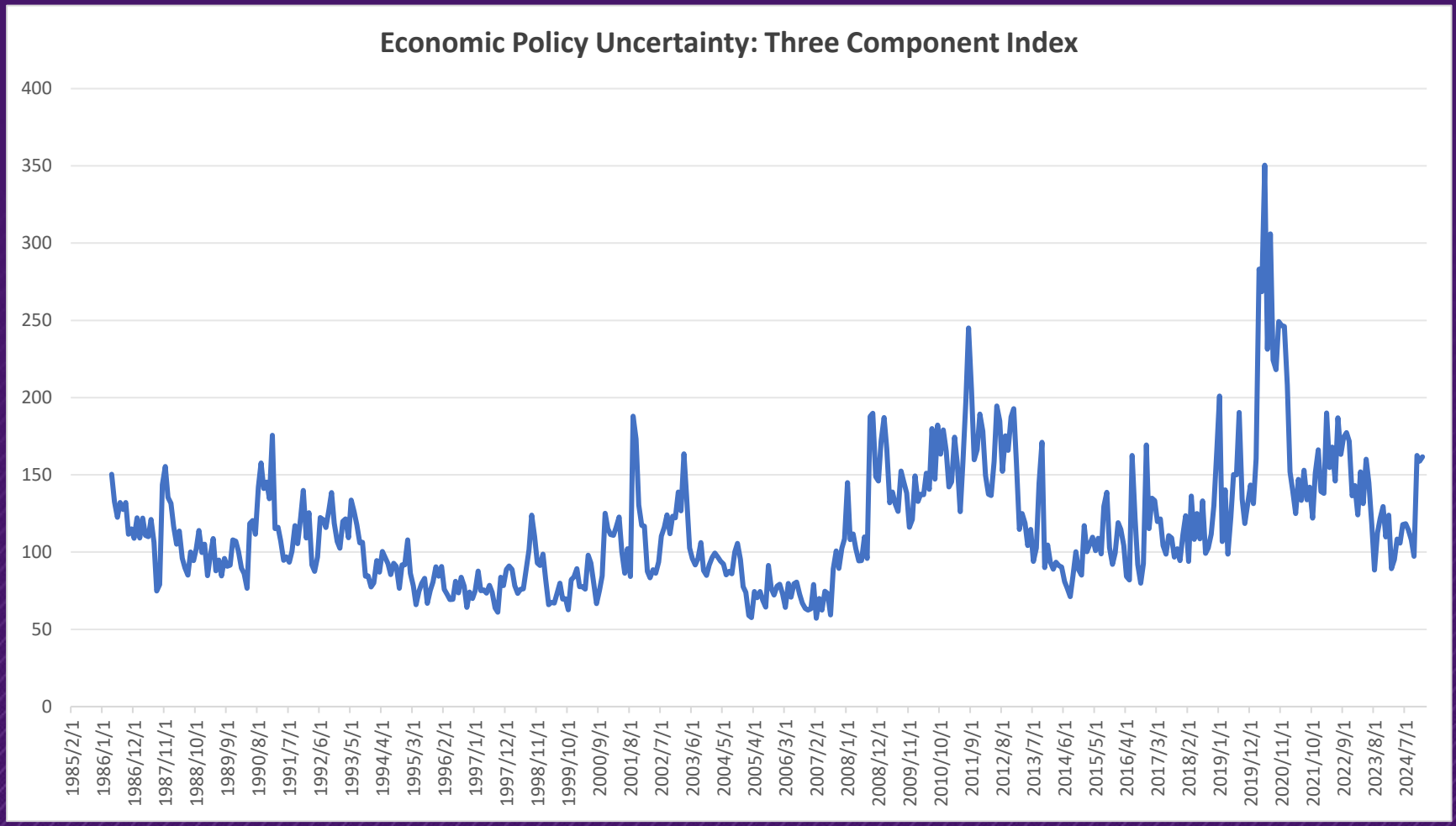
- Philly Fed's New York coincident index is at trend level.



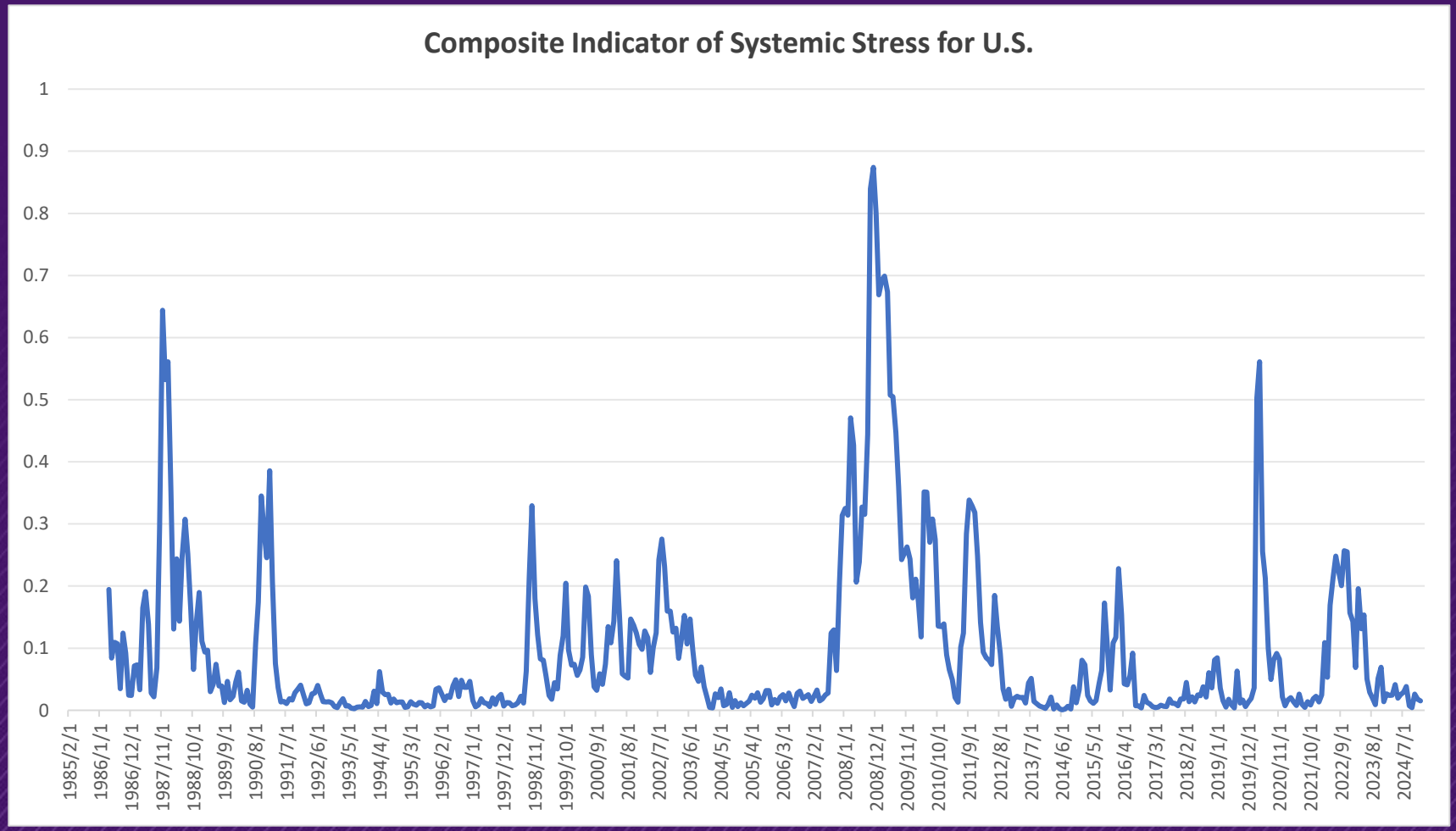
- The Blue Chip average forecast of real GDP for next year is around 2%



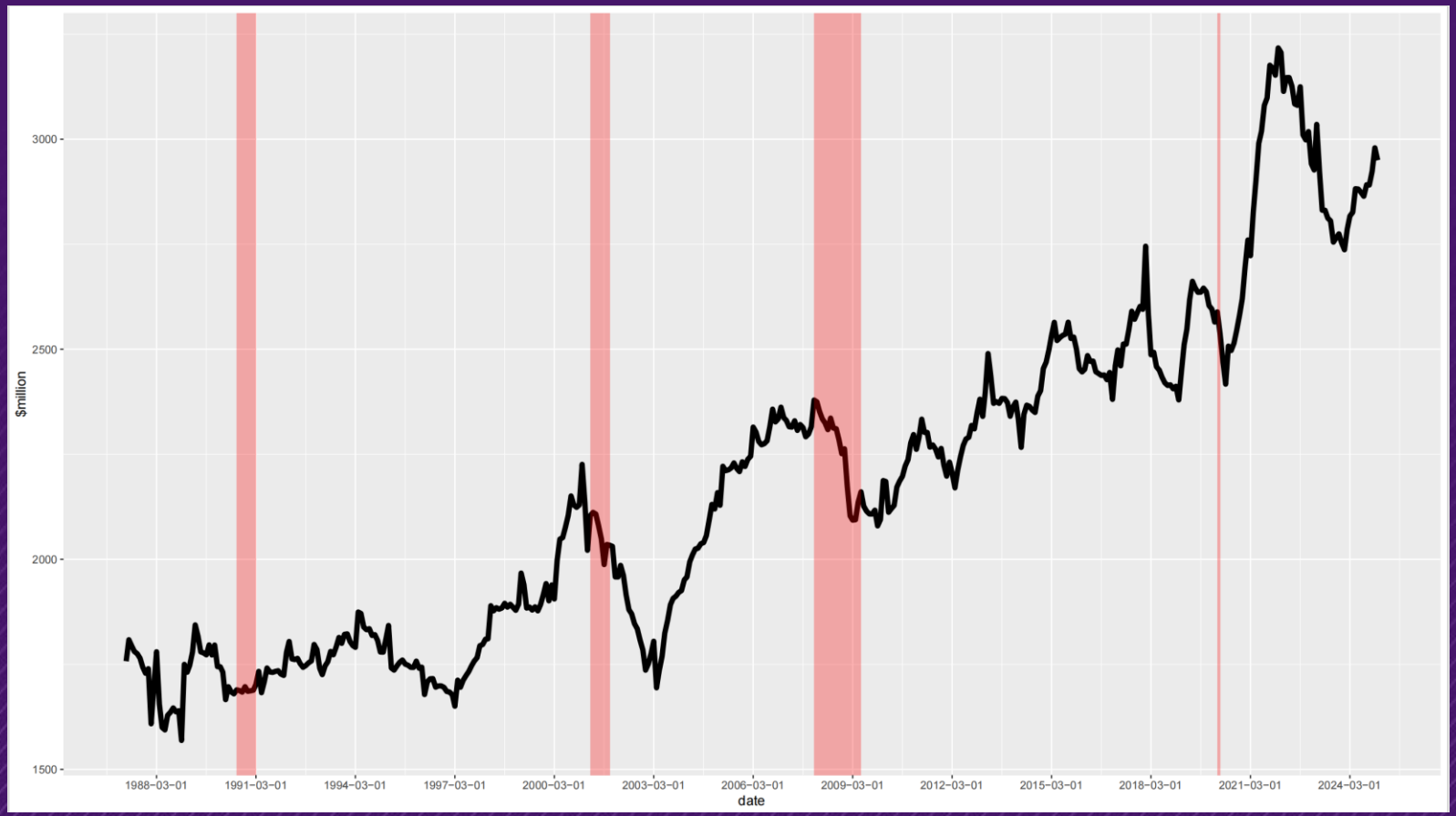
- The economic policy uncertainty index has went up.



- **Composite Indicator of Systemic Stress (CISS) for U.S. is low.**



- The monthly taxes from New York tax department is quite volatile.



We have enriched our dataset a little more recently, for example including CISS shown earlier

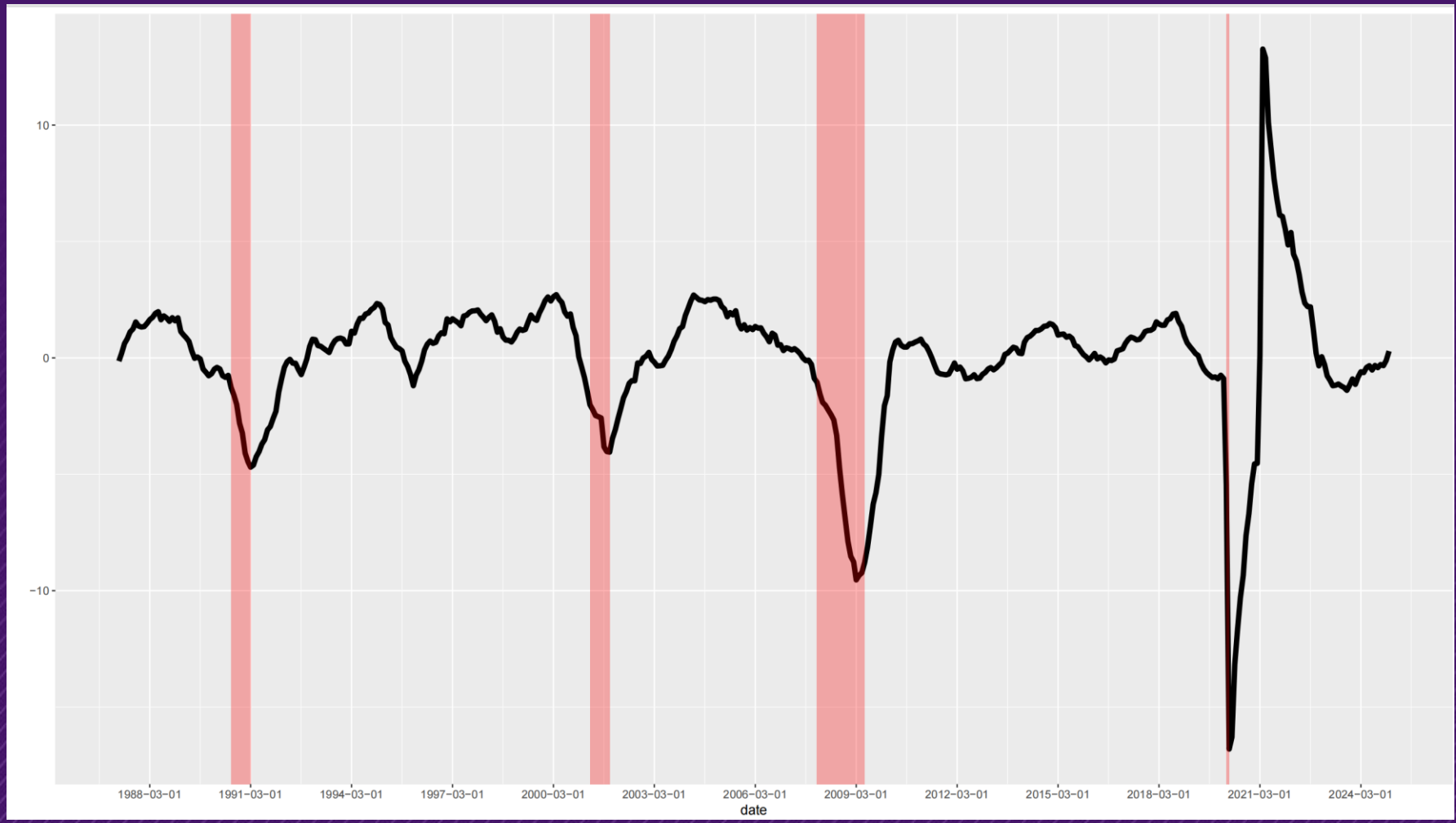
Variable	Source	Frequency	Transform	Note
Monthly tax variable	Department of Taxation and Finance	M	4	tax
Annual tax variable	Department of Taxation and Finance	A	5	tax
Tax policy variable	New York State Division of the Budget; National Association of State Budget Officers	A	1	policy
Existing home sales: single family	National Association of Realtors	M	1	NY
Median sales price existing single-family homes	National Association of Realtors	M	1	NY
Real estate: FHFA house price index - new and existing buildings - all transactions	U.S. Federal Housing Finance Agency	Q	1	NY
New York State total electric generation	New York Independent System Operator	M	0	NY
New York State personal income	U.S. Bureau of Economic Analysis	Q	1	NY
Auto traffic: six PANYNJ crossings	The Port Authority of New York and New Jersey	M	3	NY
Truck traffic, six PANYNJ crossings	The Port Authority of New York and New Jersey	M	3	NY
State coincident index-New York	Federal Reserve Bank of Philadelphia	M	1	NY
Total housing permits: New York	U.S. Census Bureau	M	2	NY
Initial claims: New York	U.S. Employment and Training Administration	M	3	NY
Business leaders survey: future business activity	Federal Reserve Bank of New York	M	0	NY
Early benchmarked employment: New York State	Bureau of Labor Statistics	M	1	NY
Capacity utilization-total industry	U.S. Board of Governors of the Federal Reserve System	M	1	US
Personal consumption expenditures	US. Bureau of Economic Analysis	M	1	US
Personal income	US. Bureau of Economic Analysis	M	1	US
Personal saving rate	US. Bureau of Economic Analysis	M	0	US
Leading economic index	The Conference Board	M	1	US

Variable	Source	Frequency	Transform	Note
Transportation service index: total	Bureau of Transportation Statistics	M	1	US
Blue Chip real GDP forecast: current year	Blue Chip Economic Indicators	M	0	US
Blue Chip real GDP forecast: next year	Blue Chip Economic Indicators	M	0	US
SPF probability of decline in real GNP/GDP in next quarter	Federal Reserve Bank of Philadelphia	M	0	US
OECD business confidence Index: U.S.	Organization for Economic Co-operation and Development	M	0	US
Overall economic policy uncertainty index	Economic Policy Uncertainty	M	0	US
Total employees: whole sales trade, retail trade and other services	Bureau of Labor Statistics	M	1	US
Moody's seasoned Aaa corporate bond minus 10-Year treasury constant maturity rate	Moody's ; U.S. Board of Governors of the Federal Reserve System	M	0	US
Travel in millions of vehicle miles	U.S. Department of Transportation	M	1	US
ISM manufacturing employment index	Institute for Supply Management	M	0	US
ISM manufacturing inventory index	Institute for Supply Management	M	0	US
ISM manufacturing prices index	Institute for Supply Management	M	0	US
ISM manufacturing new export orders index	Institute for Supply Management	M	0	US
ISM manufacturing import index	Institute for Supply Management	M	0	US
ISM non-manufacturing new orders index	Institute for Supply Management	M	0	US
ISM non-manufacturing employment index	Institute for Supply Management	M	0	US
Withheld income and employment federal taxes	U.S. Treasury	M	1	US
Continued claims of unemployment insurance	U.S. Employment and Training Administration	M	3	US
Employment level	U.S. Bureau of Labor Statistics	M	1	US
NEW CISS - composite indicator of systemic stress for U.S.	European Central Bank	M	0	US

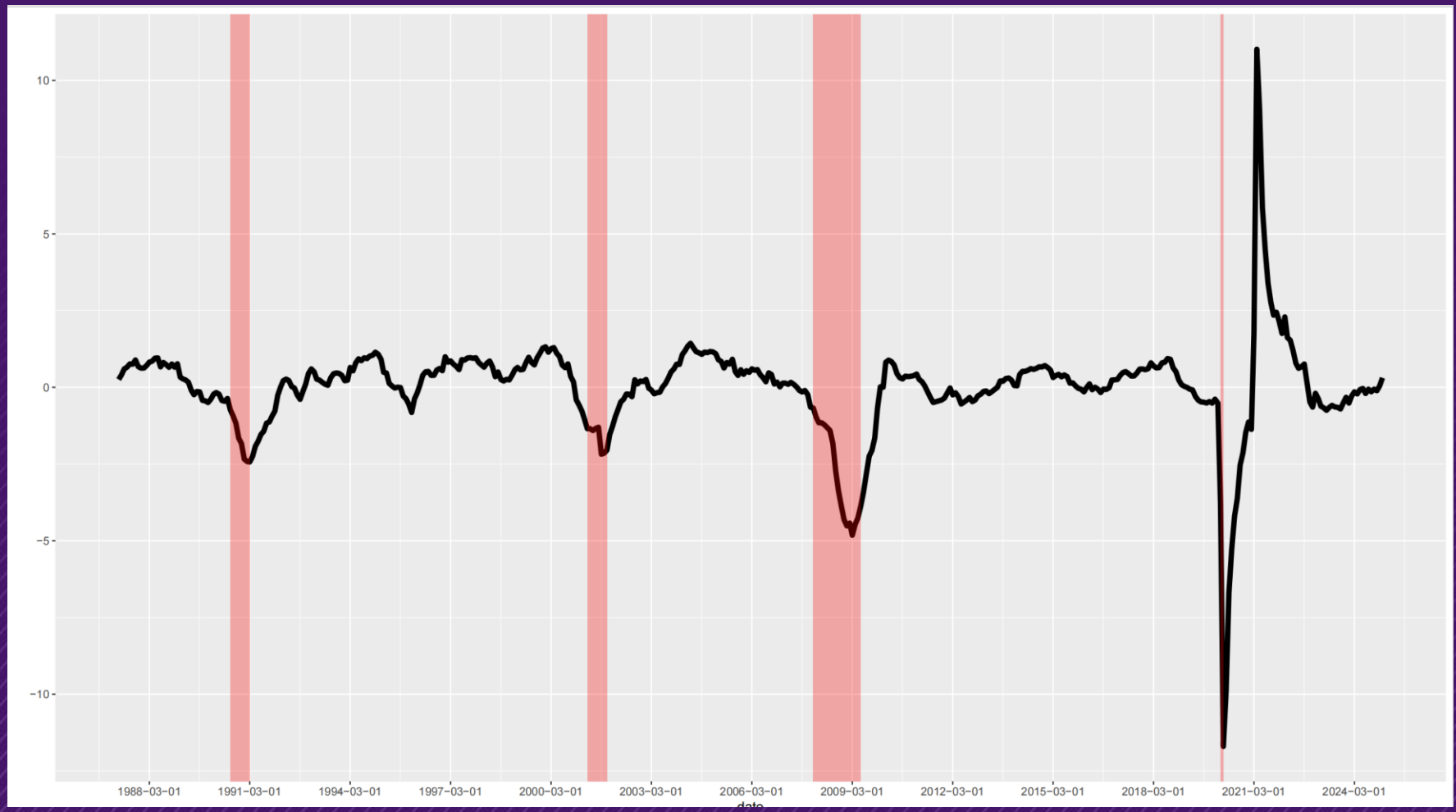
NEWER FACTOR MODELS

- We have been estimating a US factor and NY factor for our forecasting models
- Recently we have adopted a more recent dynamic factor model by Cascaldi-Garcia et al. (2024), where the two factors are estimated jointly.

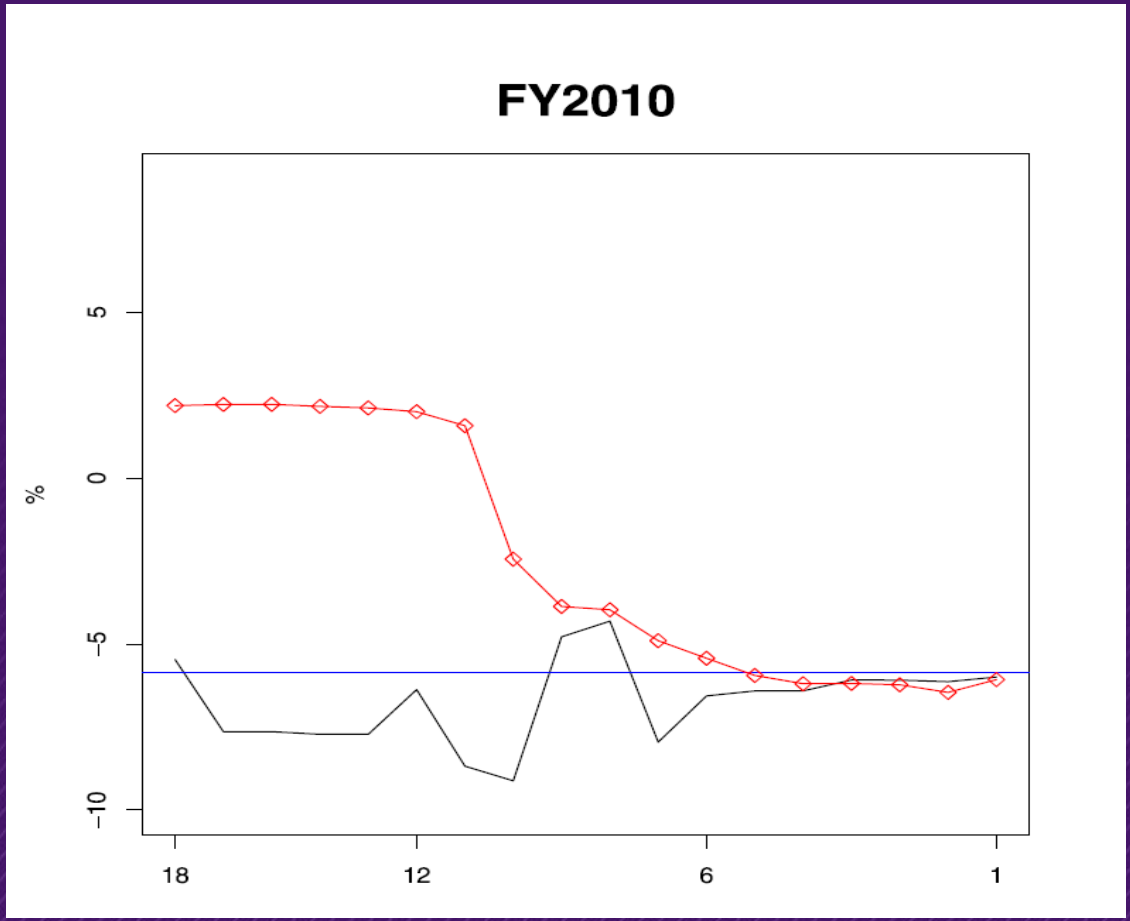
US Composite Factor is slowly increasing



New York Composite Factor is slowly increasing



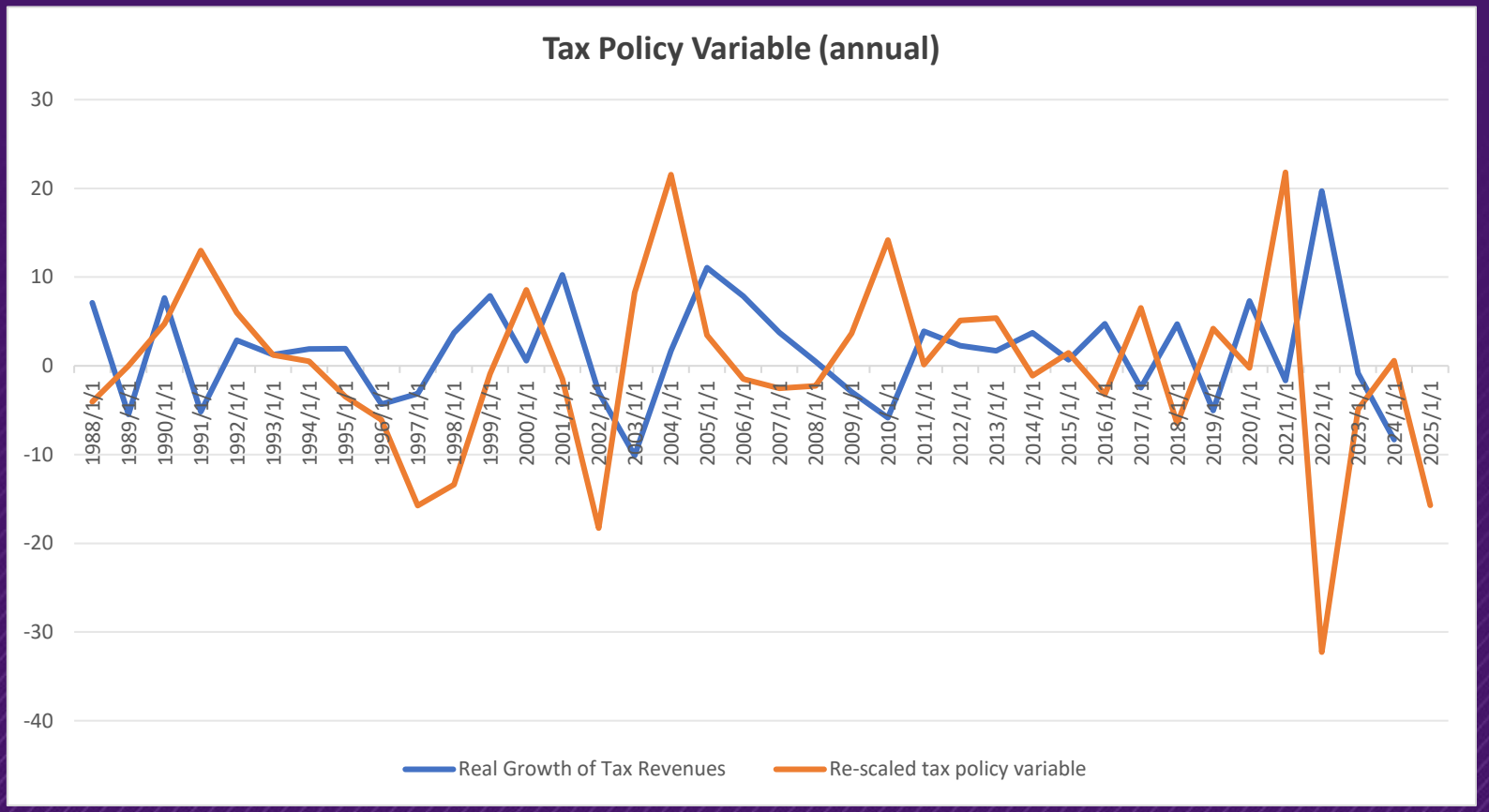
- Our model used many leading indicators, and was able to reduce forecast errors during recessions



Source: Lahiri and Yang (2022). Black line represents our forecasts; Red line with square represents forecasts of a benchmark model without the leading indicators; Blue line is the actual value.

- Three ADL-MIDAS models: one with monthly tax variable as predictor, one with US factor, one with NY factor. All three models have lagged dependent variable and the tax policy variable also on the right-hand side as predictors. Each model looks like the following
- Building on multiple sources (NASBO, DOB, Ways and Means, Senate Finance, Urban Institute, etc.), we created an additional "policy change" variable that captures experts' judgements on the anticipated effects of recent tax policy changes on tax revenues for the next FY, and used it as one of the predictors in our model
- We also estimate the forecast uncertainty with bootstrap.

- Our tax policy variable



Our Model

- The ADL-MIDAS model is defined as

$$y_{t+h} = \alpha + \sum_{j=0}^{n_y} \gamma_j y_{t-t_0-j} + \Phi(L;\beta,\theta) z_{t+\omega+1} + b_1 p_{t+\omega} + \epsilon_{t+h},$$

$$t = 12,24,36, \ldots$$

- y_{t+h} is annual tax revenue growth; $z_{t+\omega+1}$ is one of the three monthly predictors with information available until $t+\omega+1$, which is aggregated by $\Phi(L;\beta,\theta)$, a lag distribution with parameters θ and coefficient β; $p_{t+\omega}$ is our tax policy variable.

Our Model

- At each time $t + \omega$, forecast combination weights are computed:

$$\boldsymbol{w}_{+\omega t}^{h-\omega} = argmin_{\boldsymbol{w}}\, \boldsymbol{w}'\, \widehat{\Omega}_{t+\omega}^{\{h-\omega\}} \boldsymbol{w}$$

$$\boldsymbol{s.t.} \sum_{t=1}^{3} \boldsymbol{w_i} = \boldsymbol{1}$$

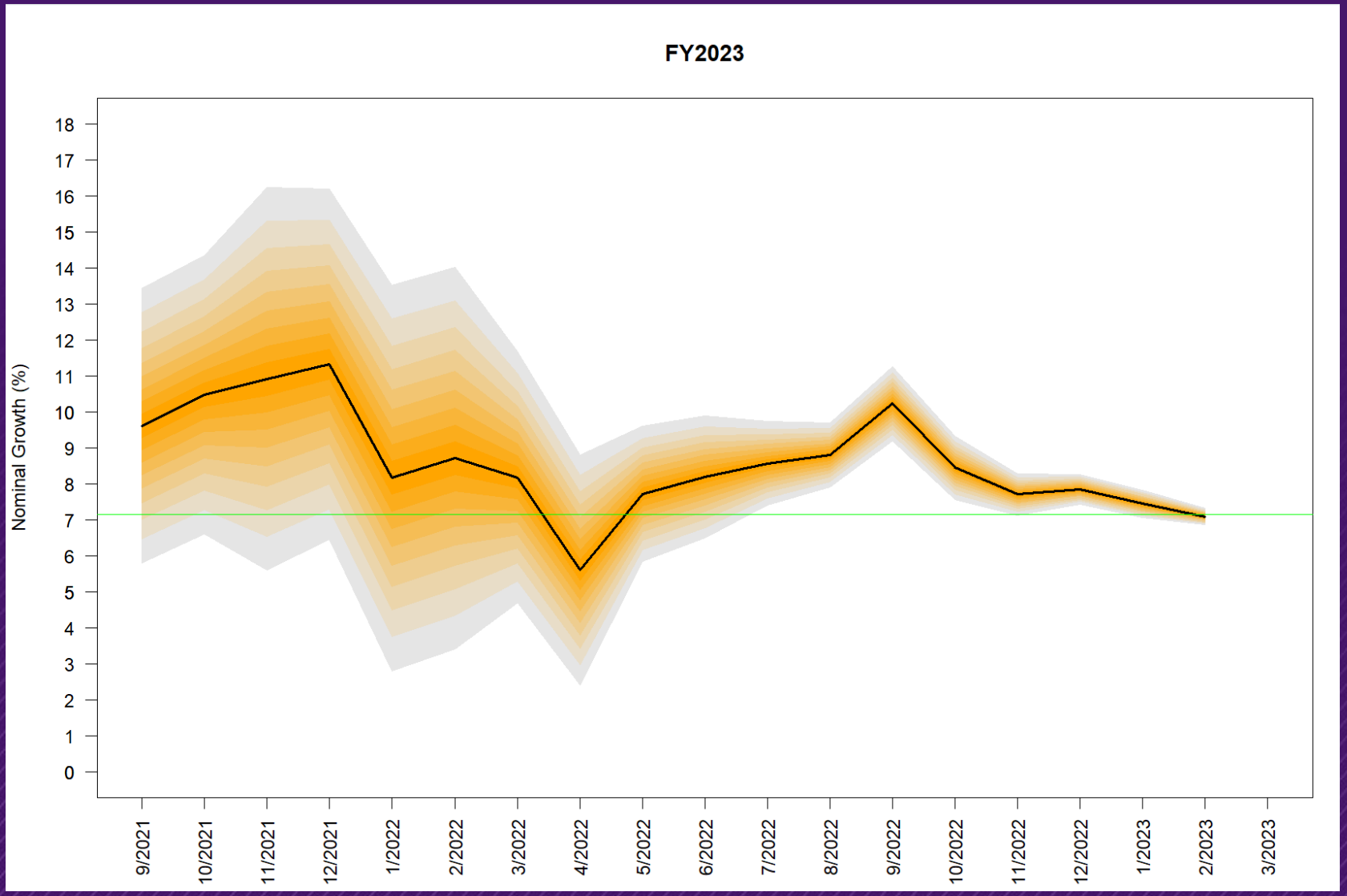
$$\boldsymbol{w_i} \geq \boldsymbol{0}, \forall \boldsymbol{i}$$

$\widehat{\Omega}_{t+\omega}^{h-\omega}$ is estimated variance-covariance matrix of forecast errors of the three models.

- The three models are combined:

$$\tilde{y}_{t+h|t+\omega} = \sum_{i=1}^{3} \omega_{i,t+\omega}^{\{h-\omega\}}\ \hat{y}_{i,t+h|t+\omega}$$

- The uncertainty of the combined forecast, $Var(\tilde{y}_{t+h|t+\omega})$, is estimated by bootstrap using Hounyo and Lahiri (2023)


FY2023
Nominal Growth (%)
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
9/2021
10/2021
11/2021
12/2021
1/2022
2/2022
3/2022
4/2022
5/2022
6/2022
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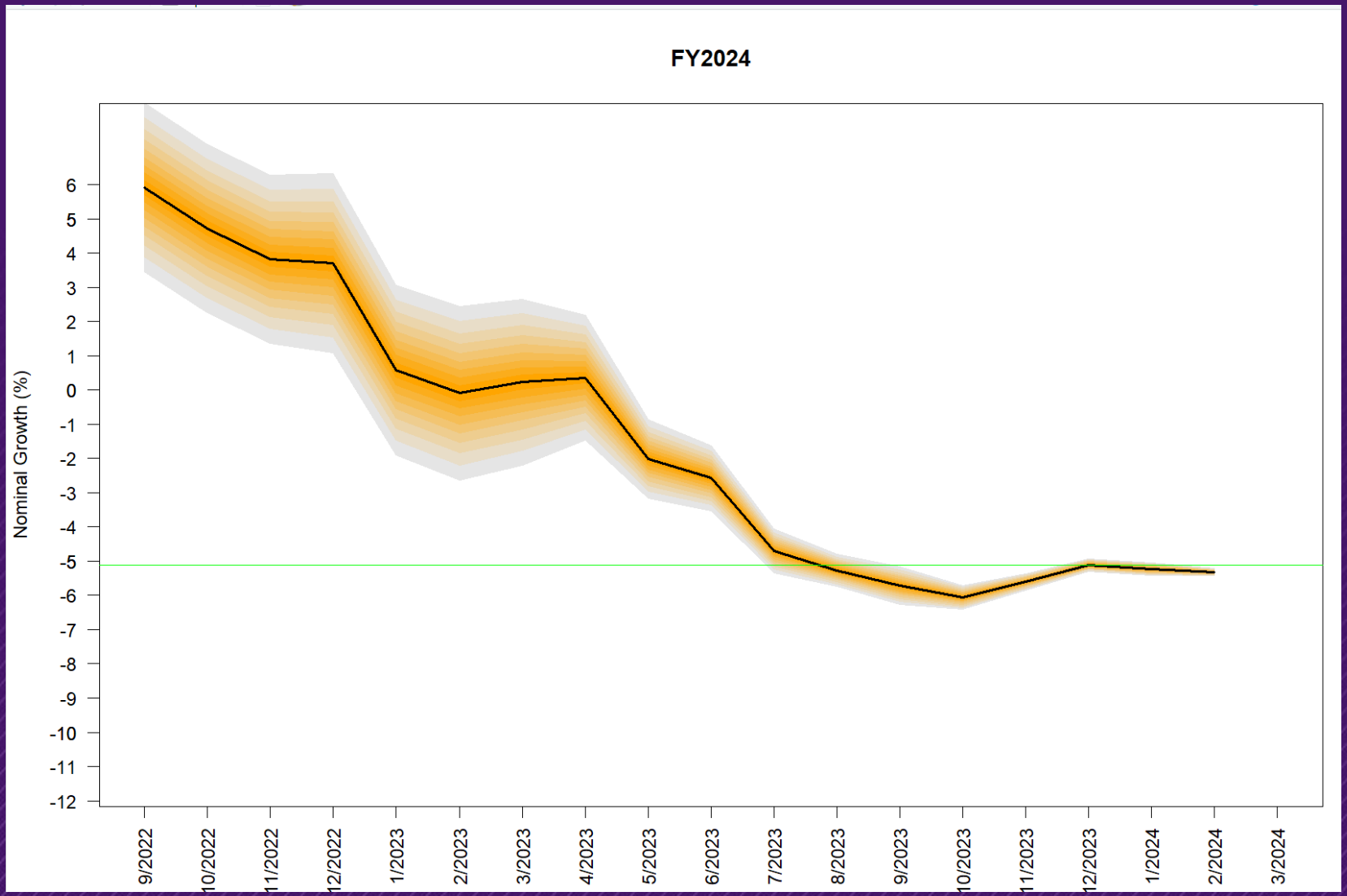
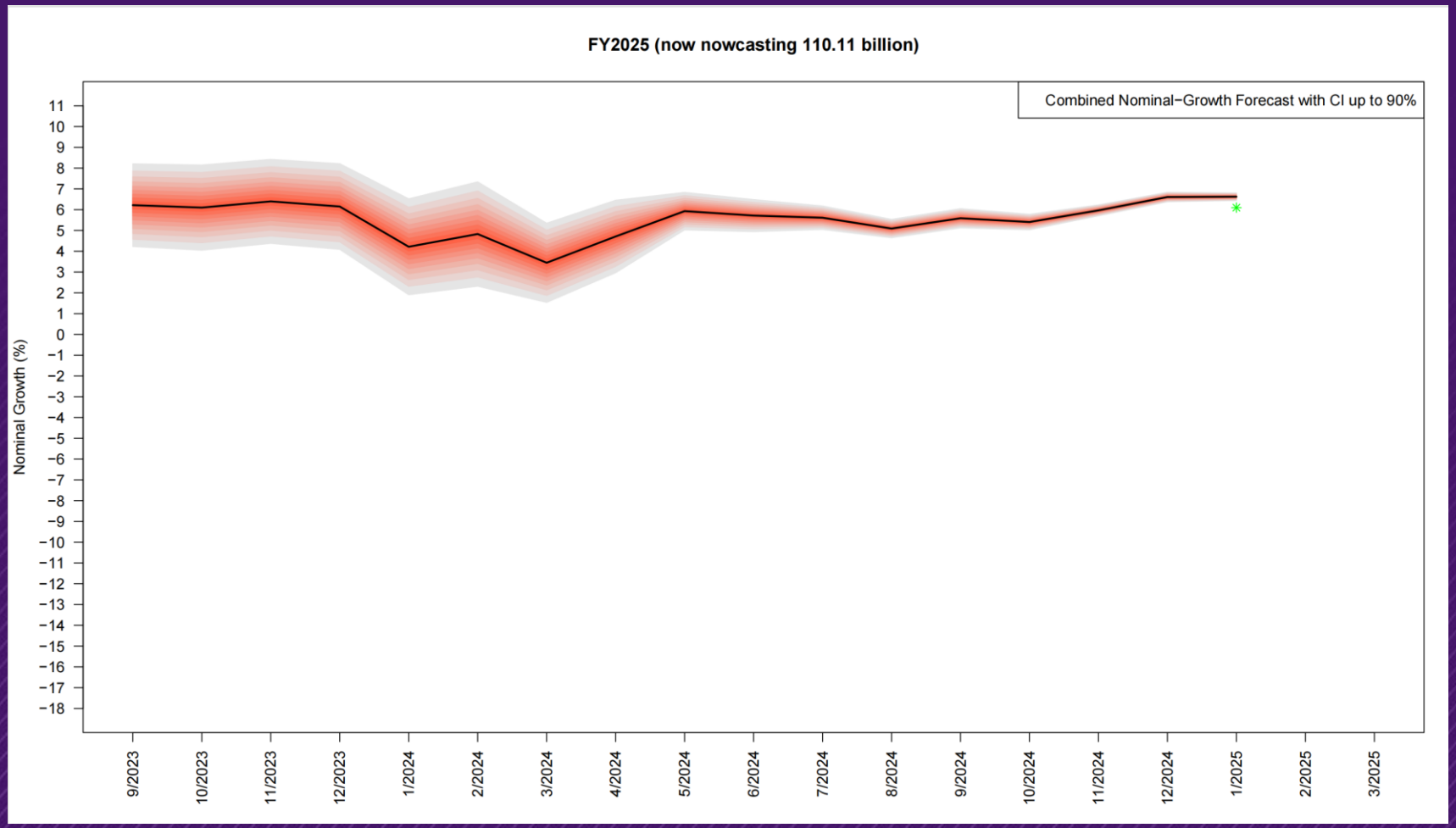
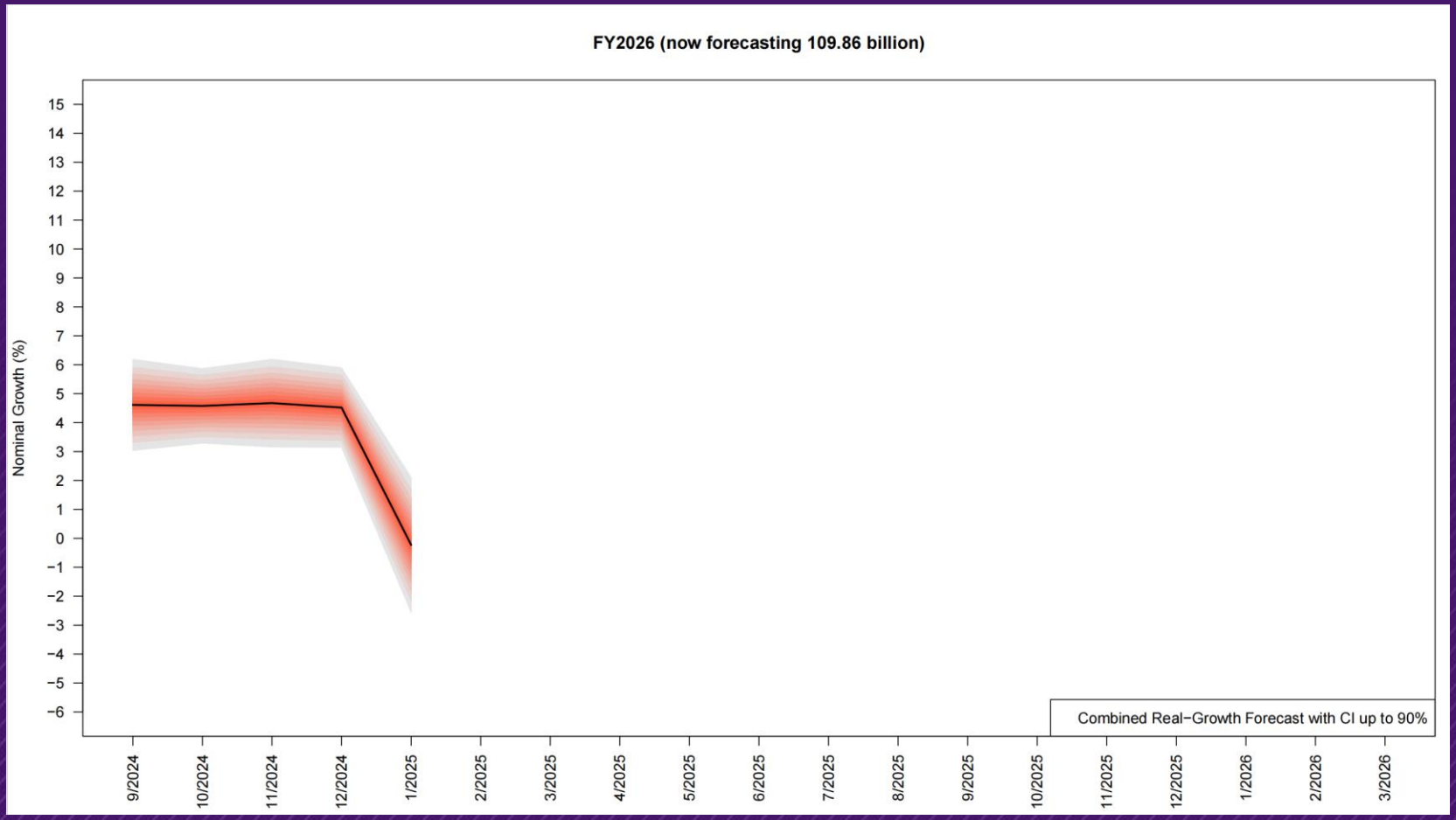
11/2022
12/2022
1/2023
2/2023
3/2023


FY2024
Nominal Growth (%)
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
-8
-9
-10
-11
-12
9/2022
10/2022
11/2022
12/2022
1/2023
2/2023
3/2023
4/2023
5/2023
6/2023
7/2023
8/2023
9/2023
10/2023
11/2023
12/2023
1/2024
2/2024
3/2024

- Our nominal-growth nowcast of tax revenues for FY2025 is currently -6.52% (or $110.11 billion, not excluding PTET (Pass Through Entity Tax) or other things)



- Our nominal-growth forecast of tax revenues for FY2026 is currently -0.15% (or 109.86 billion, not excluding PTET or other things).



Tax growth and NY coincident index growth

- Our current 14-month-ahead forecast for FY 2026 is at -0.15% (nominal growth), that translates into $109.86 billion based on the $110.11 billion nowcast for FY 2025 (using tax department tax revenue data that includes PTET).