

# REMI RESEARCH & DEVELOPMENT

Jerry Hayes, Senior Vice President of Research & Development

# Agenda

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Introduction

New features and changes

Looking into 2024

*what does **REMI** say?<sup>sm</sup>*

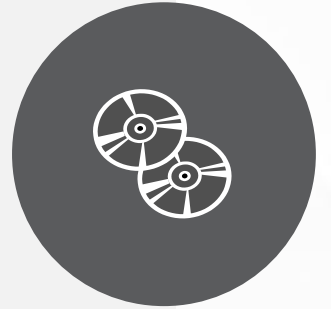


## Model Development

- Annual data updates
- National forecast
- Research

## Model Fulfillment

- Building
- Testing
- Shipping



## Software Development

- New features
- Software improvements
- New products

## More

- Internal projects
- Model support
- More



# Agenda

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Introduction

Reviewing 2023

Looking into 2024

*what does **REMI** say?<sup>sm</sup>*

- Incorporated BLS 2021-2031 employment projections
- BEA Personal Income by County 2001-2021 (Revised 2014-2020)
- BEA GDP by county to 2021 GDP (Revised 2017-2020)
- BEA Personal Consumption Expenditures by State (Revised 2014-2020)

- The Employment Projections (EP) program develops information about the labor market for the nation as a whole for 10 years in the future.
  - Supply and use tables from 1997-2021, 2031
  - Output and employment by sector, 2031
  - Employment by occupation, 2031
  - Labor force participation rate projections, 2022-2031

# BLS Supply and Use Table Changes

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- 'Scrap' and 'Used and Secondhand Goods' were combined
- 'Noncomparable Imports' and 'Rest of World Adjustment' were combined
- The new BLS input-output tables have intermediate demand values for the Private Households sector due to a change in methodology
- The BLS Chained Output and Chained Price Index has changed relative to previous years' releases. BLS says that is due to a change in methodology and now it matches the BEA price index more closely.

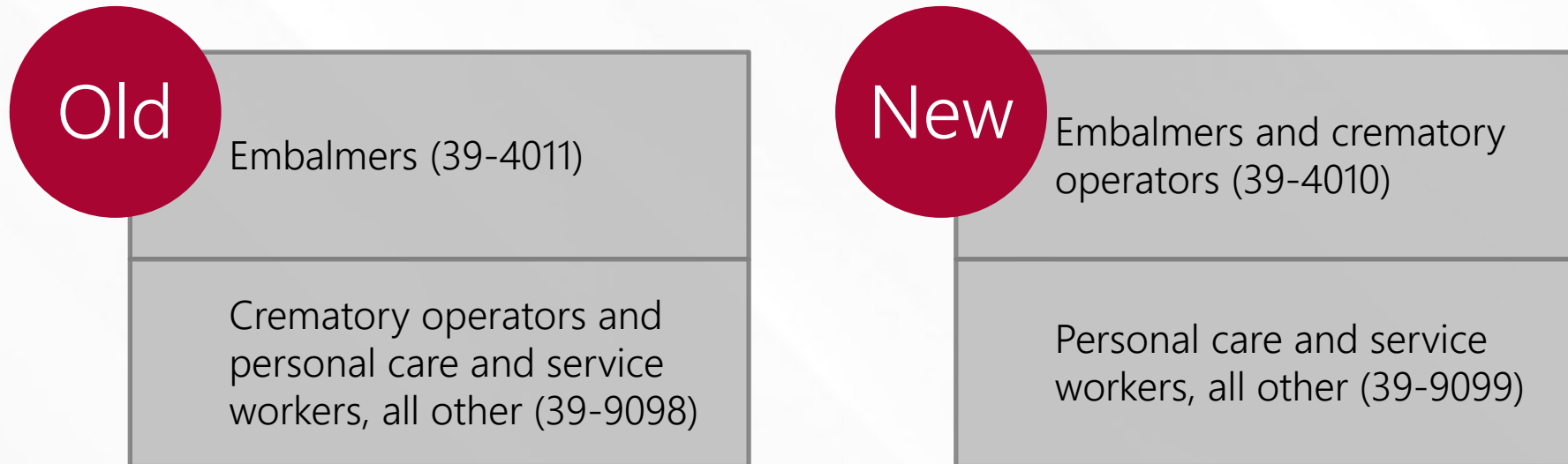
# Processing BLS Make and Use Tables

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- BLS provides make and use tables
- Needed to separate categories that BLS combined:
  - Scrap and Used and Secondhand Goods
  - Noncomparable Imports and Rest of World Adjustment
- Distribute trade and transportation margins to convert between purchaser's prices and producer's prices
- Create symmetric industry-industry input-output tables
- Aggregate to REMI sectors

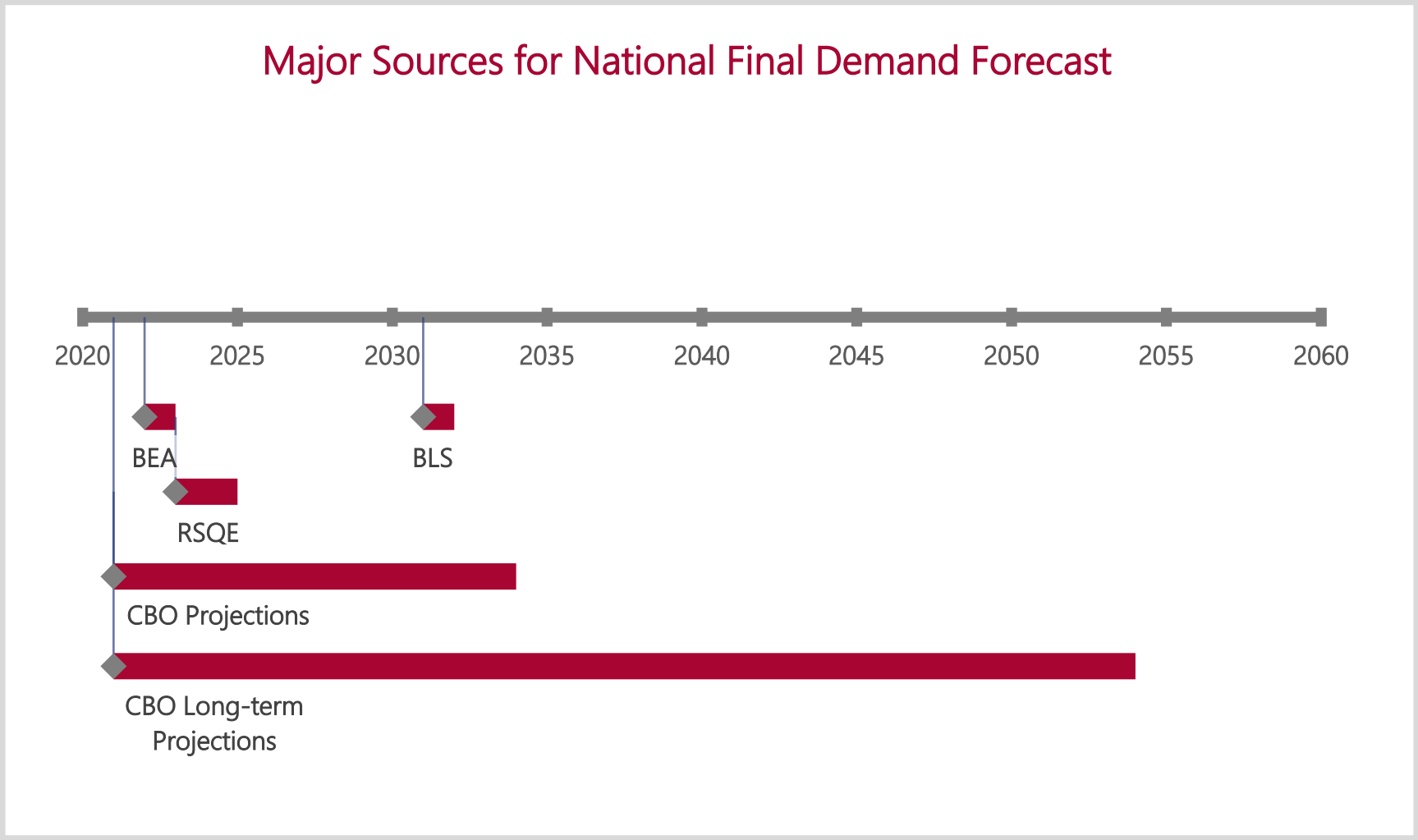


- Crematory operators are now grouped with Embalmers instead of Personal care and service workers



- REMI calibrates the national forecast using other datasets
  - BEA historical data (2022)
  - RSQE forecast (2023-2024)
  - BLS employment projections (2031)
  - CBO forecast (2021-2033)
  - CBO long-term projections (2021-2053)

# National Final Demand Forecast

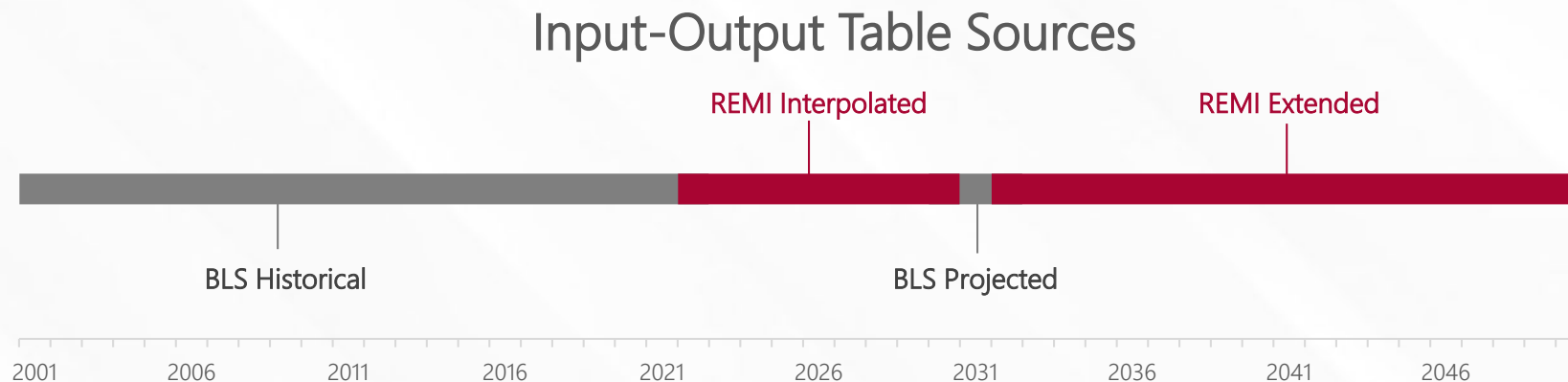


what does **REMI** say?<sup>sm</sup>

# BLS Inter-Industry Relationships



- BLS supplies make and use tables for 1997-2021, plus 2031 which REMI converts to symmetric input-output tables
- REMI interpolates tables between 2021 and 2031 and extends the tables beyond 2031



- Research Seminar in Quarterly Quantitative Economics releases a two year economic outlook four times a year.
- REMI uses the RSQE forecast to shape the short-term national forecast.

REMI Last History  
Year 2020

RSQE February 2022

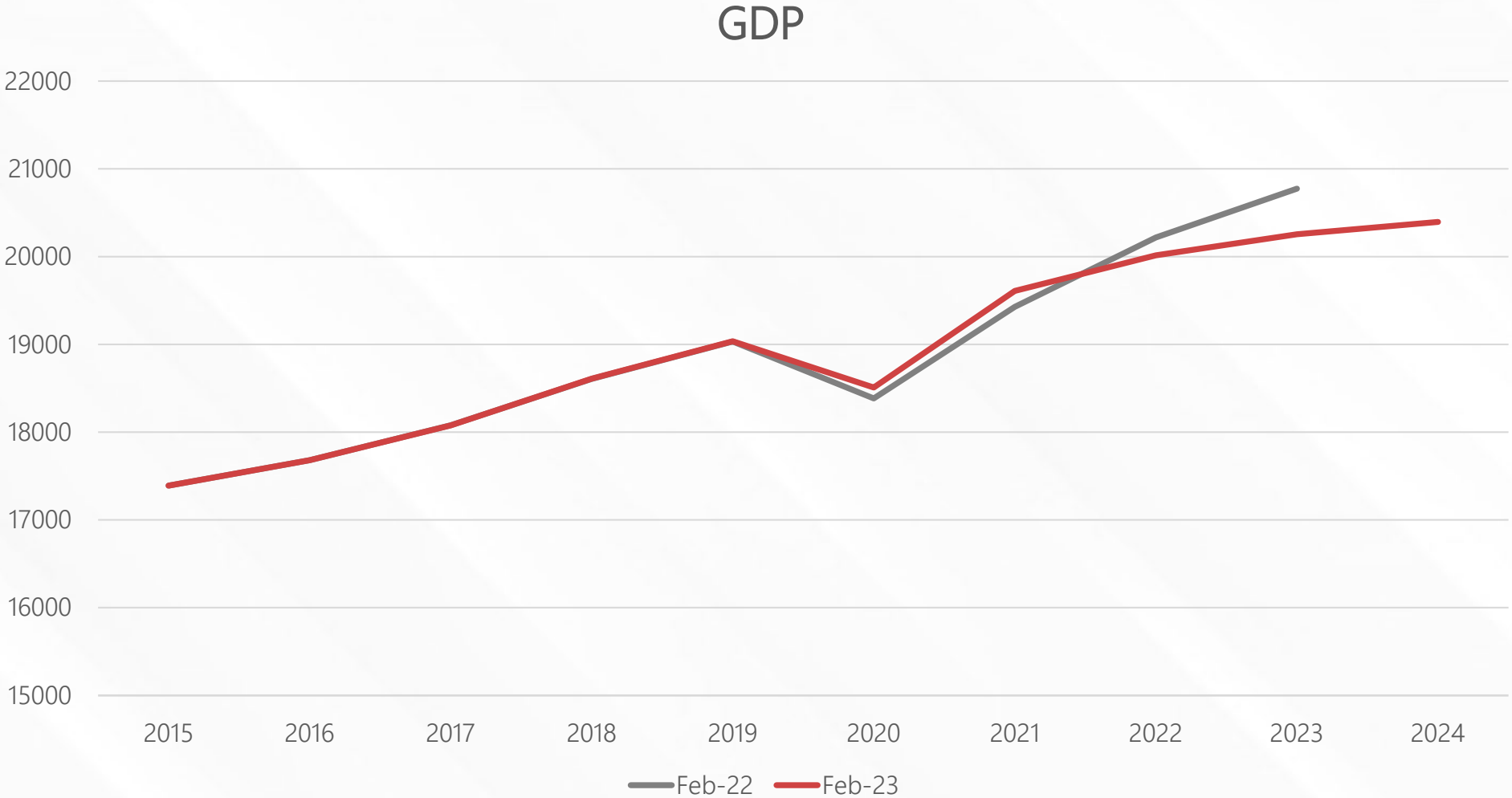
REMI Last History  
Year 2021

RSQE February 2023

- Debt ceiling standoff
- Inflation
- Interest Rates
- Failure of Silicon Valley Bank and Signature Bank and tightening credit standards
- Ukraine
- Labor market may be cooling

- “We expect the economy to soften by late 2023, driven by a slowdown in consumer spending. We expect a very modest increase in the unemployment rate, peaking at 4.1 percent in 2024.”
- “Many banks had already been tightening credit standards before the current stress episode began, and they are likely to tighten standards further to lower the average credit risk of their loan portfolios. This credit tightening will likely contribute to the slowdown in growth we are expecting.”

# GDP Comparison



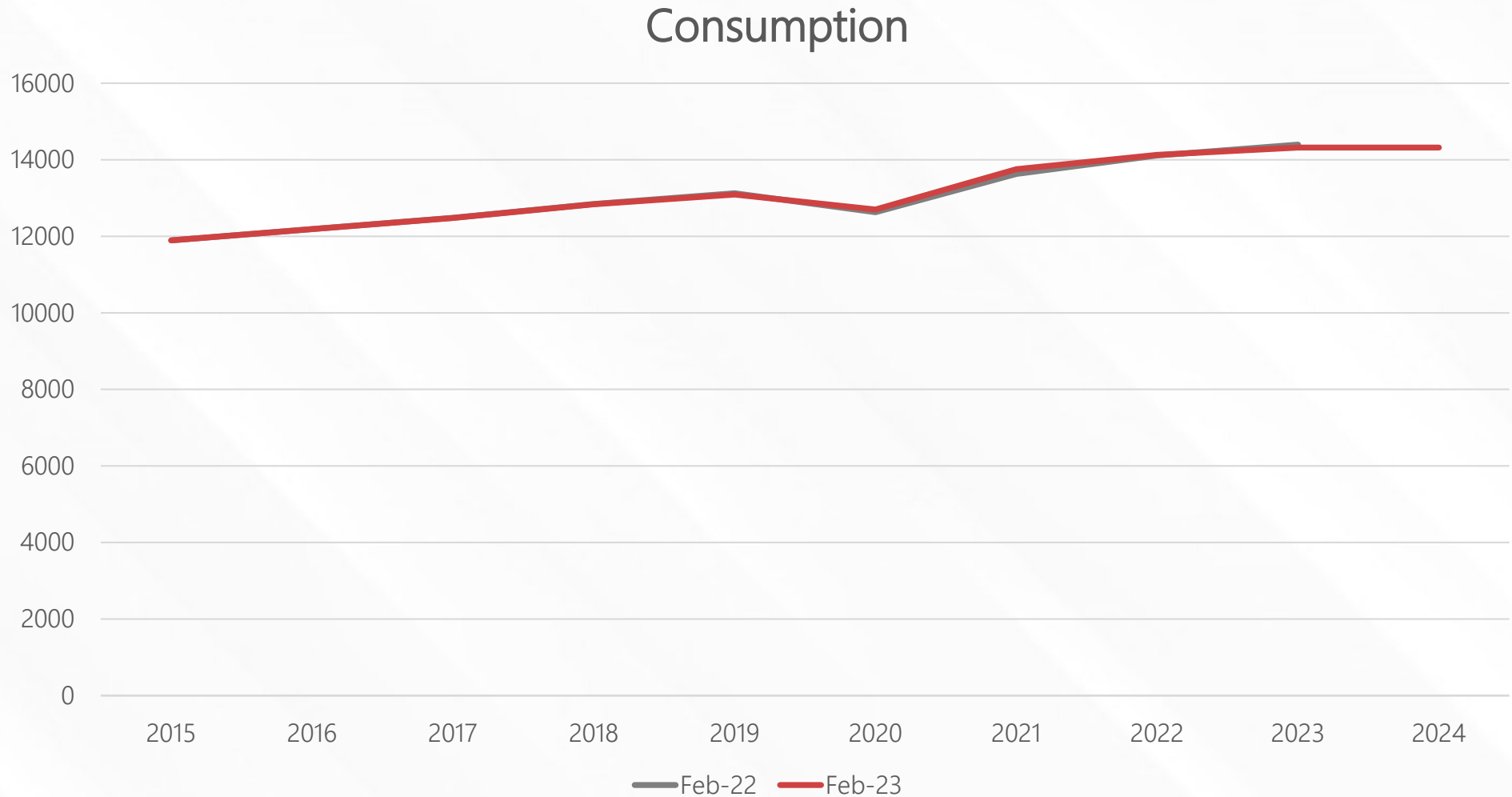
what does **REMI** say?<sup>sm</sup>



# Consumption Comparison



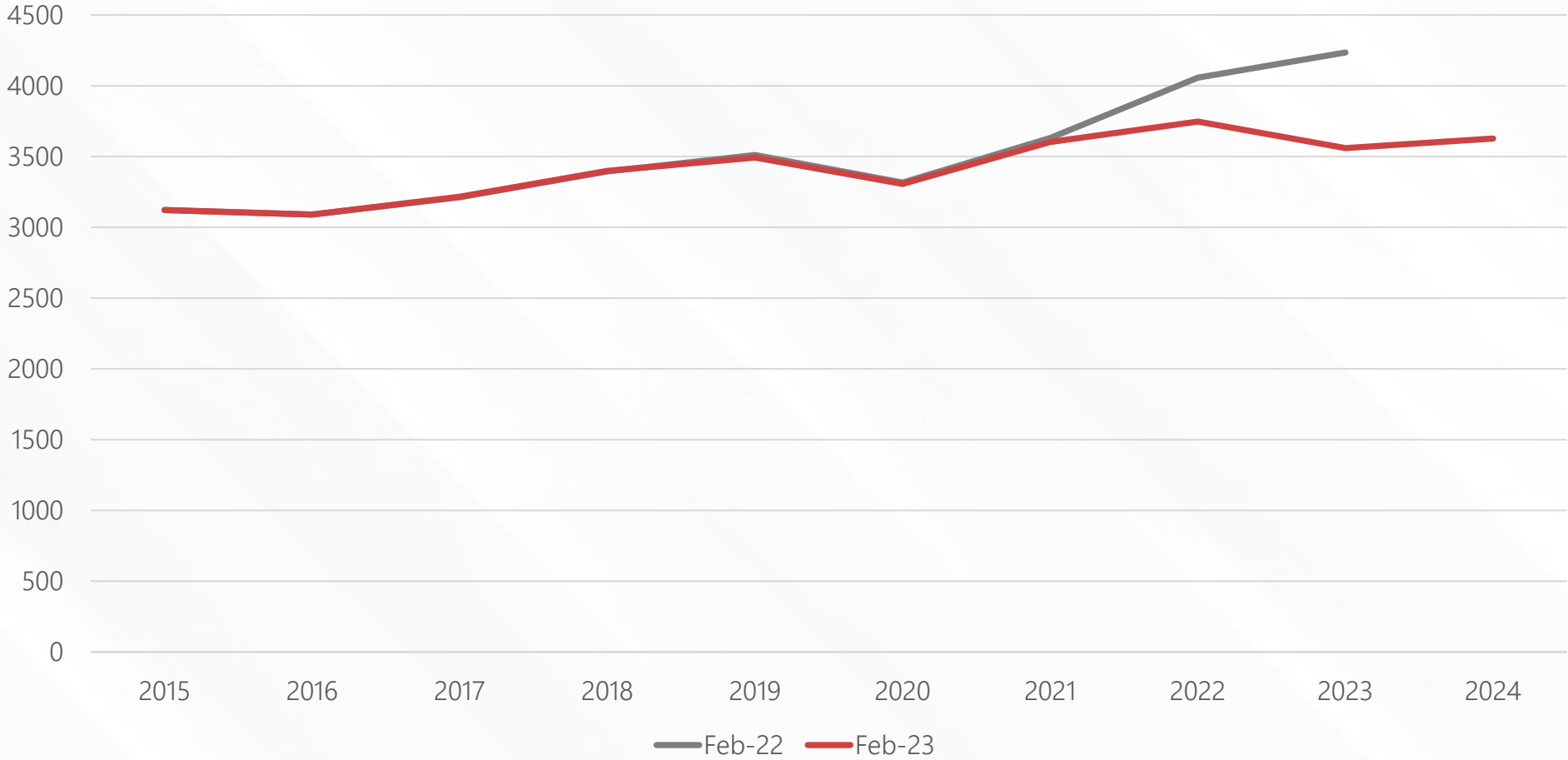
- RSQE:  
"We project consumption growth to falter between 2023Q2 and 2024H1, stalling out under the weight of stagnating real incomes and tightening credit standards."



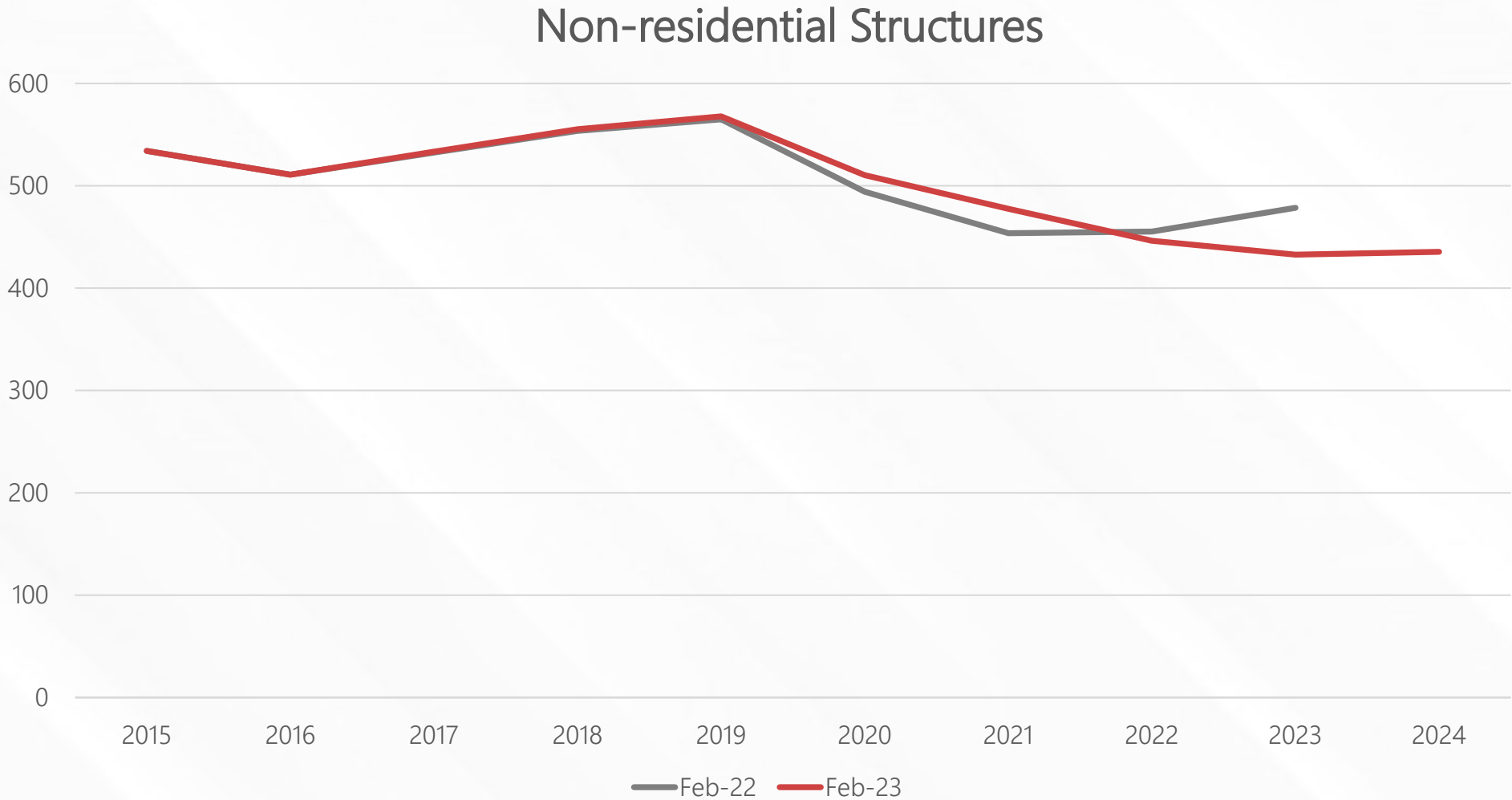
# Private Investment Comparison



### Private Investment



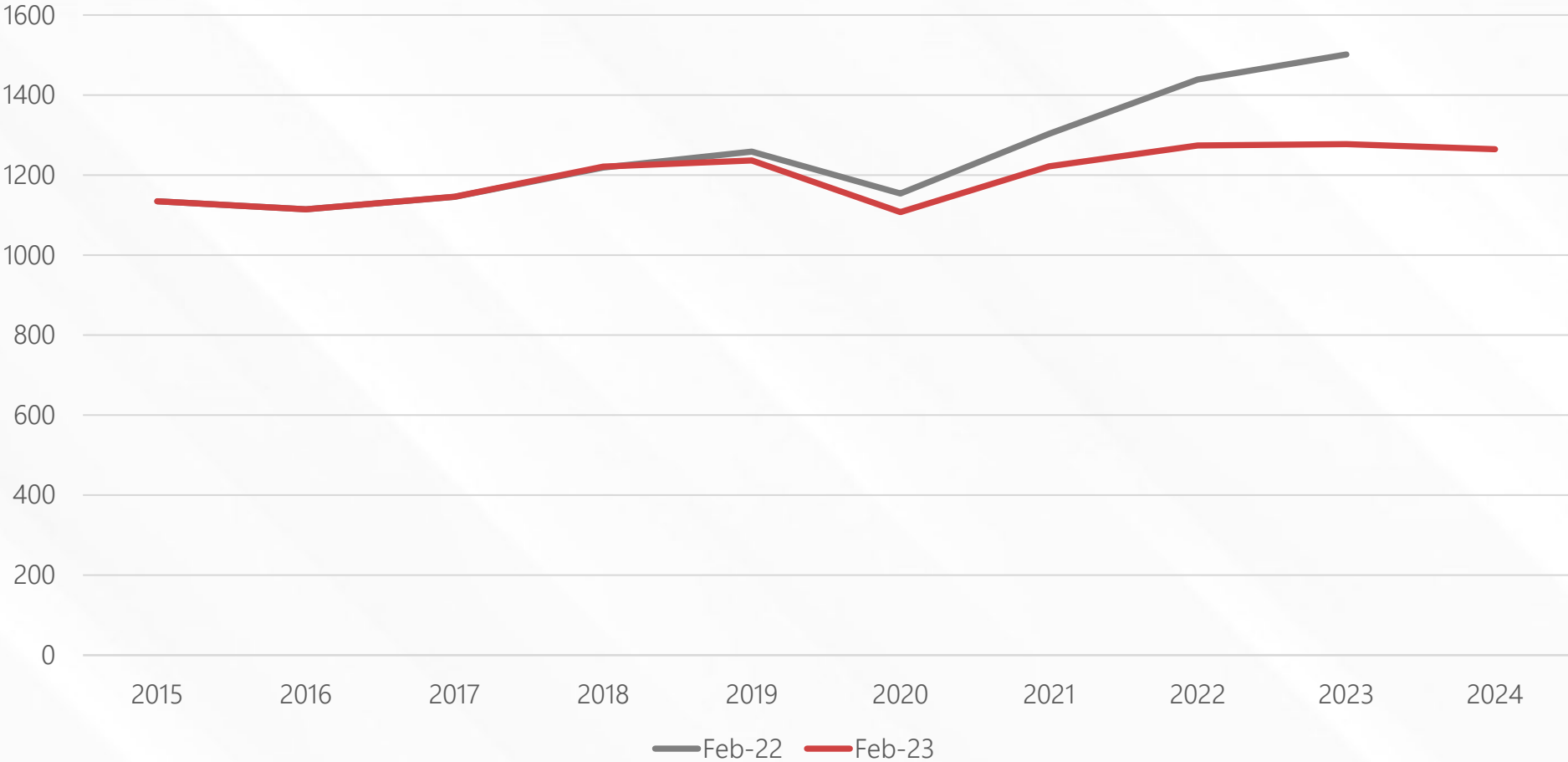
# Non-residential Structures Investment Comparison



# Non-residential Equipment Investment Comparison



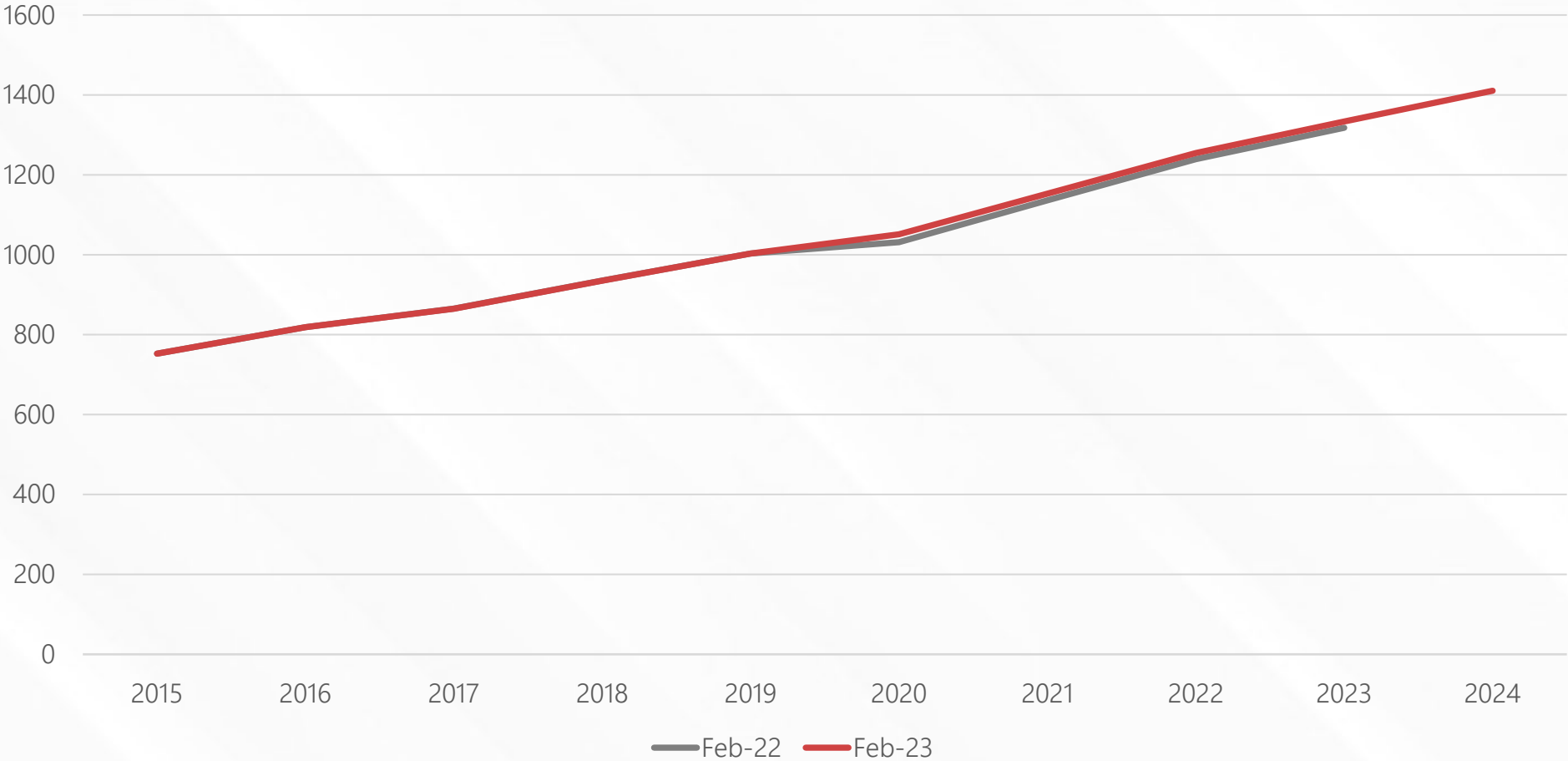
### Non-residential Equipment



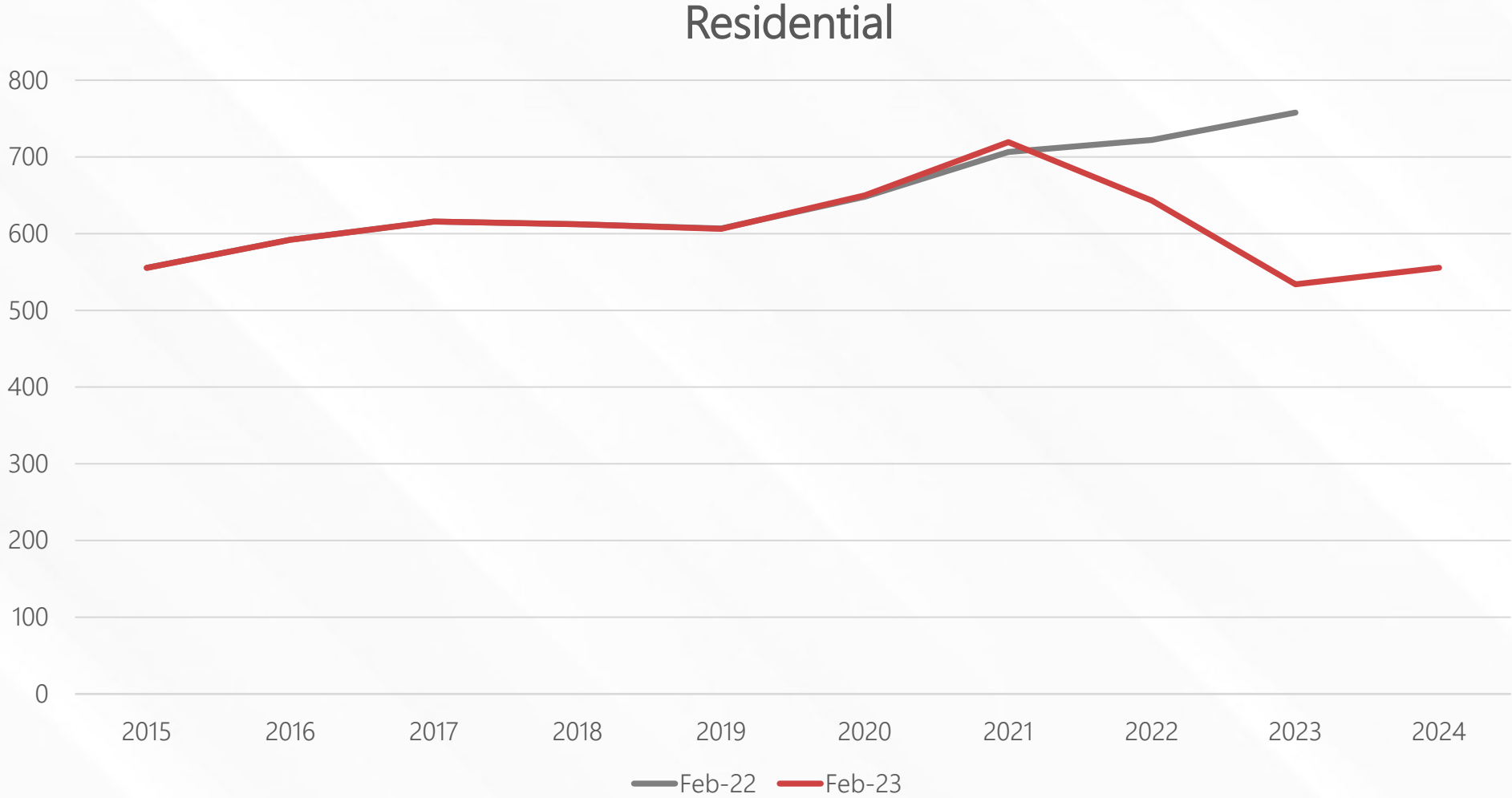
# Non-residential Intellectual Property Investment Comparison



## Non-residential Intellectual Property



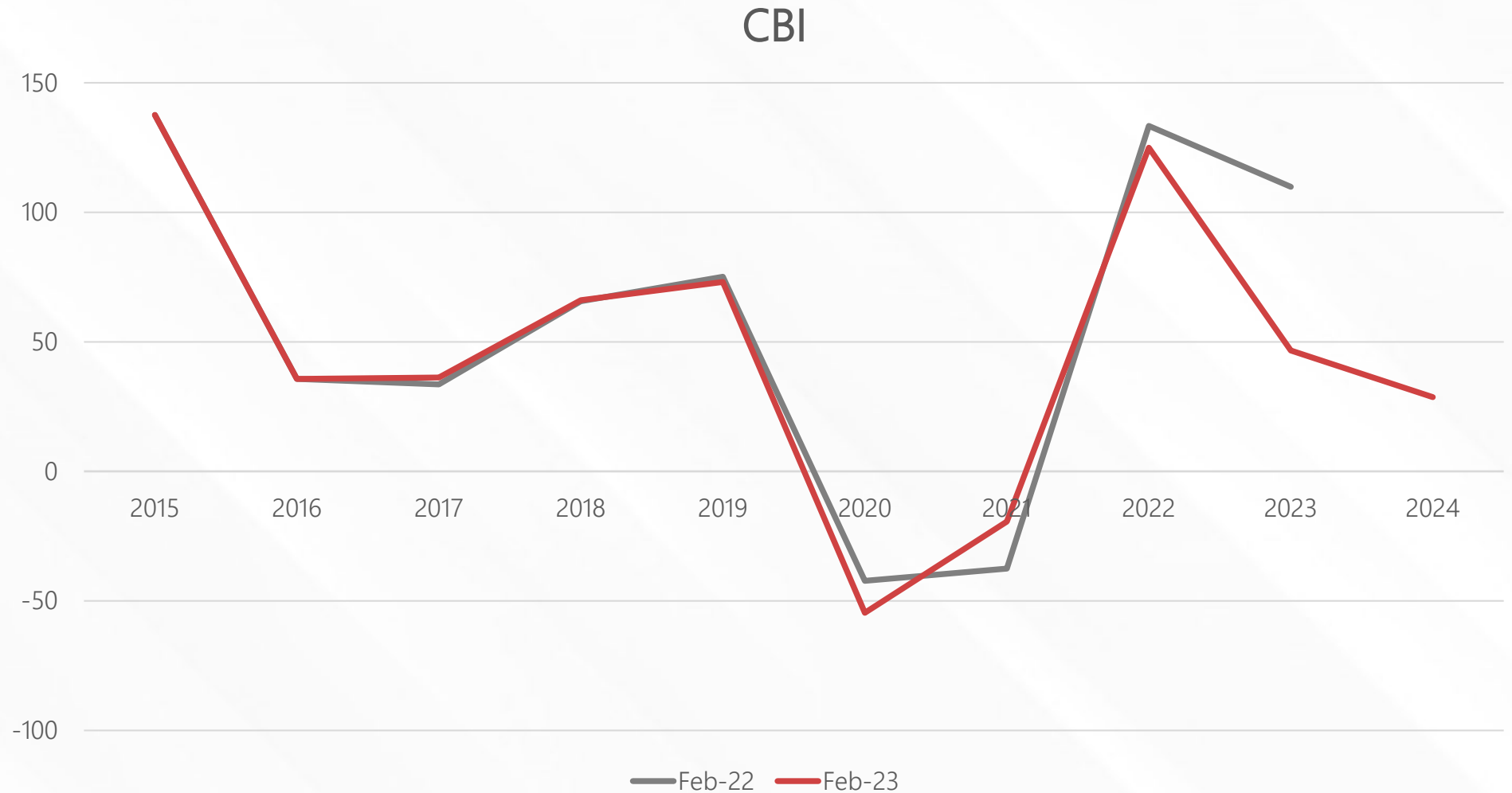
# Residential Investment Comparison



# Change in Business Inventories Comparison



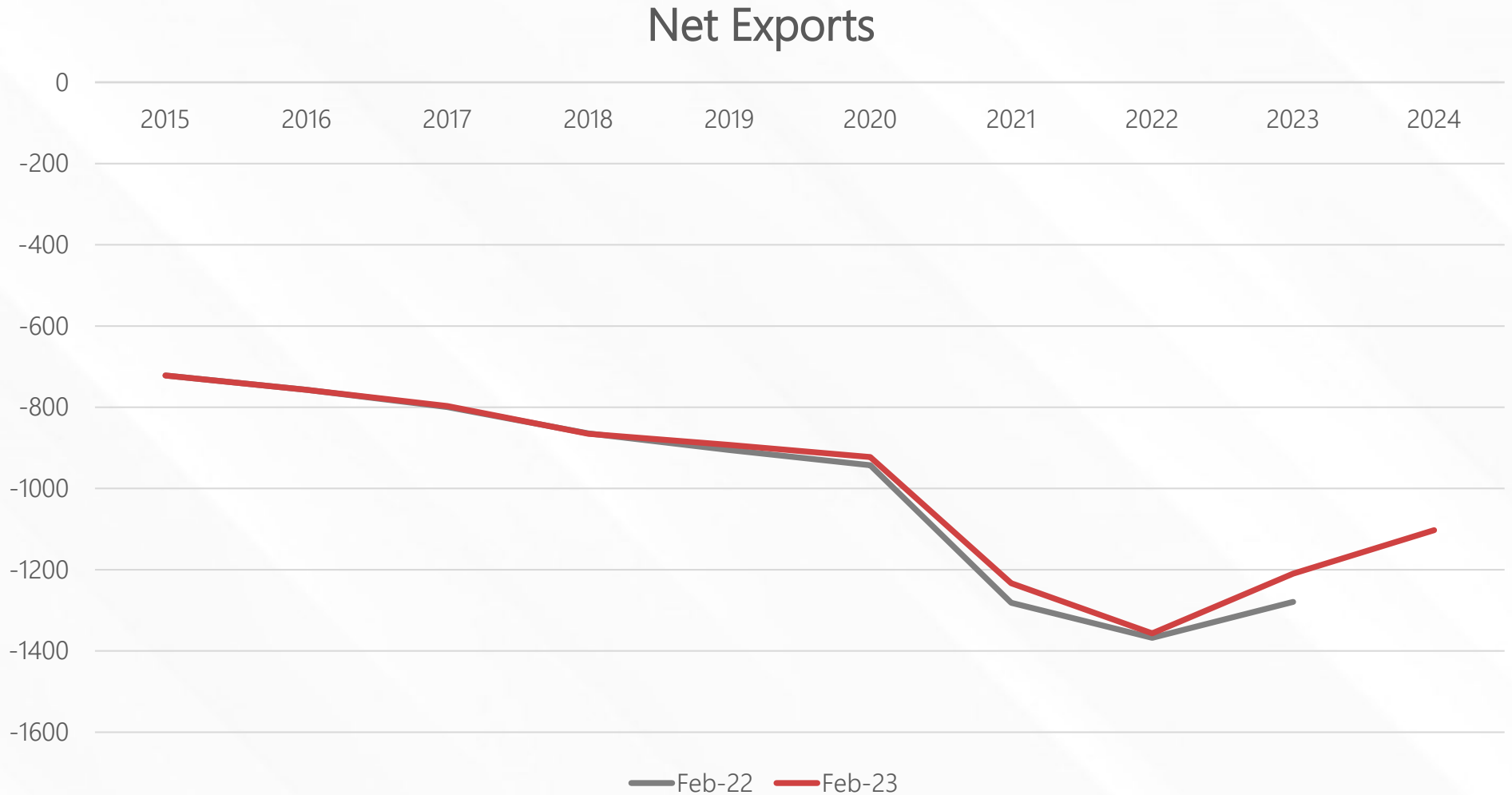
RSQE:  
"In 2022Q4,  
inventory restocking  
supplied half of real  
GDP growth"



# Net Exports Comparison

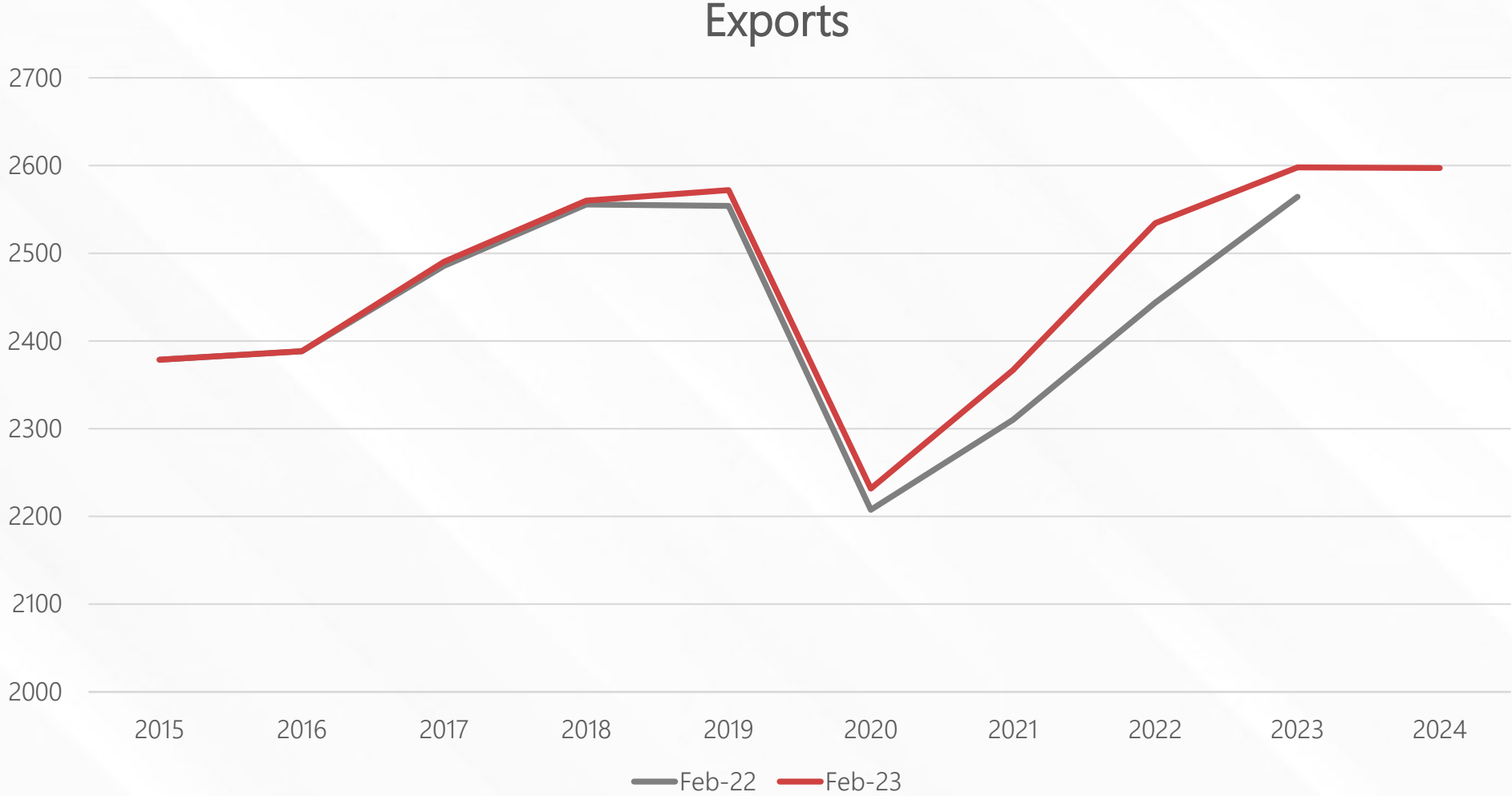


RSQE:  
"Both exports and imports pull back in 2023 relative to GDP. As the dollar depreciates slightly, consumption continues to shift back from goods to services, and overall demand cools off, imports fall by more than exports and the trade deficit continues to contract over 2023–24."



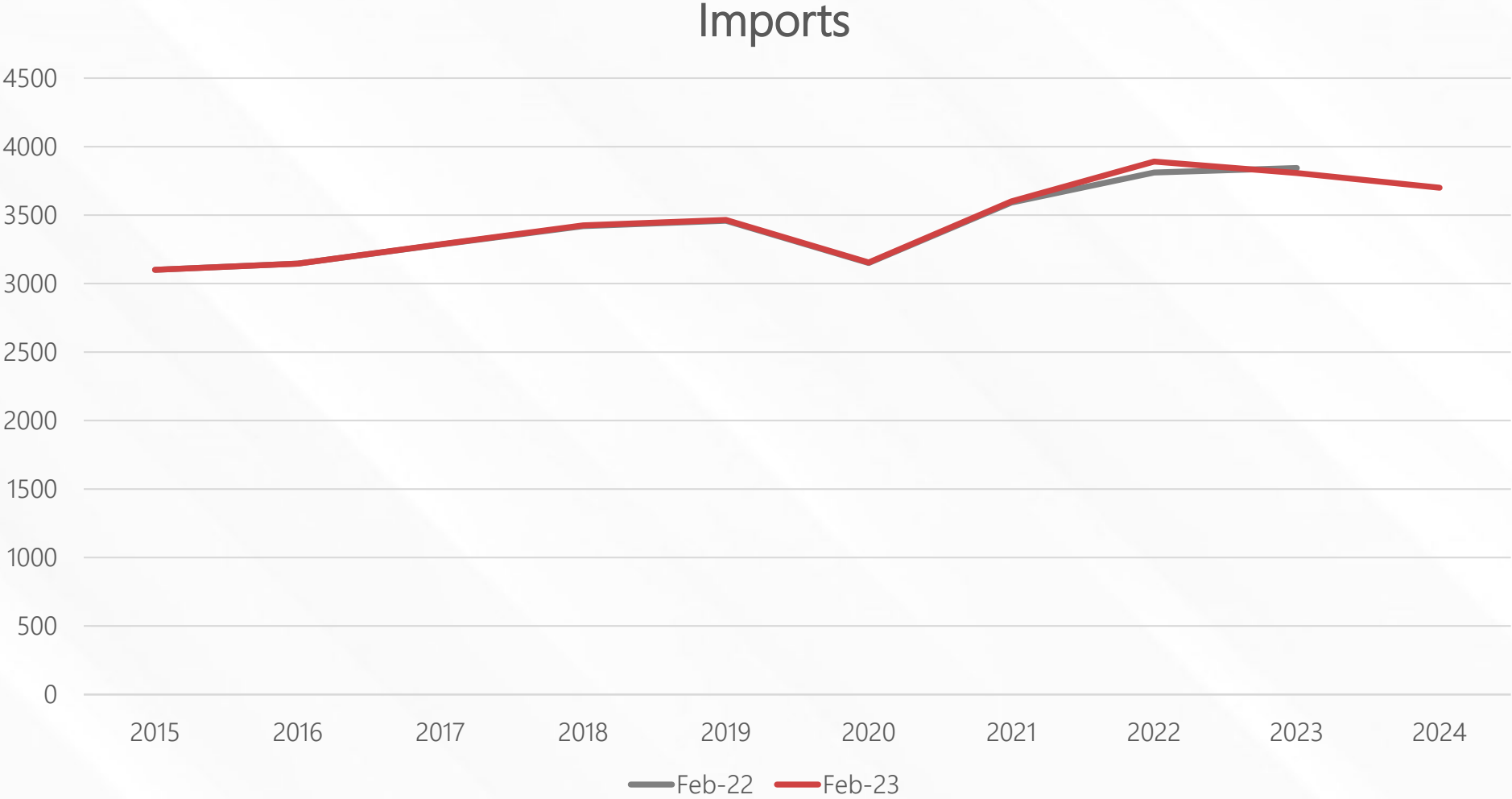


# Exports Comparison



what does **REMI** say? <sup>sm</sup>

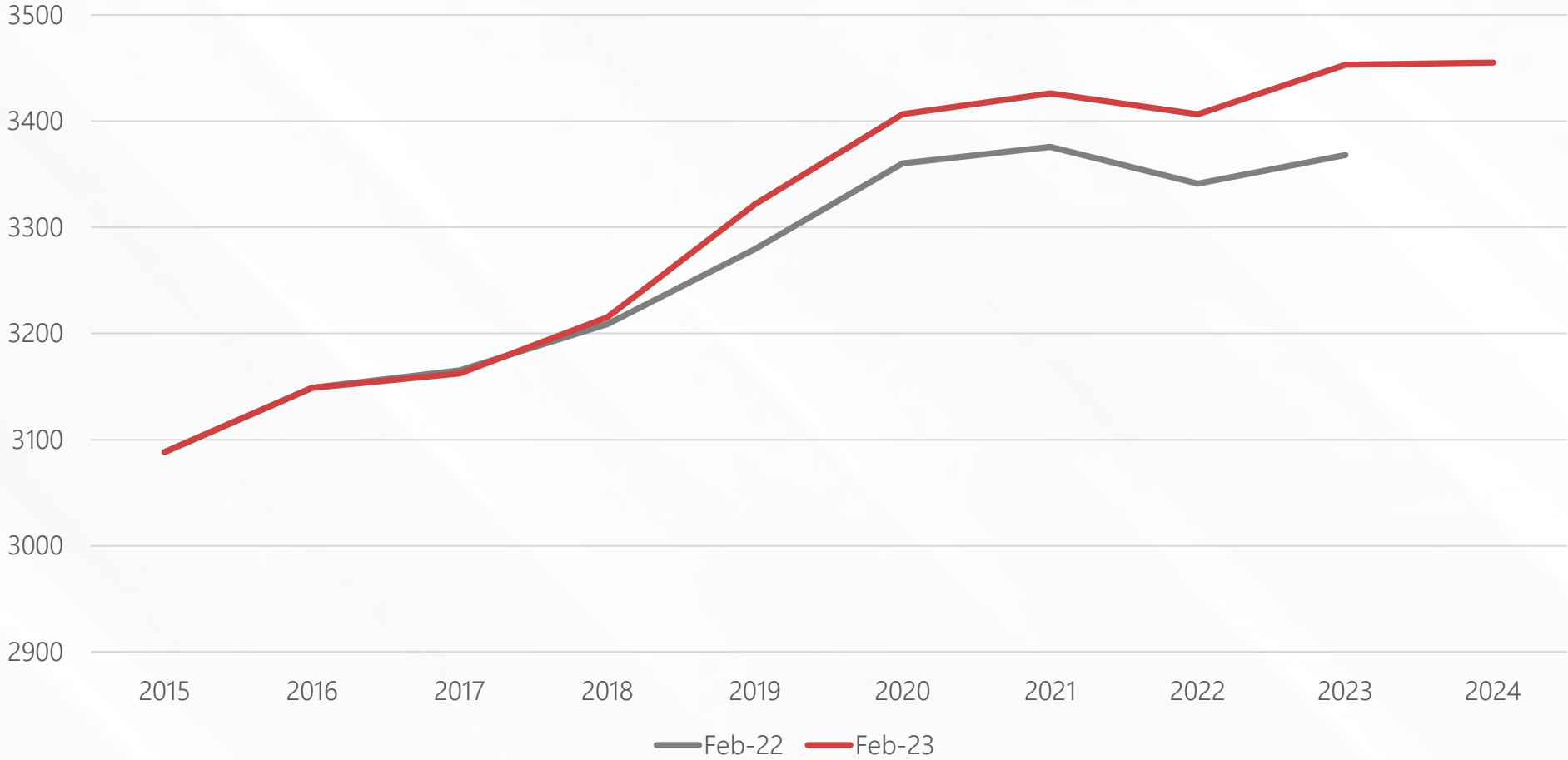
# Imports Comparison



# Government Comparison



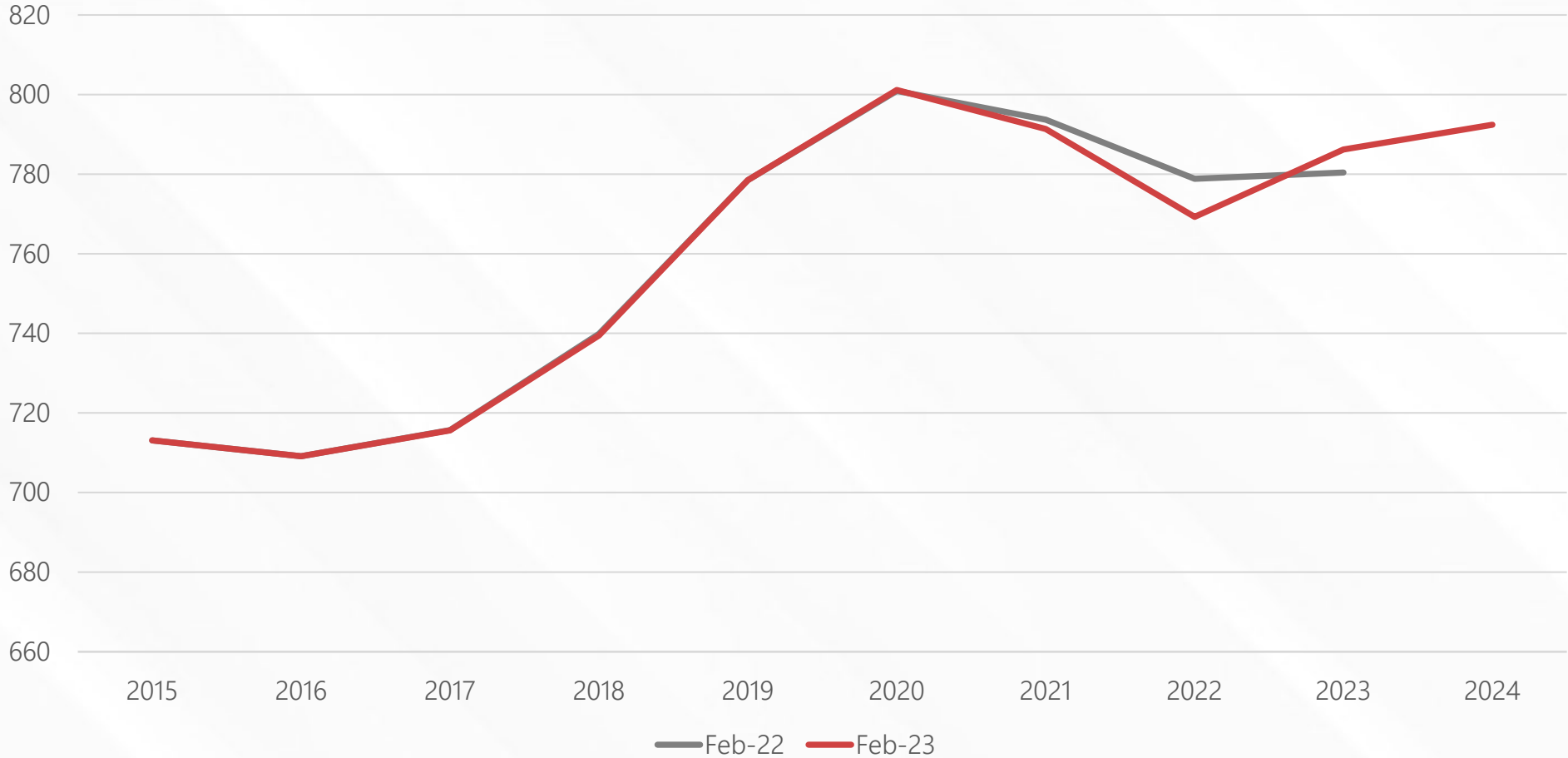
### Government



# Federal Defense Comparison



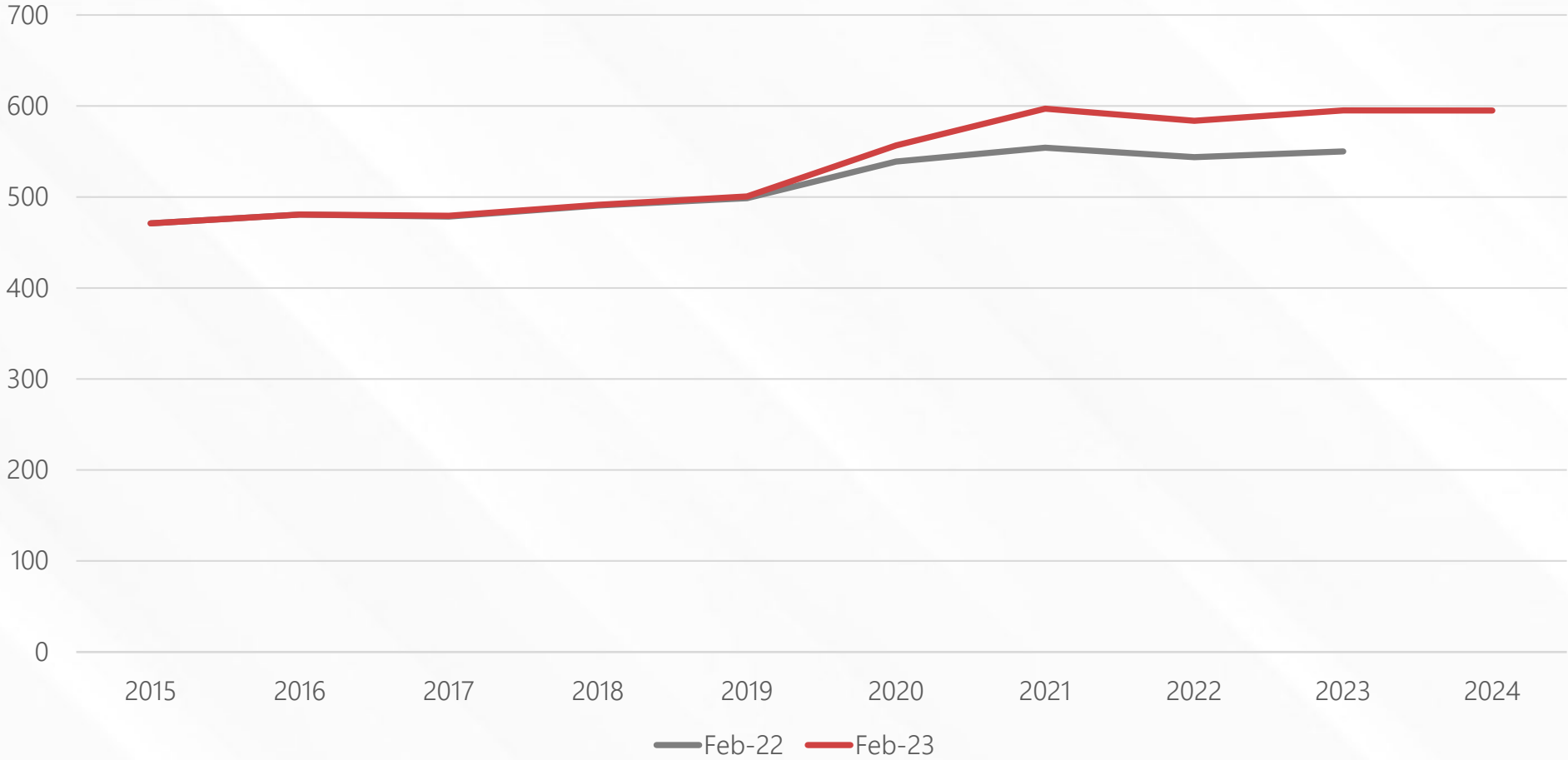
### Federal Defense



# Federal Non-Defense Comparison



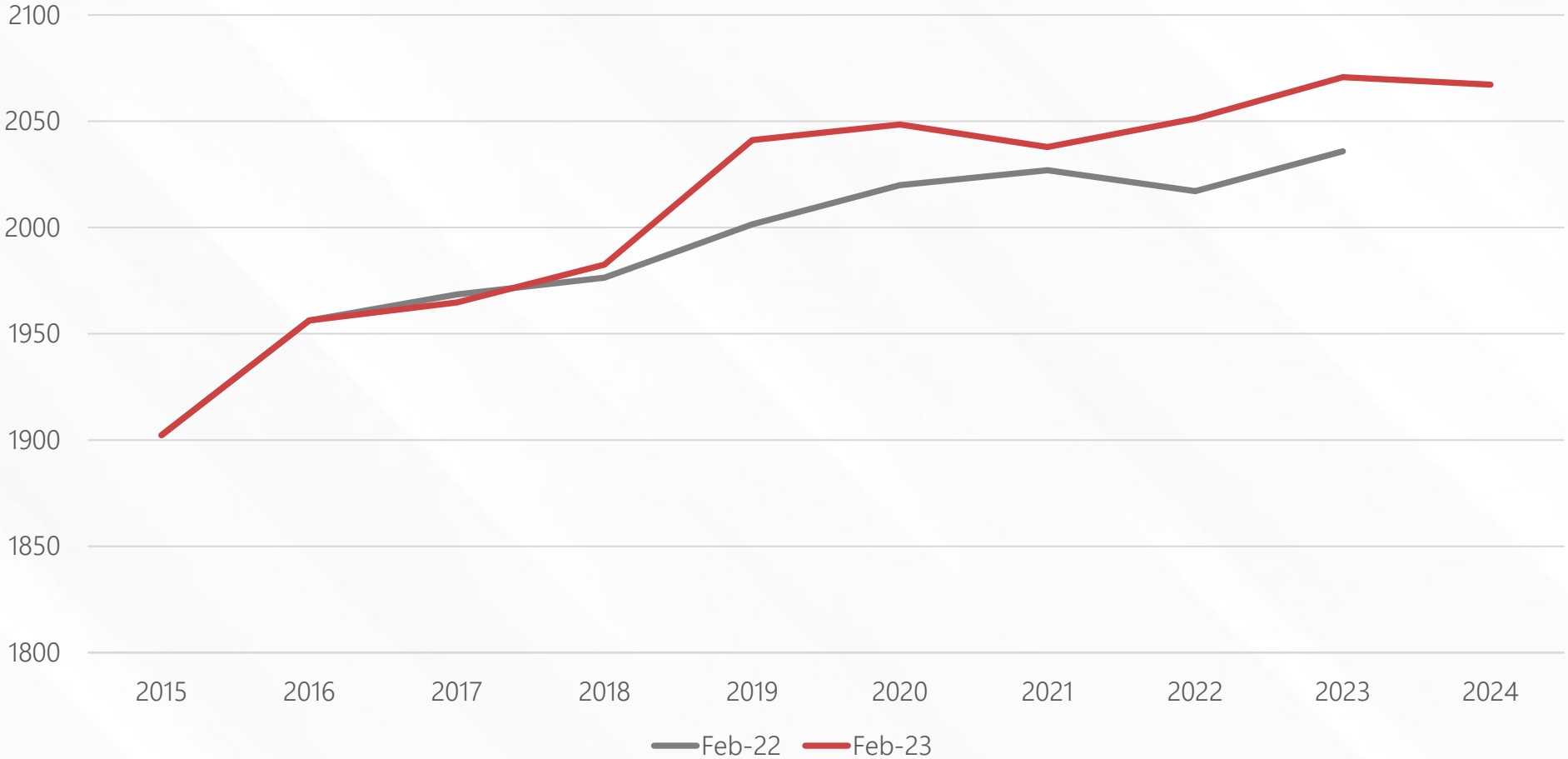
### Federal Non-Defense



# State and Local Government Comparison



State and Local



## Last History Year 2020

- Budget and Economic Outlook (2021-2031) released July 2021
- The 2021 Long Term Budget Outlook released March 2021

## Last History Year 2021

- Budget and Economic Outlook (2023-2033) released February 2023
- The 2023 Long Term Budget Outlook released July 2022

# CBO Projections Used by REMI

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- 10-Year Budget Projections
- Long-Term Budget Projections
- 10-Year Economic Projections
- Long-Term Economic Projections
- Revenue Projections, by Category
- Demographic Projections



- “The agency projects much weaker growth of real GDP for 2023 than it did last May, stronger growth during the 2024–2026 period, and similar rates of growth over the remainder of the projection period. CBO now projects higher inflation for 2023 and 2024 than it did last May, mainly for two reasons: Recent data suggest that inflation has been more persistent across many sectors of the economy than CBO anticipated, and supply-side disruptions have remained greater than the agency previously forecast. **CBO now expects both short- and long-term interest rates to be higher, on average, over the next five years than forecast last May, mostly because of higher projected inflation.**”

# Factors Changing Projections

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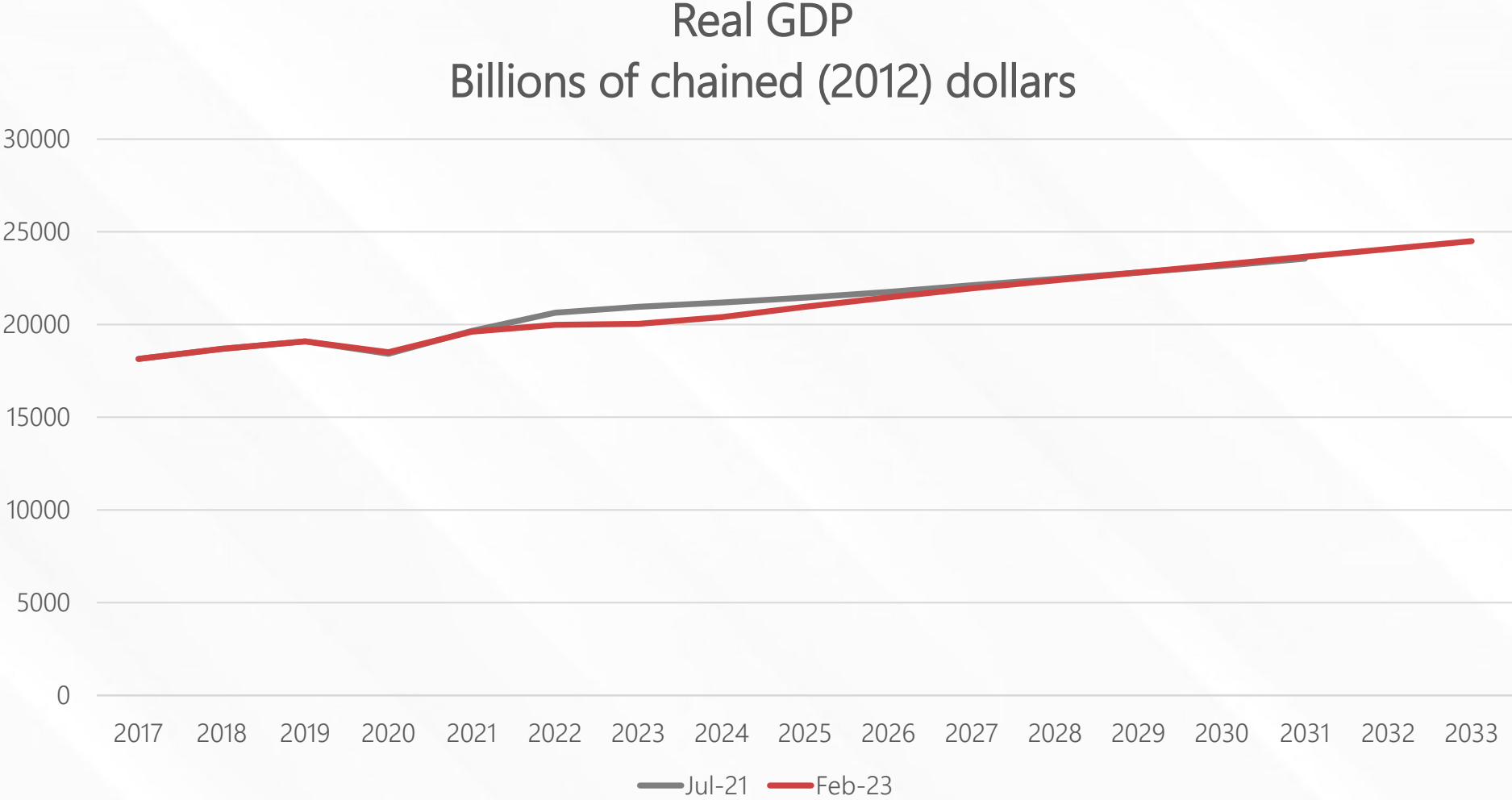
- Inflation
  - Supply side disruptions
- Rising interest rates
- Global economic slowdown
- Ukraine
- Legislative changes

# Legislative Changes

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- Honoring our PACT Act (Veteran's benefits)
- 2022 Reconciliation Act
- Bipartisan Safer Communities Act
- Consolidated Appropriations Act
  - Medicare, Medicaid, SNAP

# GDP Comparison

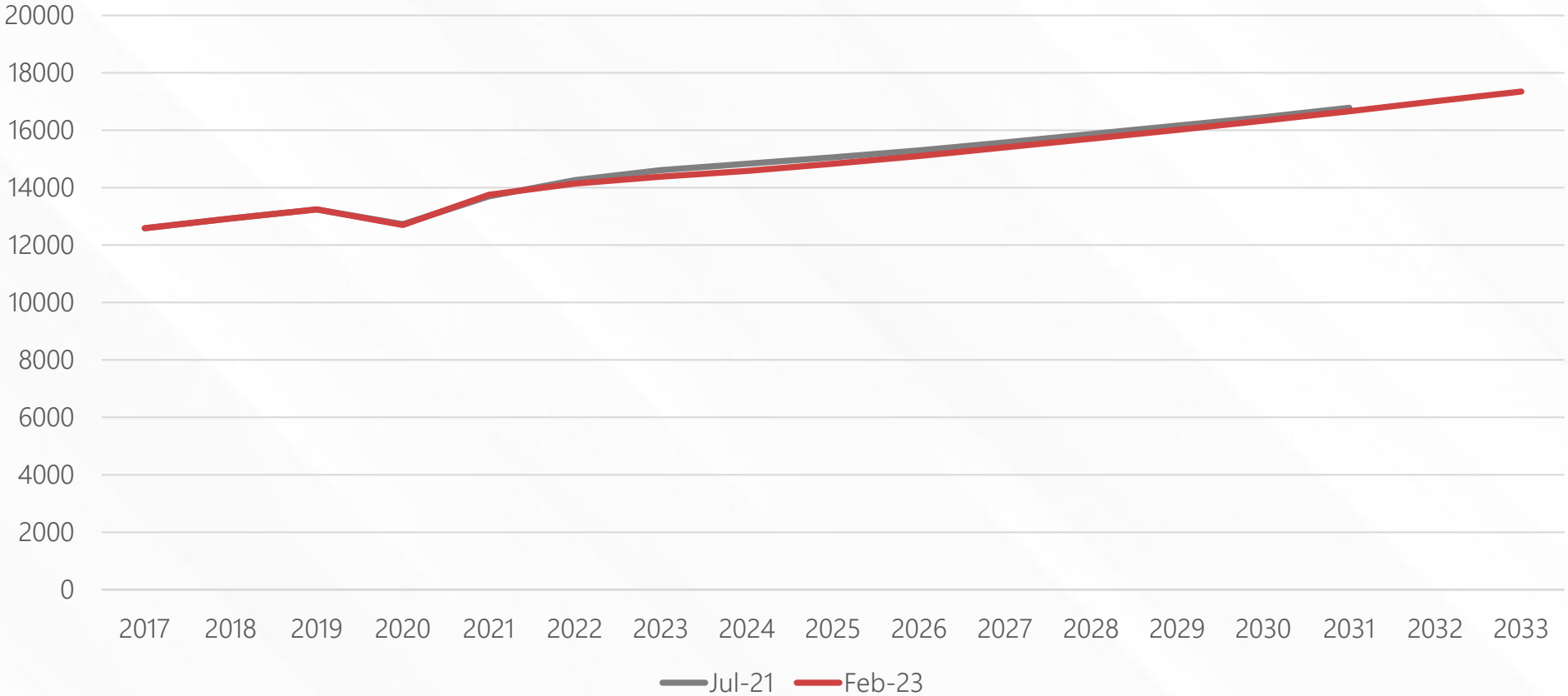


# Personal Consumption Expenditures Comparison



Personal Consumption Expenditures  
Billions of chained (2012) dollars

The agency estimates that higher real interest rates will reduce the growth of household spending by making it more costly to finance purchases (especially large purchases, such as houses and motor vehicles).

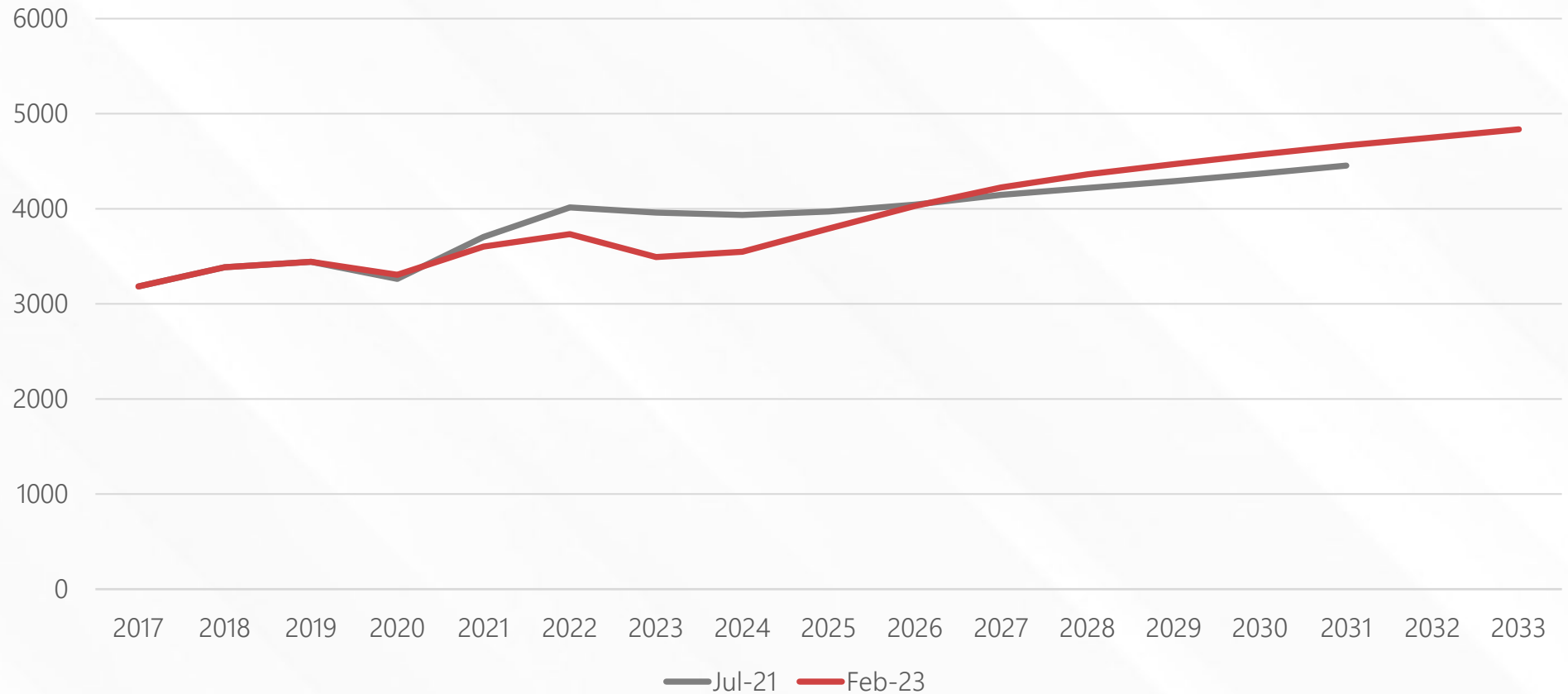


# Gross Private Domestic Investment Comparison



Higher interest rates will reduce the growth of business investment by making it more costly to borrow money to expand productive capacity, and they will reduce the growth of residential investment by raising mortgage rates.

## Gross Private Domestic Investment Billions of chained (2012) dollars

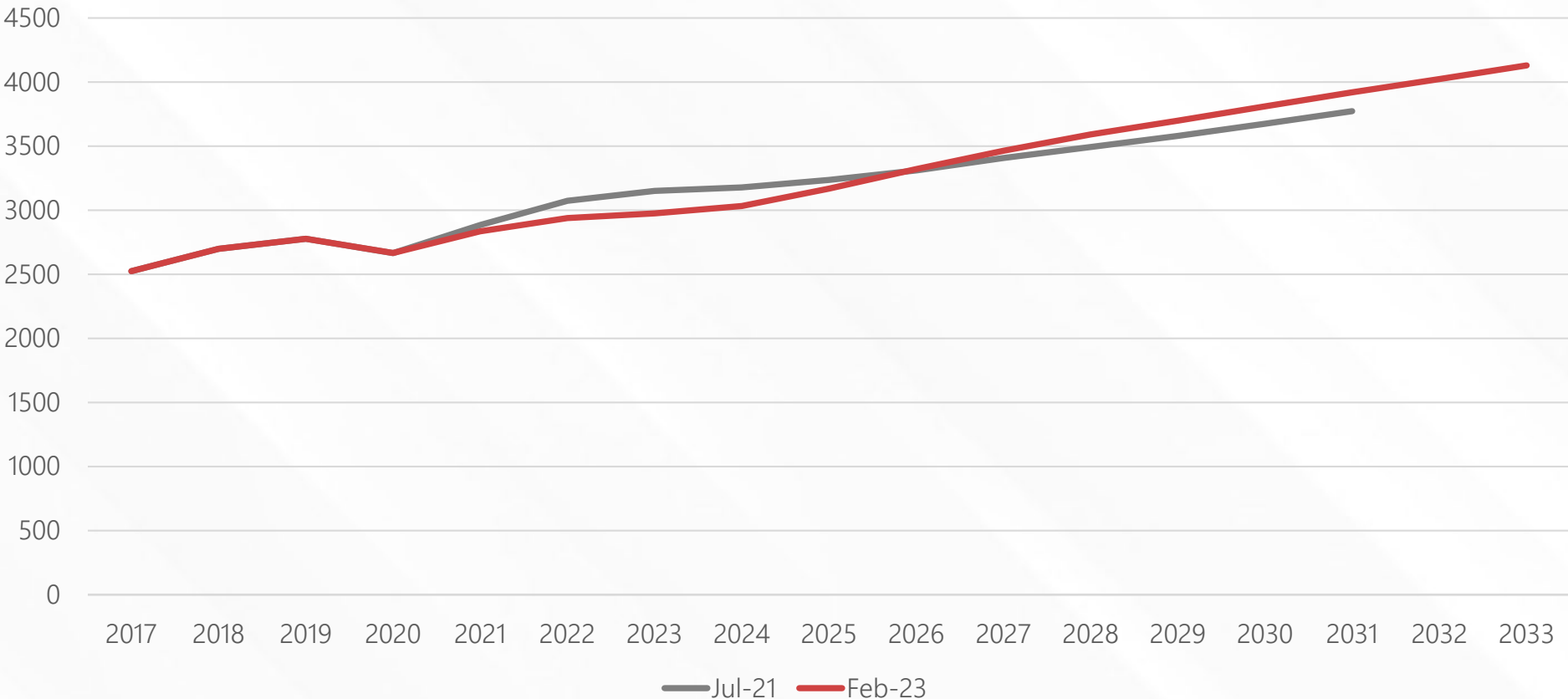


# Nonresidential Fixed Investment Comparison



Nonresidential fixed investment  
Billions of chained (2012) dollars

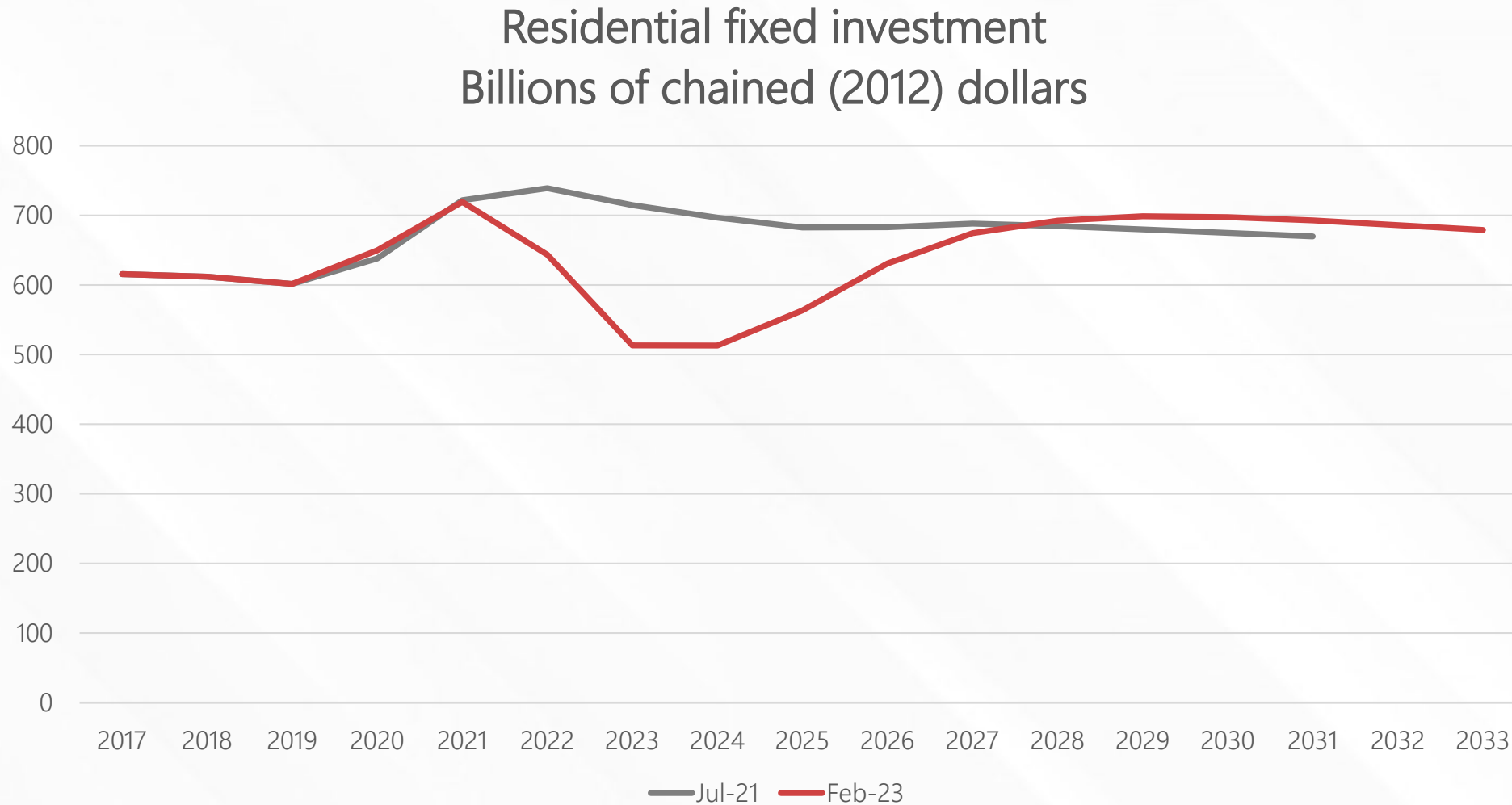
CBO expects real business fixed investment to increase by just 0.3 percent from the fourth quarter of 2022 to the fourth quarter of 2023, restrained by slowing demand for businesses' output and by rising costs of debt and equity.



# Residential Fixed Investment Comparison



Real residential investment decreased by 19.2 percent during 2022, primarily because of a sharp rise in mortgage rates. CBO expects that continued high mortgage rates and the prospect of falling home prices will cause real residential investment to decline in 2023. Thereafter, falling mortgage rates and the pent-up demand from strong household formation in 2020 and 2021 is expected to trigger a rebound in residential activity.





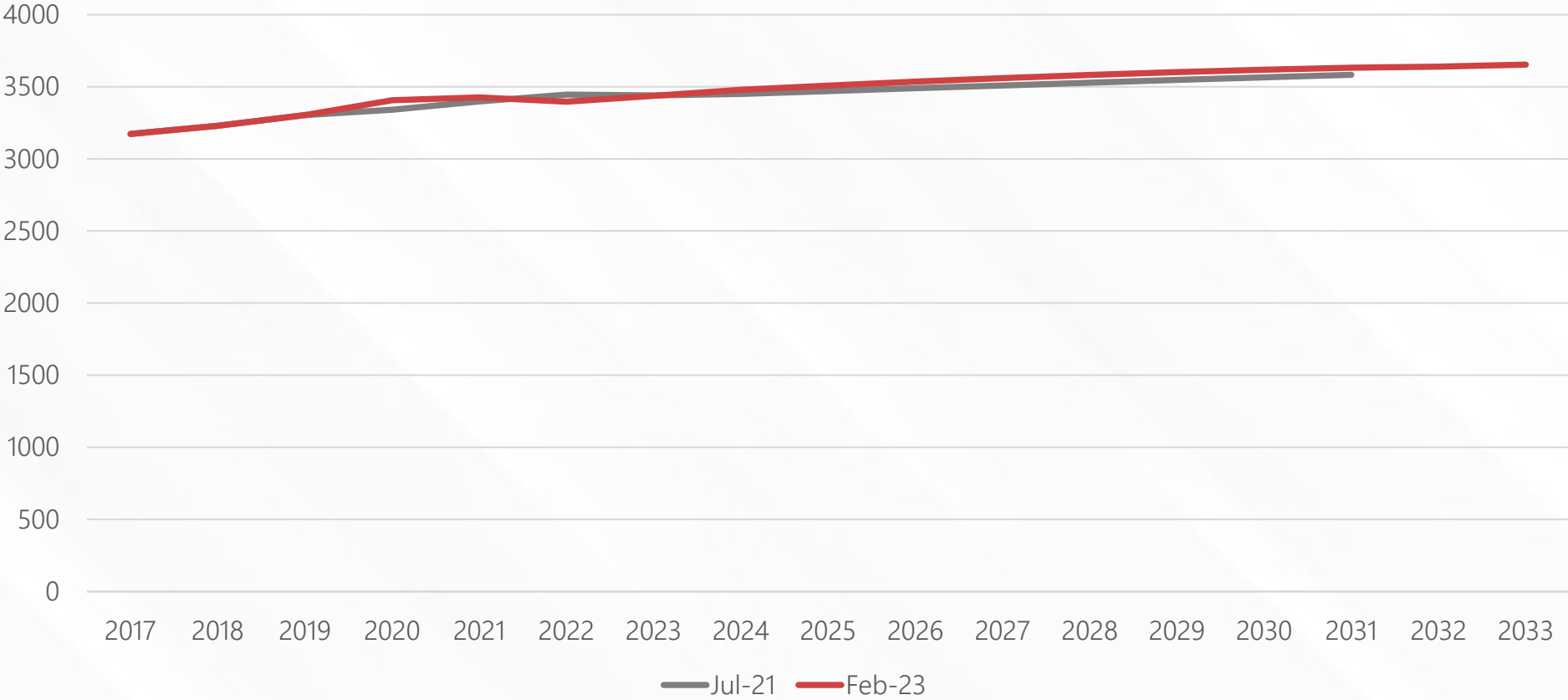
# Change in Private Inventories Comparison



Change in private inventories  
Billions of chained (2012) dollars

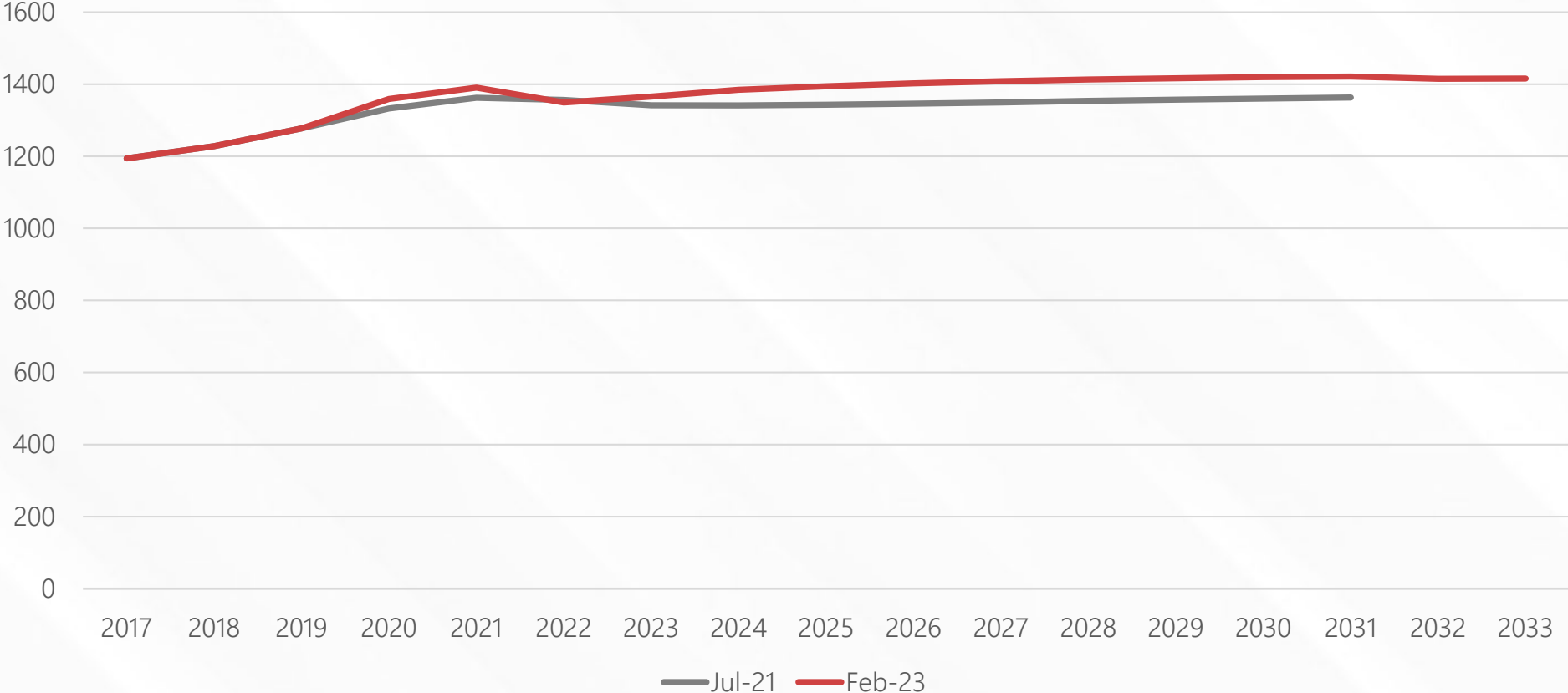


## Government Consumption Expenditures and Gross Investment Billions of chained (2012) dollars



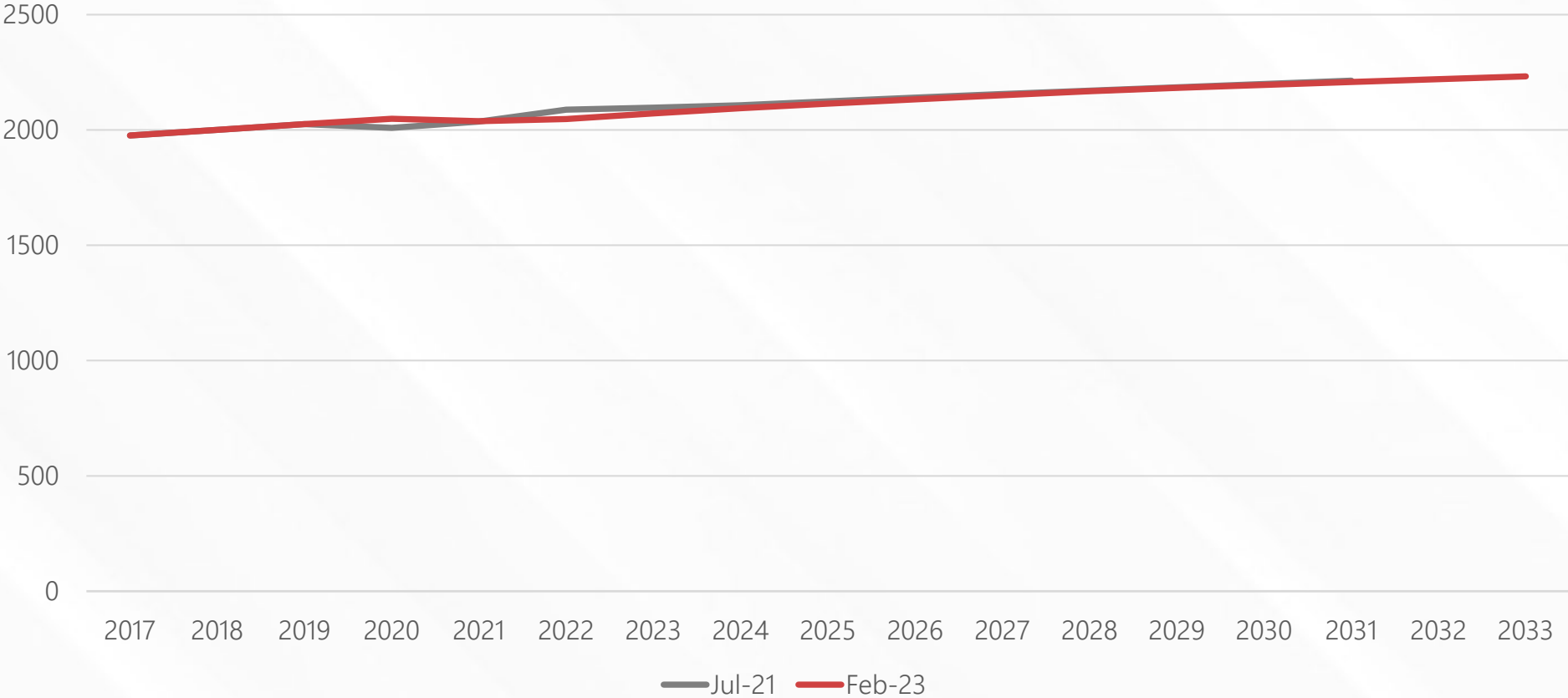


### Federal Government Billions of chained (2012) dollars



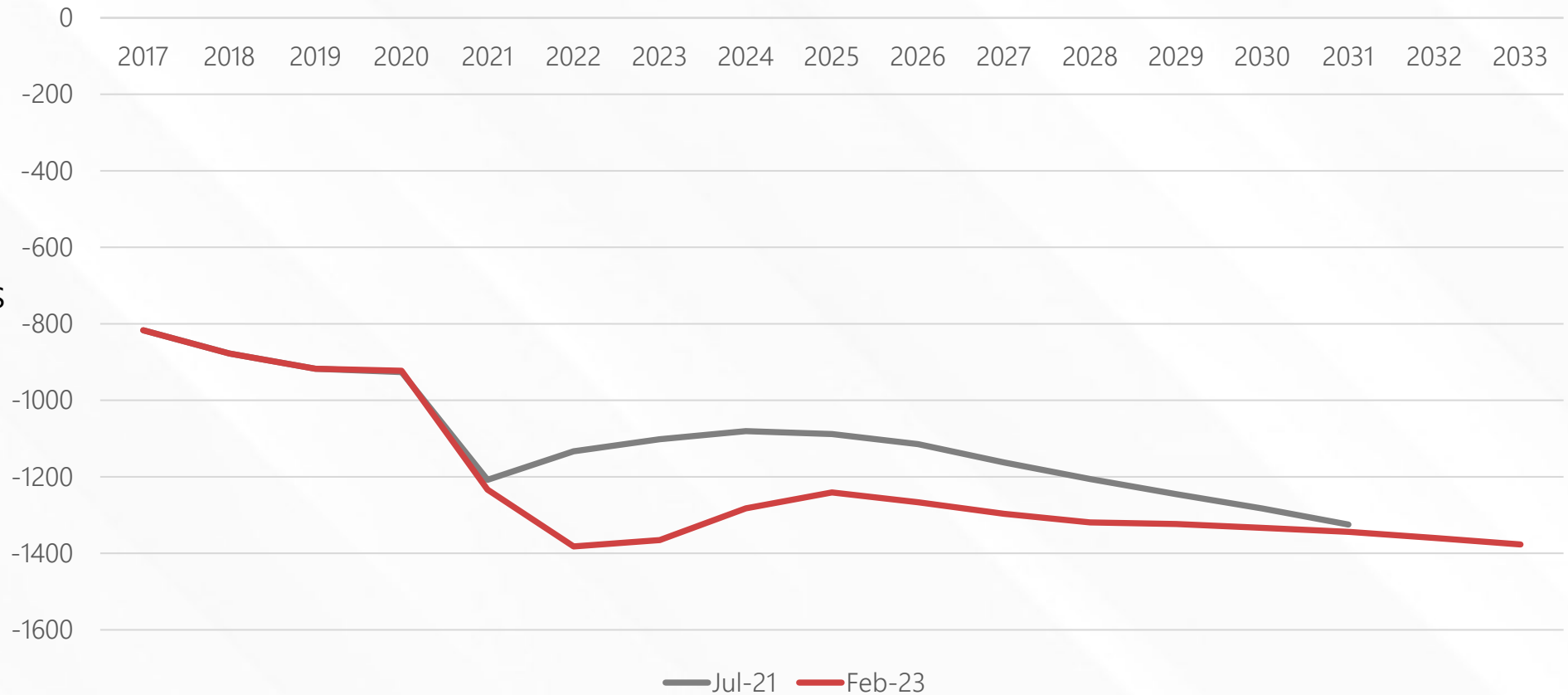


State and Local Government  
Billions of chained (2012) dollars



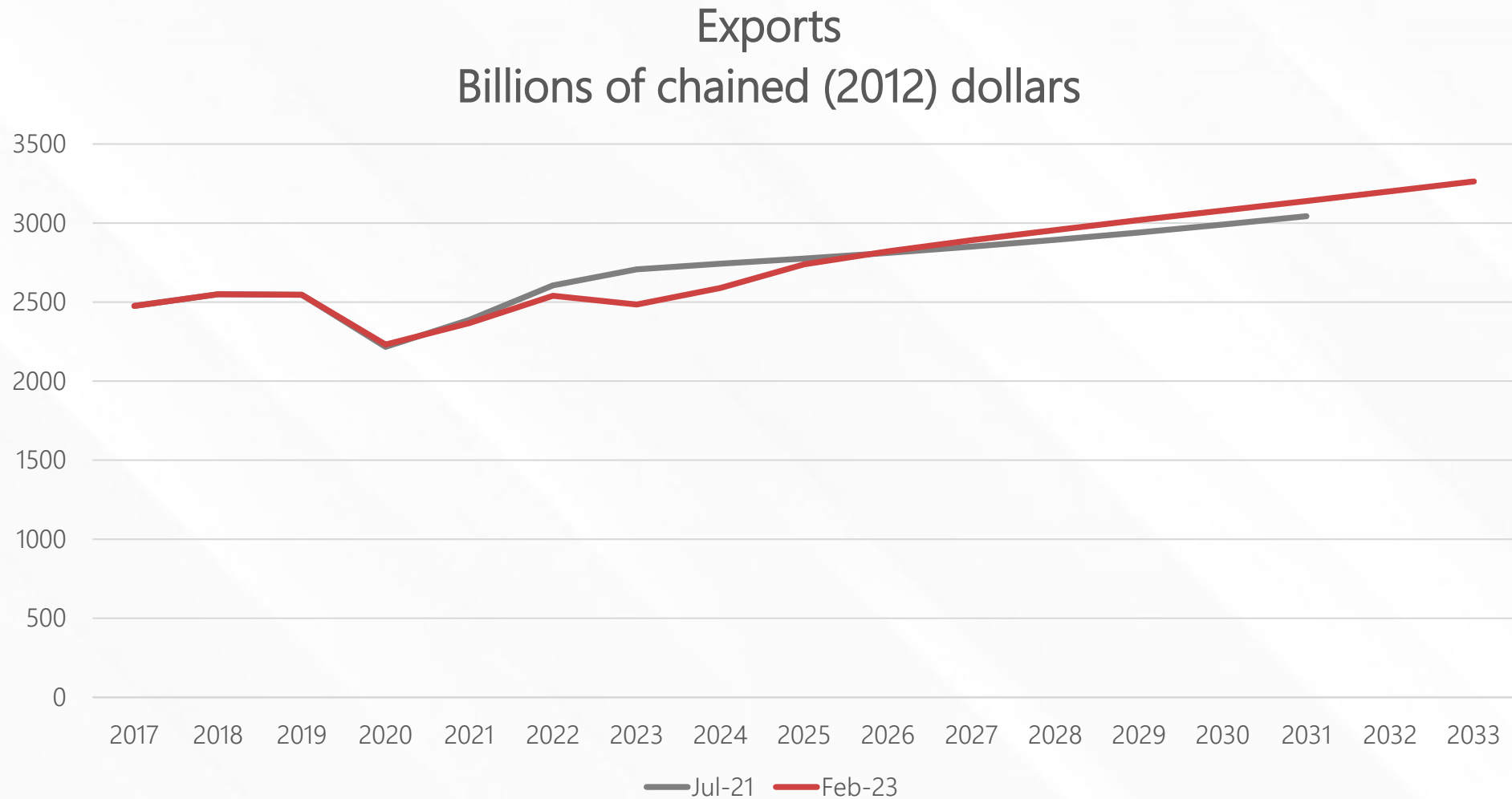
CBO expects growth in exports to outpace growth in imports in 2024 and 2025 for two reasons: The foreign exchange value of the dollar is expected to weaken, and the recovery in services trade (a sector for which the United States runs a trade surplus) is expected to continue. Beyond 2025, the trade deficit is expected to remain roughly stable as export growth moderates and imports continue to grow with domestic demand.

## Net Exports of Goods and Services Billions of chained (2012) dollars



# Exports Comparison

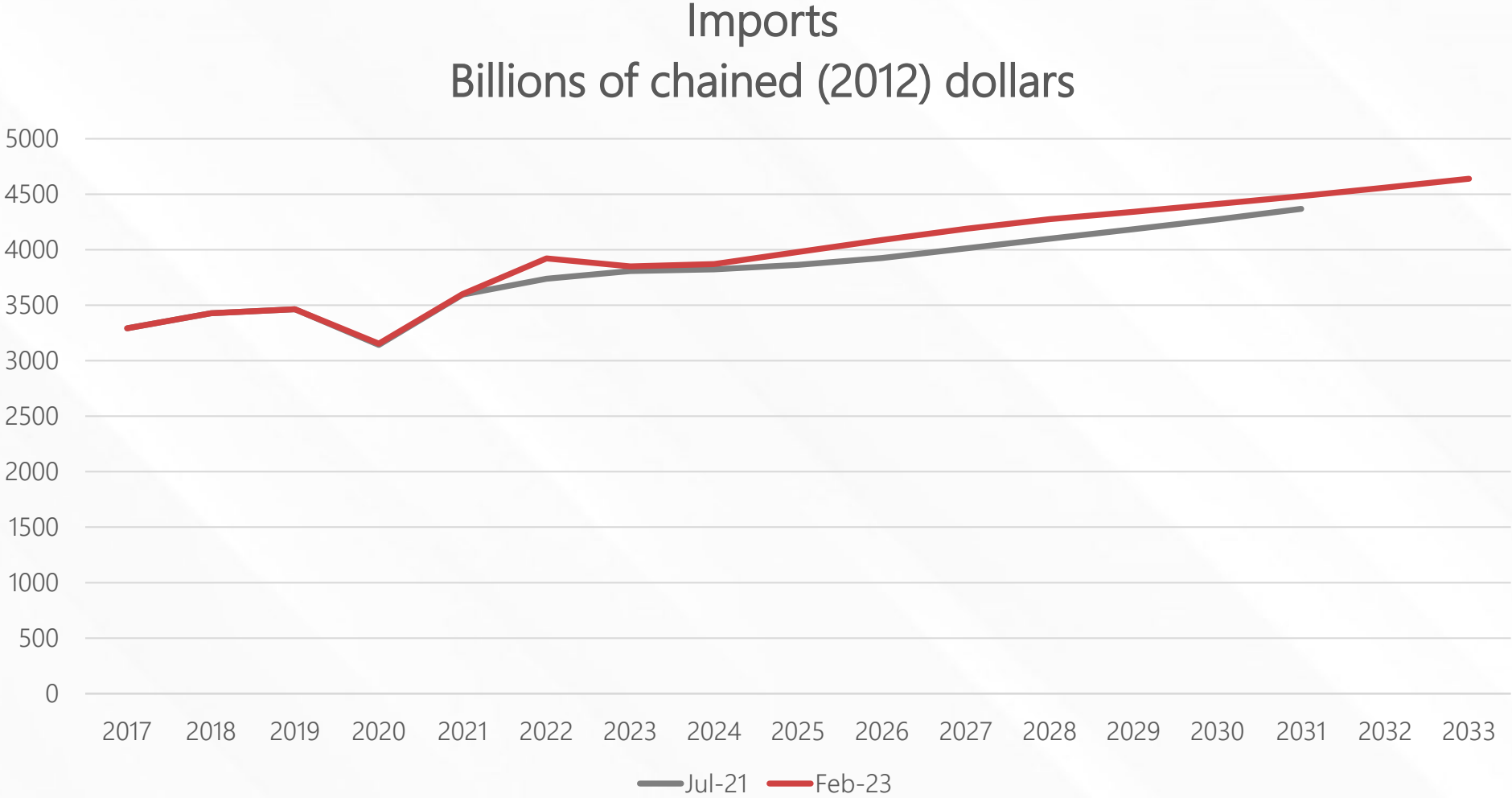
One factor contributing to that decline in exports is the expected deterioration in economic conditions abroad, which will reduce international demand for U.S. goods and services. As the global effects of the pandemic continue to wane, exports of services (mostly travel and transportation services) are expected to gradually return to their prepandemic levels.



# Imports Comparison



CBO projects that weak domestic growth in consumption and a contraction in domestic investment in 2023 will restrain growth of real imports, which are expected to decline by 3.0 percent. As growth in consumption and investment returns to a more robust pace from 2024 to 2027, CBO projects that the growth rate of real imports will rise, averaging 2.5 percent over those years.

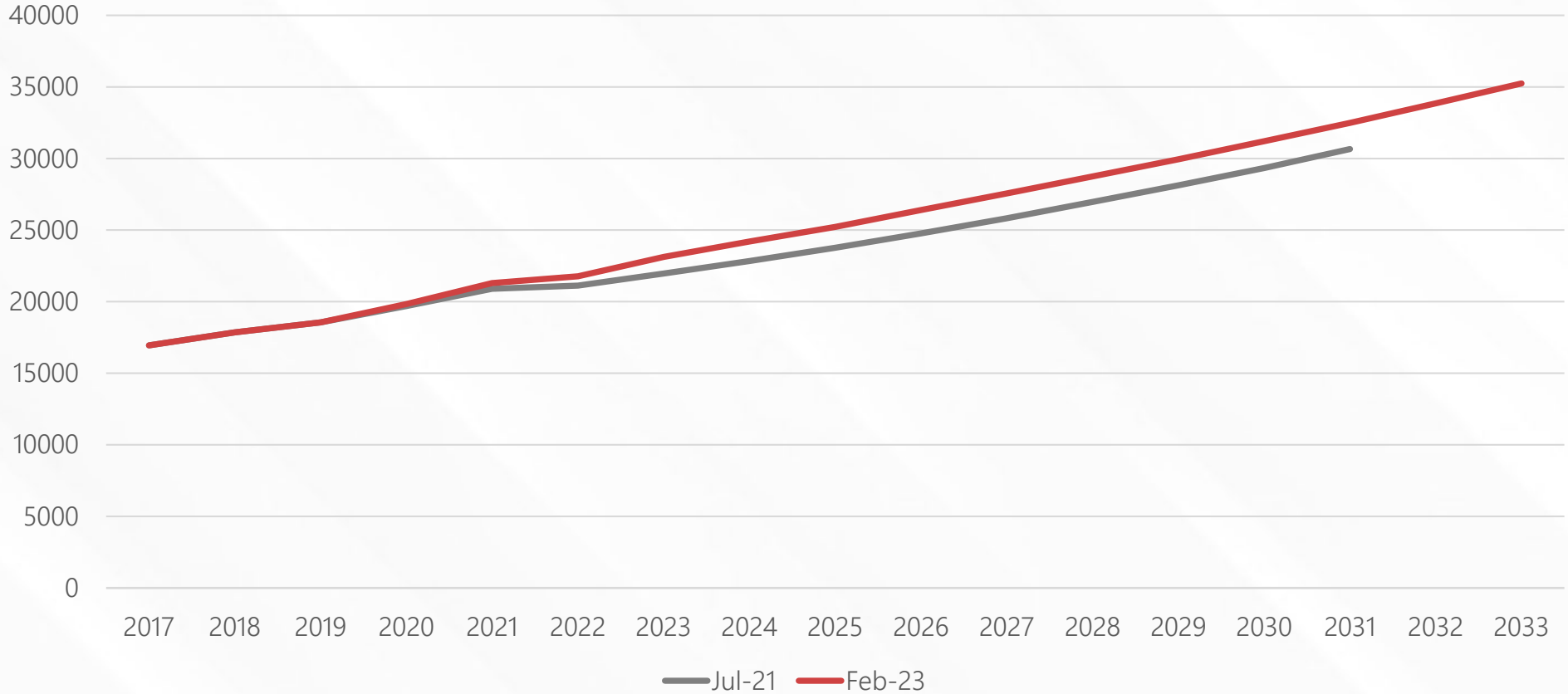


what does **REMI** say?<sup>sm</sup>

# Personal Income Comparison



Income, Personal  
Billions of dollars

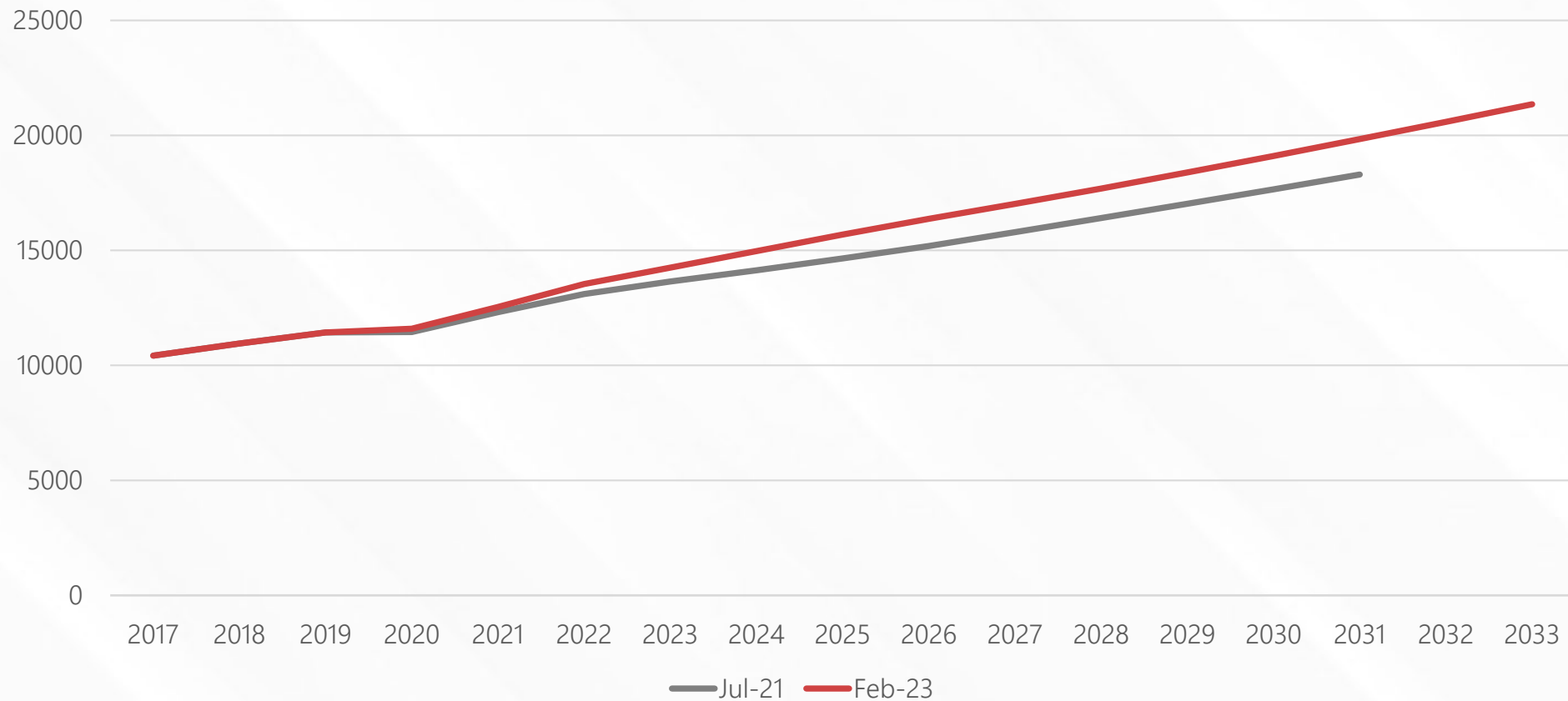




# Compensation of Employees Comparison



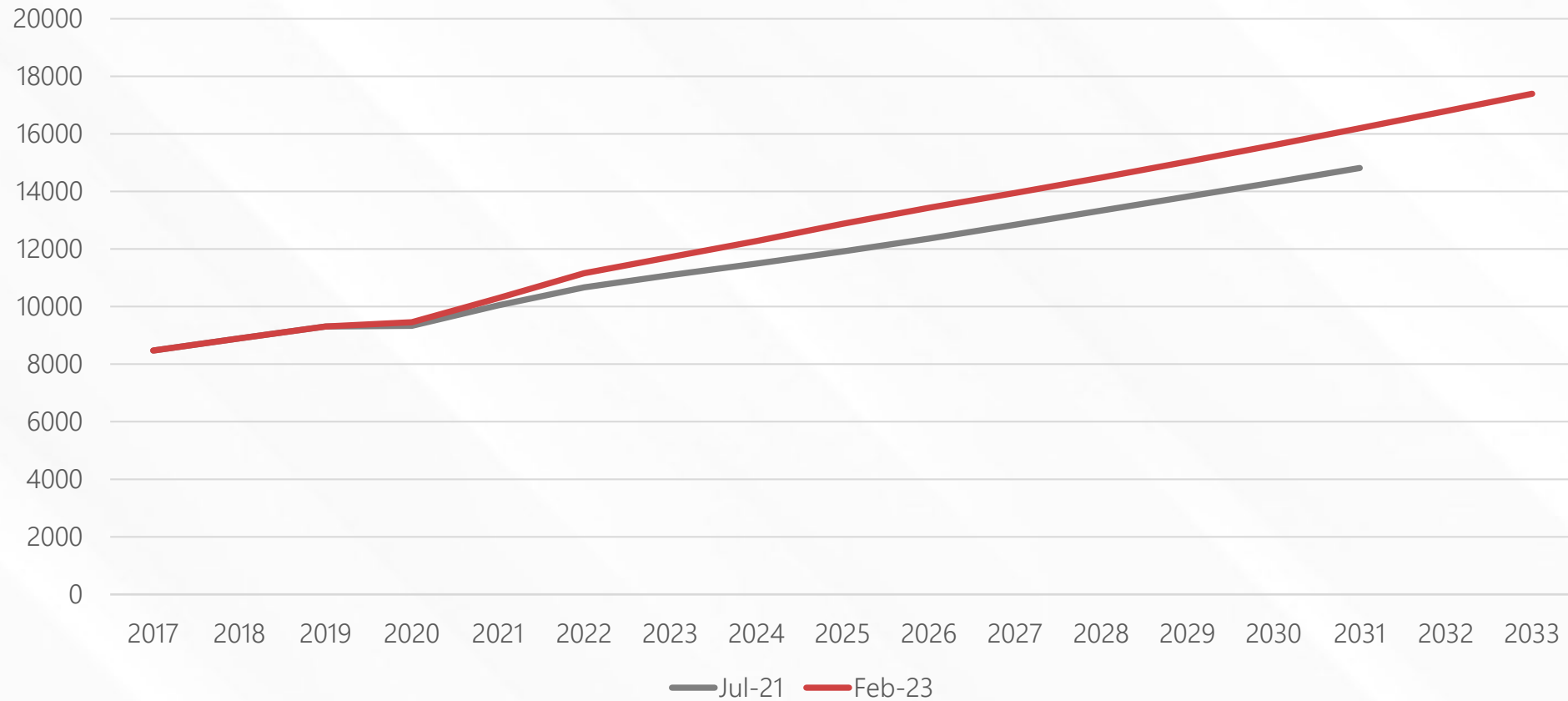
Compensation of Employees, Paid  
Billions of dollars



# Wages and Salaries Comparison



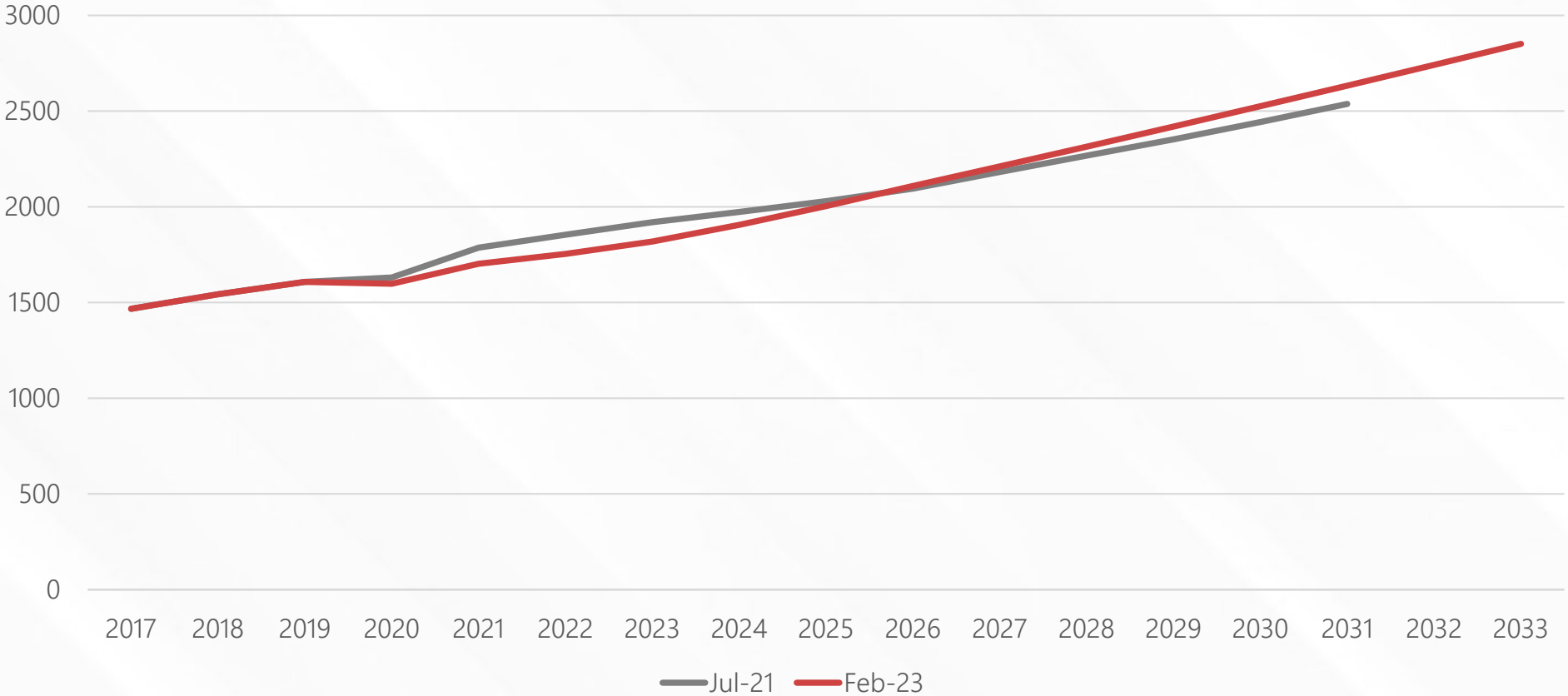
Wages and Salaries  
Billions of dollars



# Proprietors Income, Nonfarm Comparison



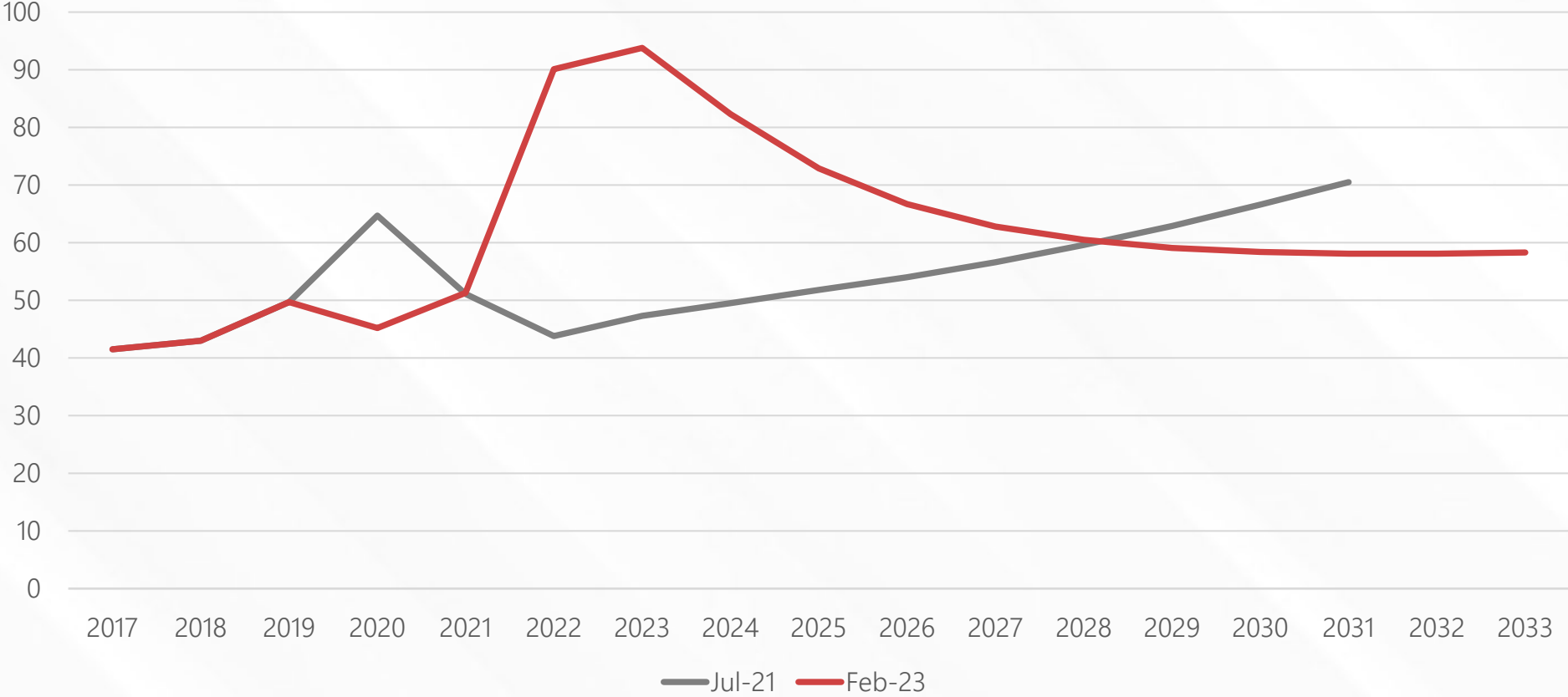
Proprietors' income, nonfarm, with IVA & CCAdj  
Billions of dollars



# Proprietors Income, Farm Comparison



Proprietors' income, farm, with IVA & CCAdj  
Billions of dollars

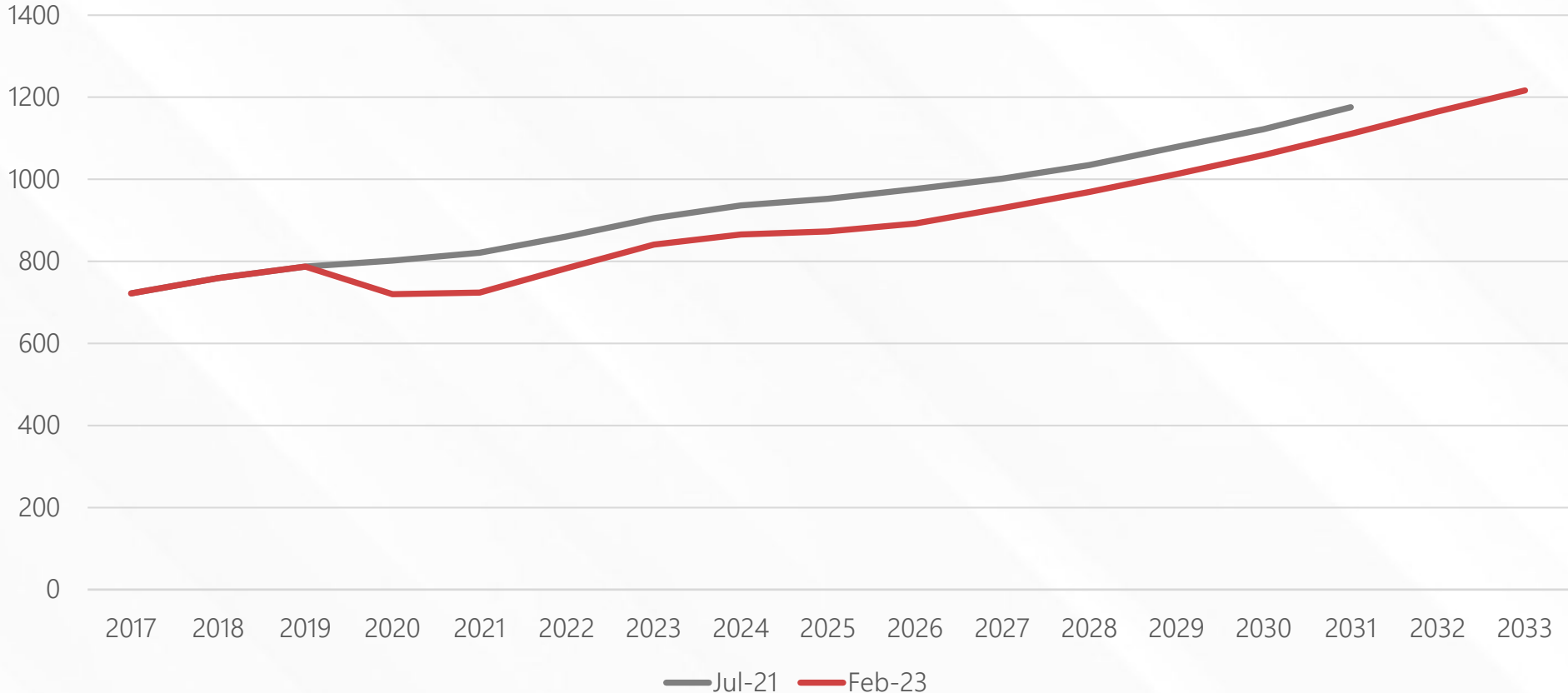


# Rental Income Comparison



Income, rental, with CCAdj  
Billions of dollars

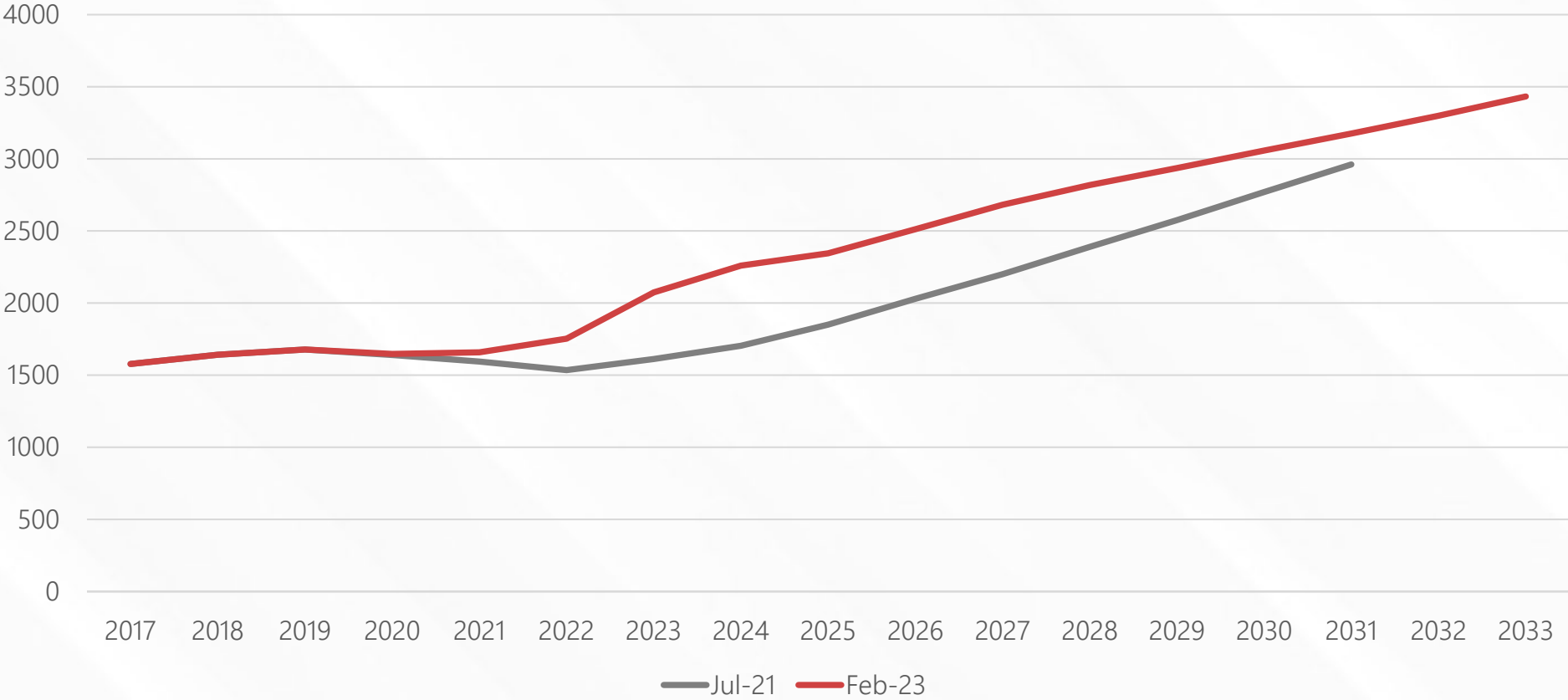
CBO projects that PCE inflation in shelter services will decline in the second half of 2023 as new rental agreements respond to the decline in house prices that began in the second half of 2022, when interest rates rose and demand for homes softened.



# Interest Income Comparison



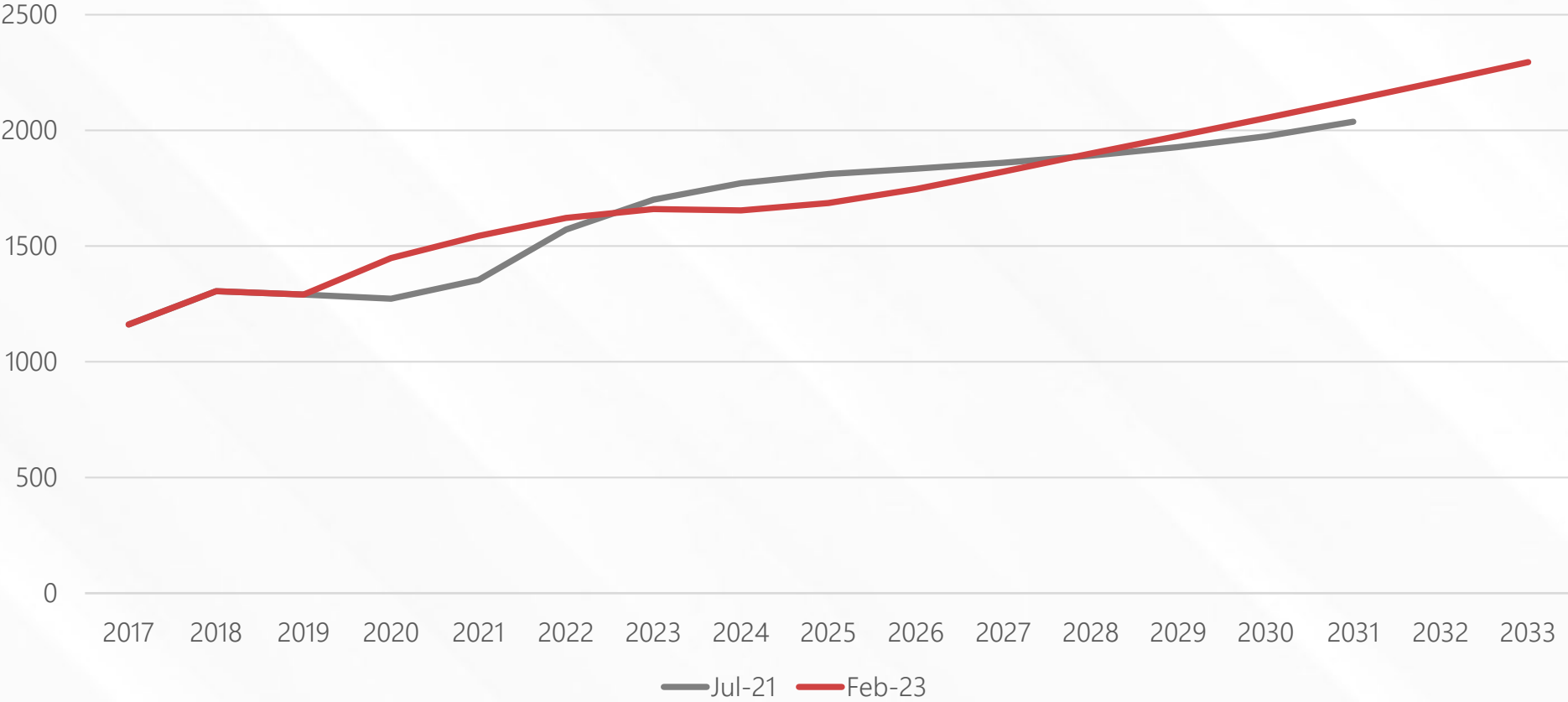
Interest income, personal  
Billions of dollars



# Dividend Income Comparison



Dividend income, personal  
Billions of dollars



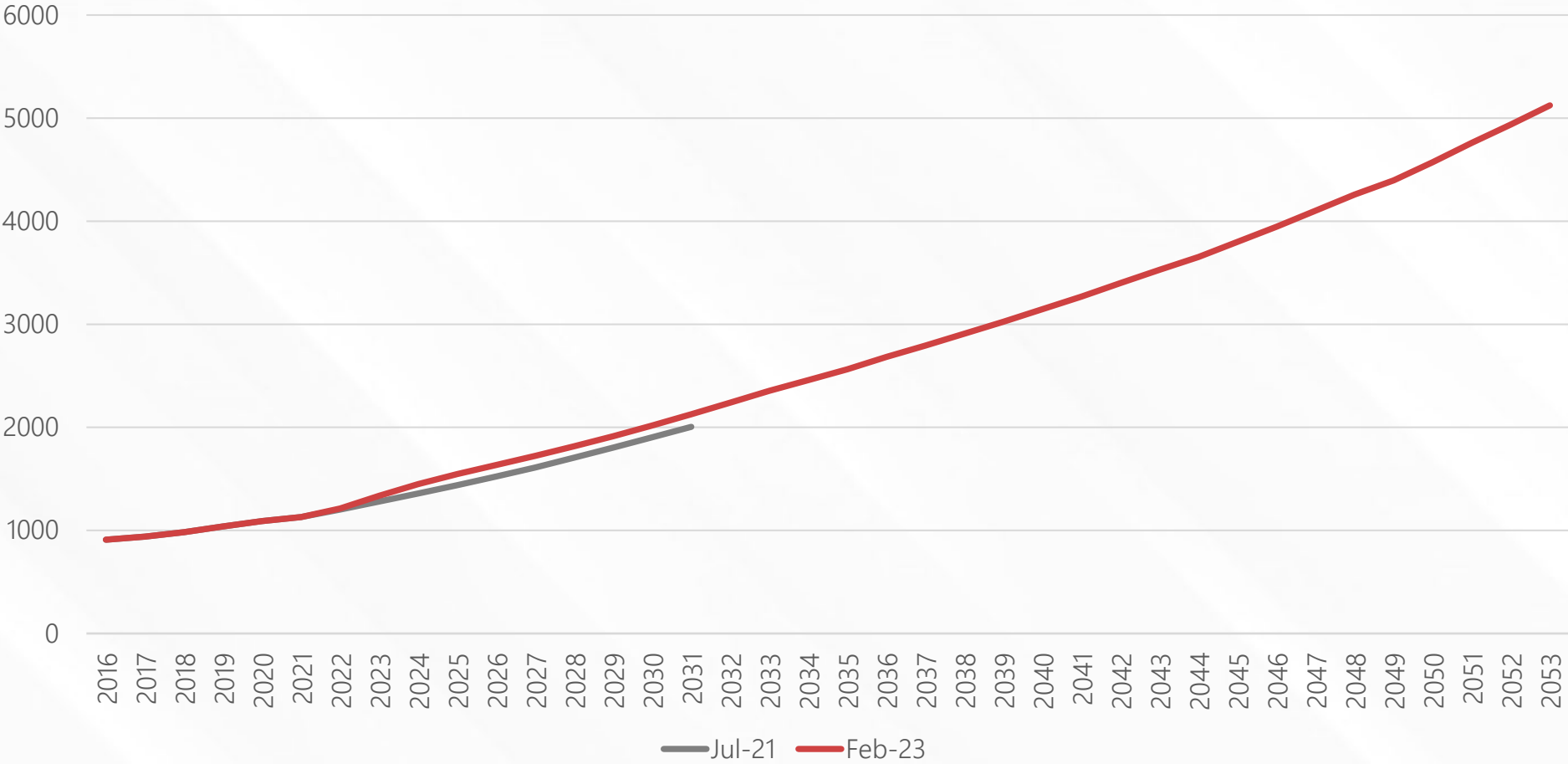
- CBO Budget Projections are used to forecast some transfer payments categories for 10 years
- 'Beginning in March 2021, extensions of 10-year economic projections for additional decades are included in the supplemental files that contain CBO's long-term economic projections'
  - This provided 20 additional years of projections for Social Security, Medicare, and Medicaid, etc.
- REMI used this to calibrate the transfer payment forecast



# Social Security Comparison



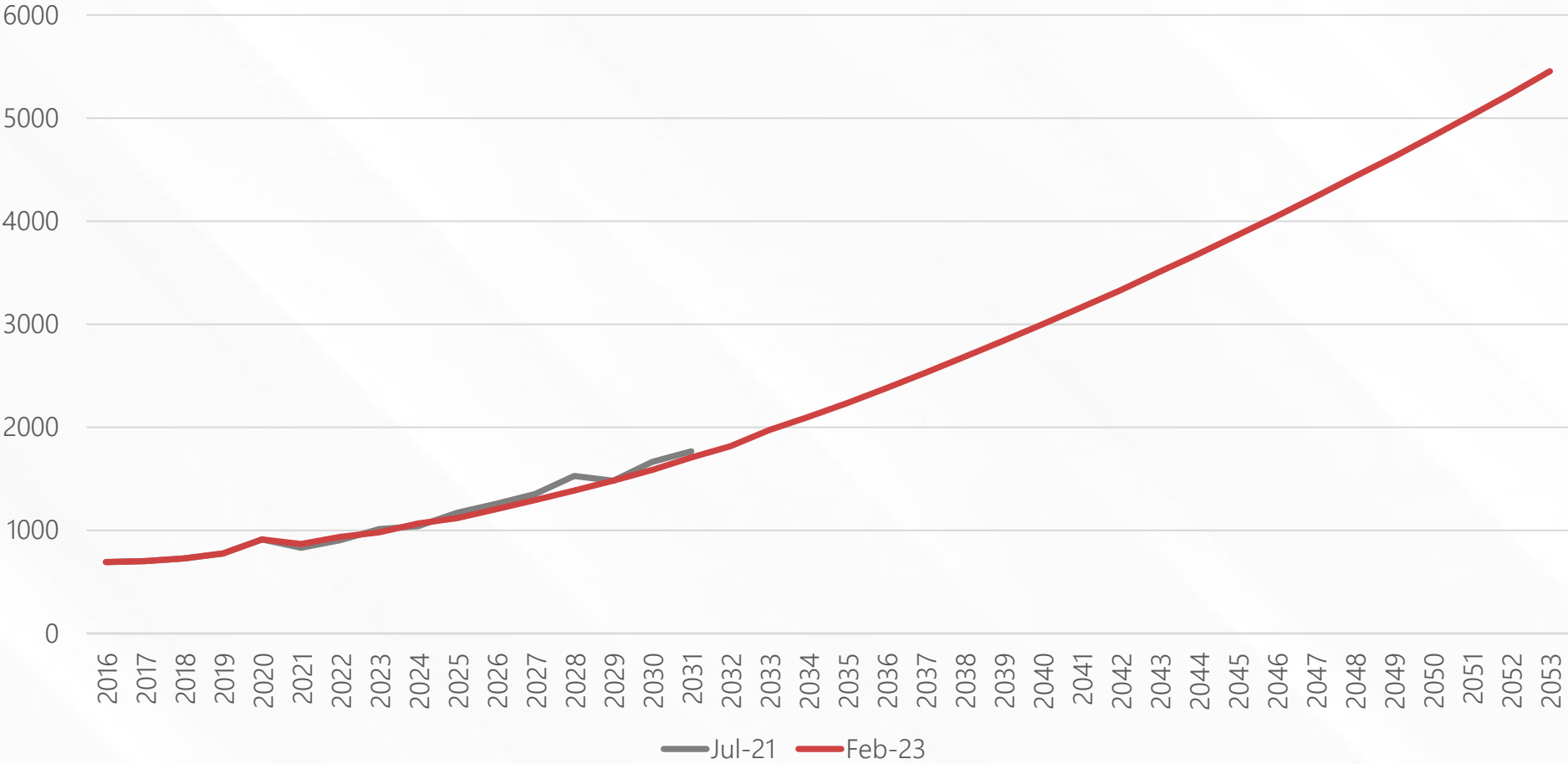
Social Security (Billions of dollars)



# Medicare Comparison



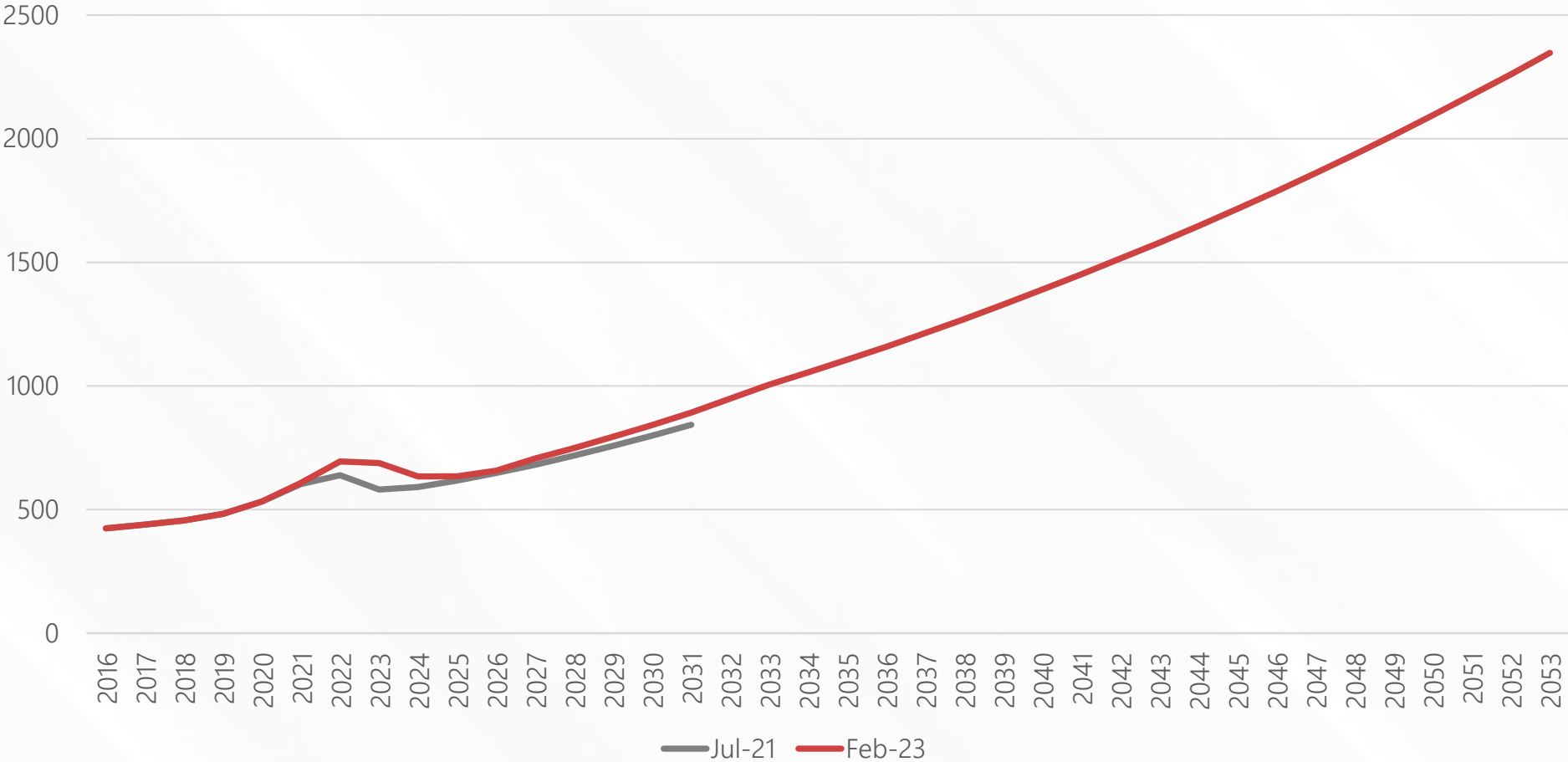
Medicare (Billions of dollars)



# Medicaid, etc Comparison



Medicaid, etc. (Billions of dollars)



# Demographics

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- There have been interesting developments in both the demographic situation and demographic data recently
  - Census 2020
  - COVID
  - Political impacts

- Population totals have been revised in light of the 2020 Census
- Population estimates by sex, race, age, and Hispanic Origin
  - 2010-2019 estimates have not been revised in light of the 2020 Census
  - 2020-2021 estimates are based off 2020 Census
- CDC no longer provides bridged-race estimates by single year of age

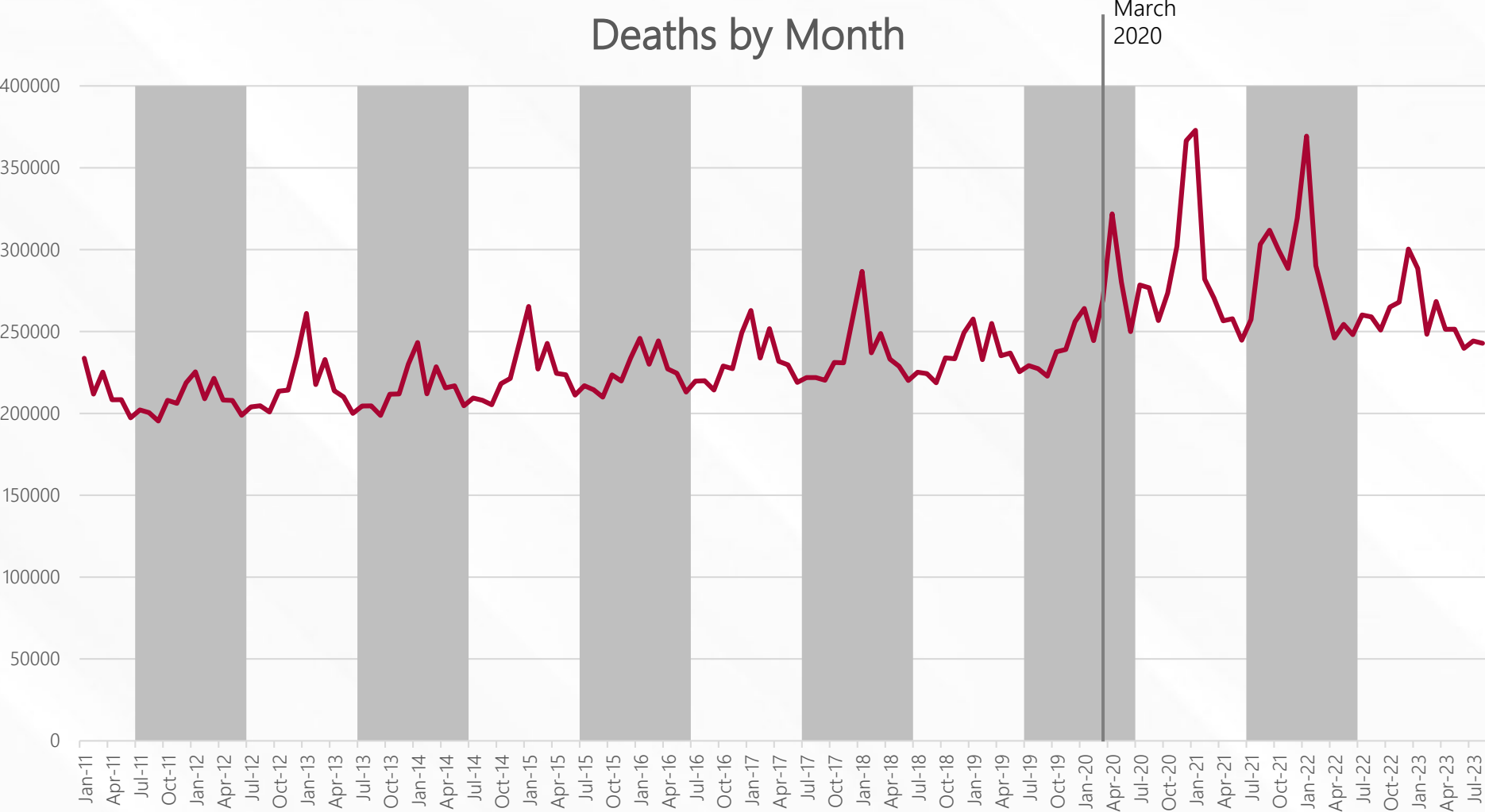
# Components of Demographic Change During COVID

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- From midyear 2020 to midyear 2021, the number of deaths increased by **396,797 (13%)** from the previous time period
- From midyear 2020 to midyear 2021, the number of births dropped by **131,708 (3.5%)** from the previous time period
- Net international migration dropped to lowest levels in decades

# COVID Effect on Deaths by Month

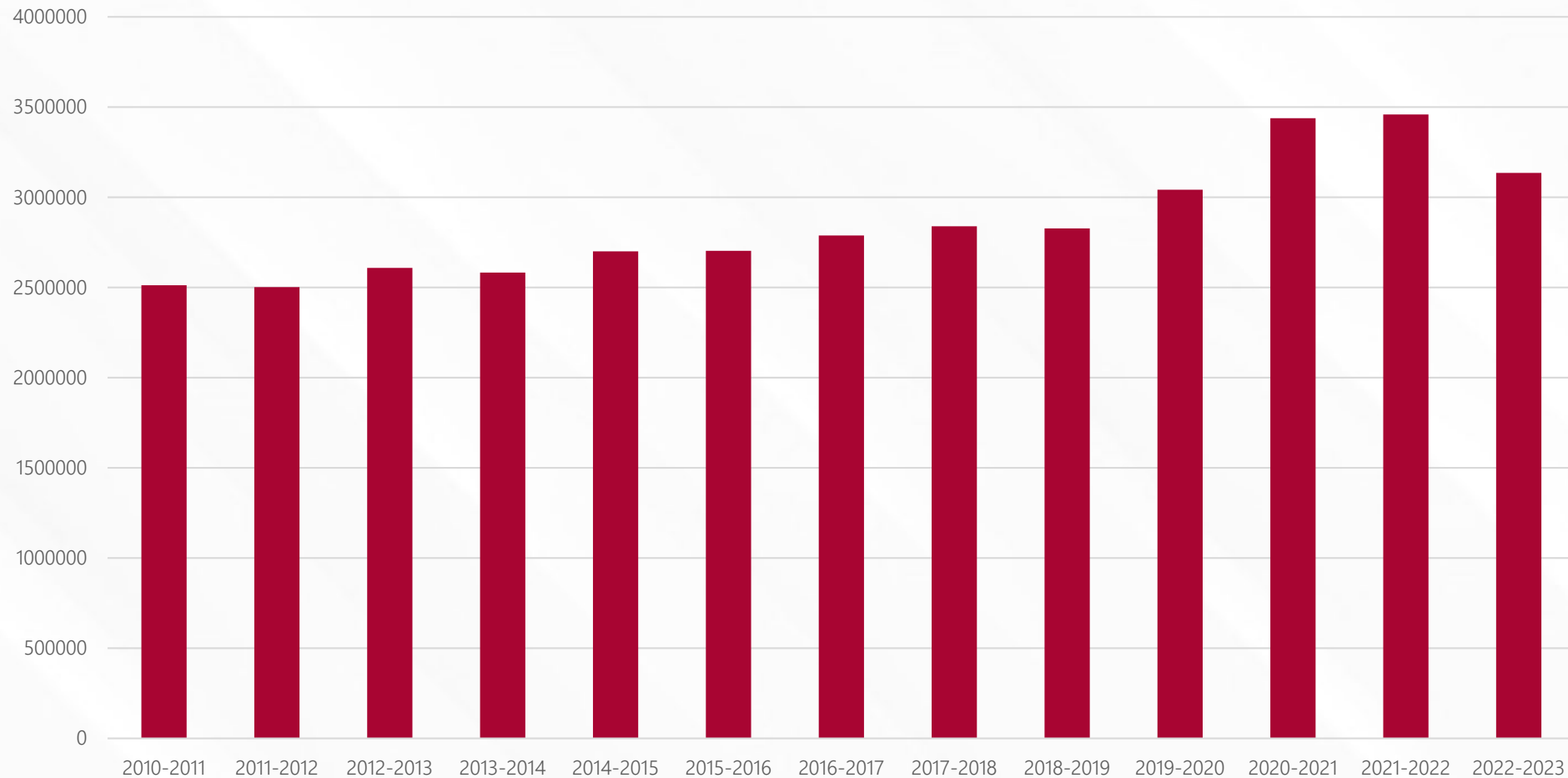


what does **REMI** say?<sup>sm</sup>

# COVID Effects on Deaths by Year



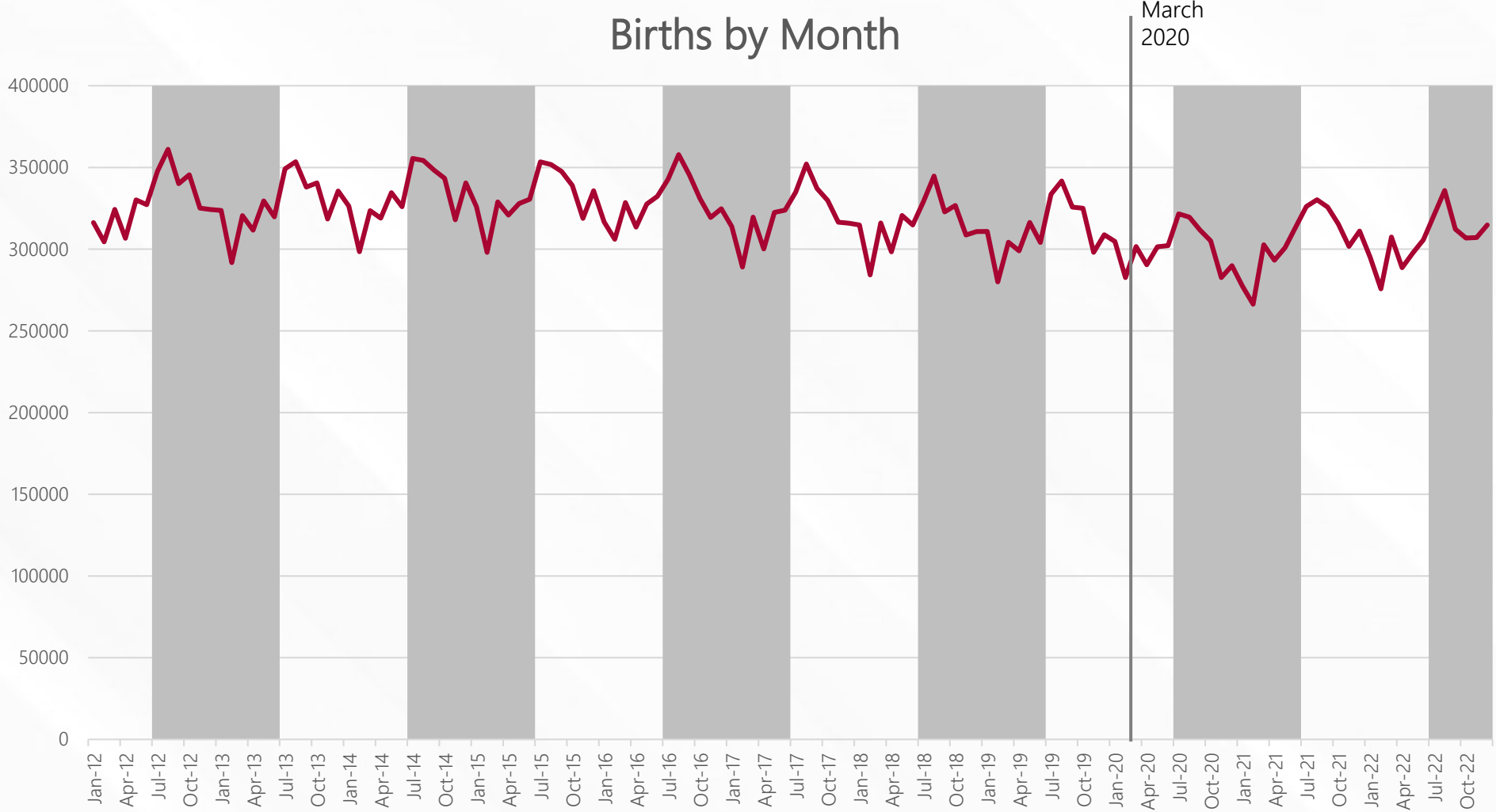
## Deaths from Midyear to Midyear



what does **REMI** say?<sup>sm</sup>



# COVID Effect on Births by Month

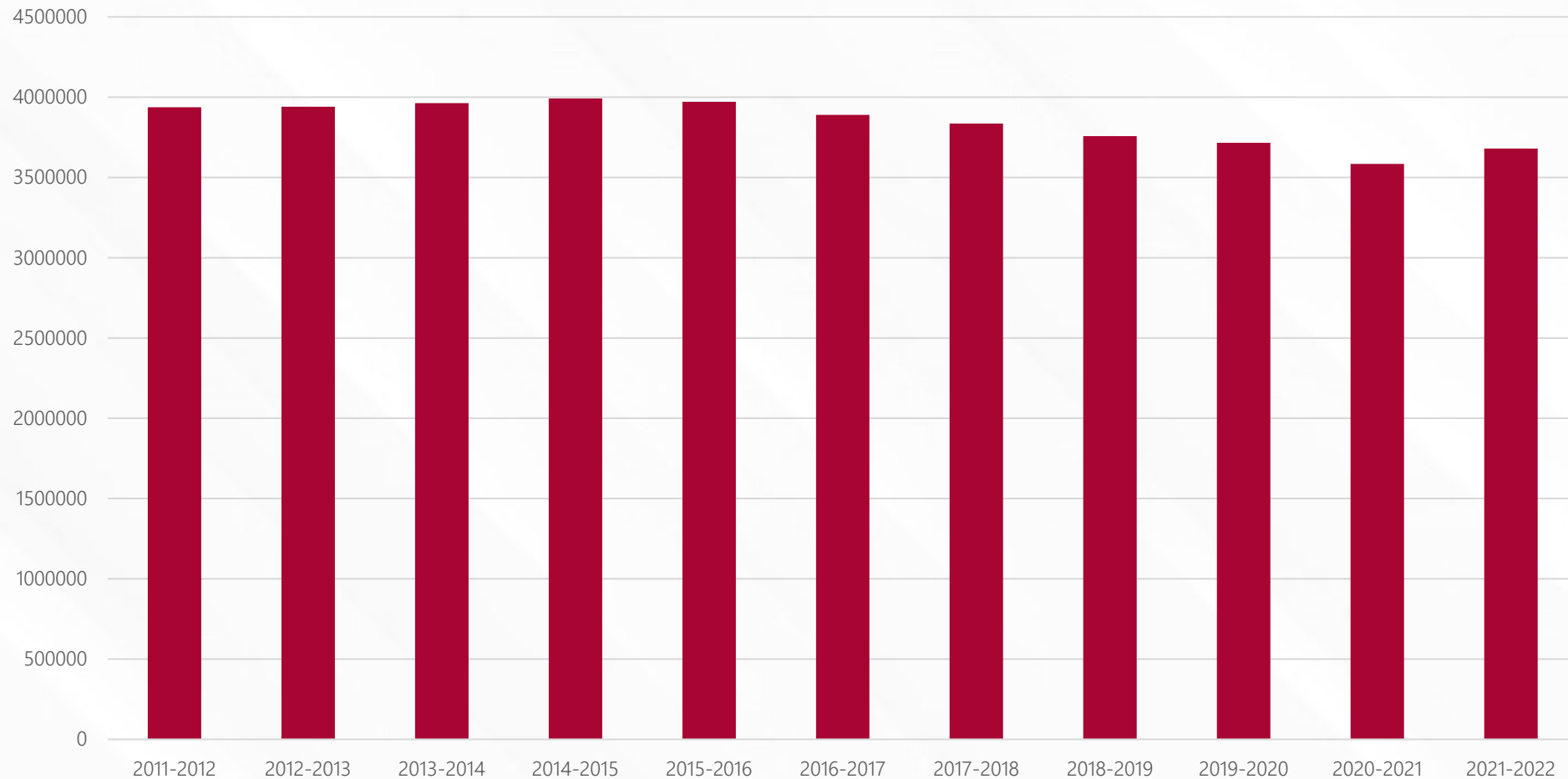


what does **REMI** say?<sup>sm</sup>

# COVID Effects on Births by Year



Birth from Midyear to Midyear

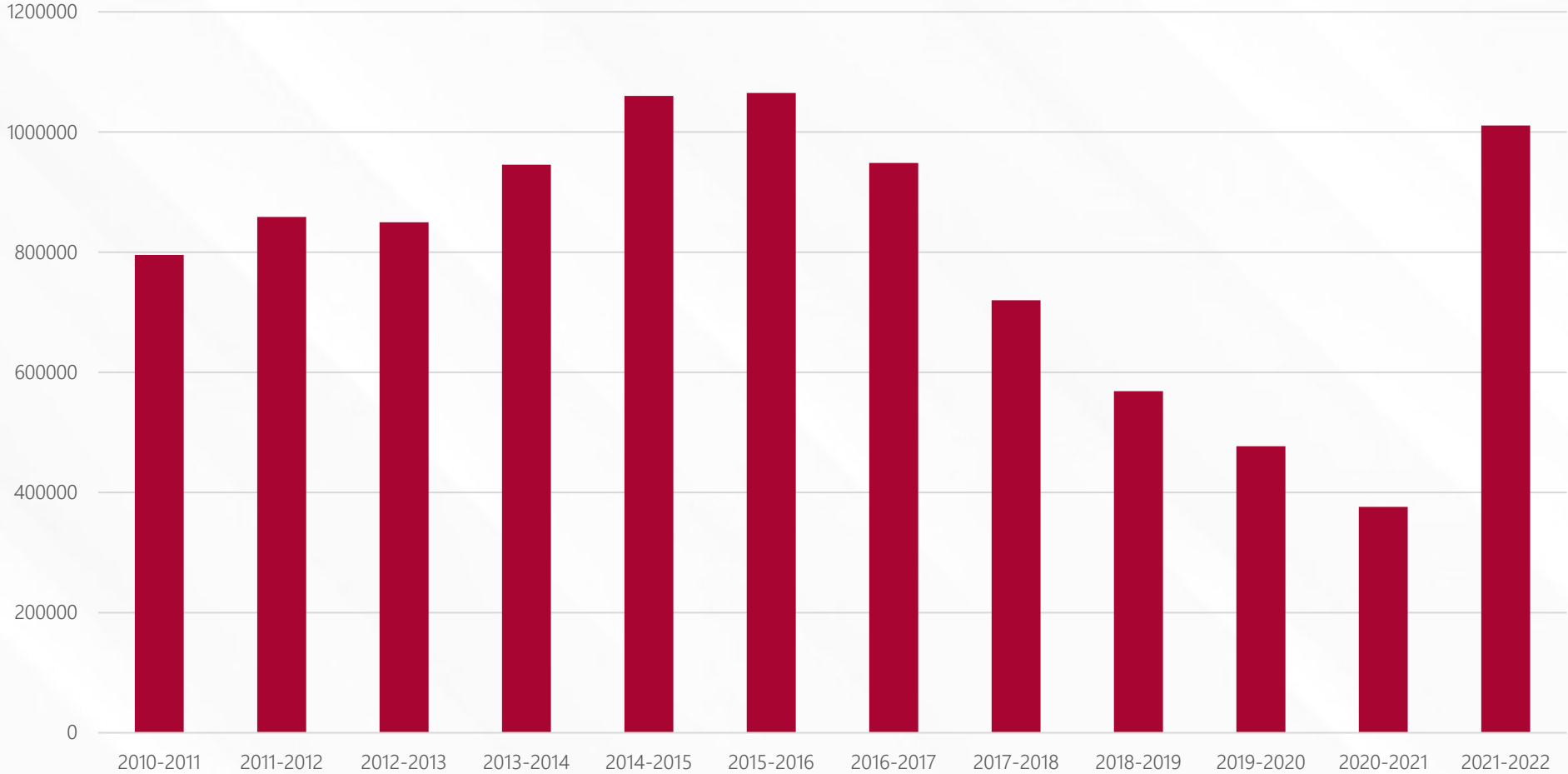


what does **REMI** say?<sup>sm</sup>

# Net International Migration by Year



## Net International Migrations from Midyear to Midyear



what does **REMI** say?<sup>sm</sup>

# Forecast Adjustments

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- The birth rates and survival rates in the model were adjusted to 'bounce-back' to pre-COVID levels
- Switched to CBO international migration forecasts instead of Census forecasts because they are released more frequently

# Agenda

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Introduction

Reviewing 2023

Looking into 2024

*what does **REMI** say?<sup>sm</sup>*

## Annual updates

- Historical period 2001-2022
- BLS 2022-2032 employment projections, etc.

## Periodic updates

- Comprehensive BEA Update
- Fixed dollar year will change from 2012 to 2017

## Software updates

- No major interface changes planned
- Usual improvements, fixes, and suggestions



- Comprehensive update to the National Economic Accounts (NEAs)
  - National Income and Product Accounts (NIPAs)
  - Industry Economic Accounts (IEAs)
- Comprehensive update of the Regional Economic Accounts (REAs)
- New detailed supply and use tables (SUTs) for 2017
- A key feature of this comprehensive update is the concurrent release of the benchmark SUTs and the comprehensive updates of the NIPAs, IEAs, and REAs.
- Output, price, and chained-GDP measures will use 2017 as the reference year instead of 2012.
- Will use the 2017 NAICS instead of 2012 NAICS

- New detailed supply and use tables (SUTs) for 2017
- Major data revisions
  - Current-dollar measures of GDP and related components from 2013-2023.
  - Current-dollar GDP by industry statistics from 2005-2023
  - Gross domestic income (GDI) and select income components from 1979-2023.
- New and revised source data, including 2017 Census
- Improved methodologies and classifications



- Changes in methodologies and classifications that address data gaps or implement other improvements, including the following:
  - Improved classification and measures of real estate investment trusts
  - Improved measures of regulated investment companies
  - New measures of monetary interest paid by Federal Reserve Banks
  - Improved measures of the use by industries of financial intermediation services furnished without payment
  - Improved measures of housing services
  - Improved measures of intermediate expenses for meals and entertainment
  - Improved measures of National Flood Insurance Program services
  - Improved measures of investment in own-account software
  - Improved measures of brokers' commissions
  - Improved price measures

- The annual personal income by state statistics will be revised from 1979 to 2022.
- The annual current-dollar measures of GDP by state and related components will be revised from 1997 to 2022.
- The regional estimates will incorporate newly available and revised regional source data, including data from the U.S. Census Bureau 2017 Economic Census and annual source data that have become available since the last annual update
- New and improved methodologies

- Changes in Methodology
  - Chained-dollar measures of GDP by state and GDP by county
  - GDP by county measures of management of companies and enterprises
  - County measures of state unemployment insurance benefits
  - Discount rate for private and state and local defined benefit pension plans

# Comprehensive Updates Effect on REMI Models

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- The real dollar year in the model will switch to \$2017
- Small changes to detailed output translator policy variables
- Revised history values
- Some changes to industry names and NAICS codes, mostly in the information sector

# Detailed Industry Output Translator Variable Changes

The new tables will support slightly fewer detailed output industries

Household cooking  
appliance manufacturing

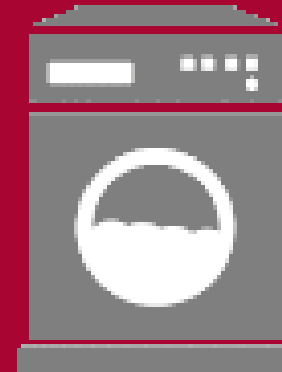
Household refrigerator  
and home freezer  
manufacturing

Household laundry  
equipment  
manufacturing

Other major household  
appliance manufacturing

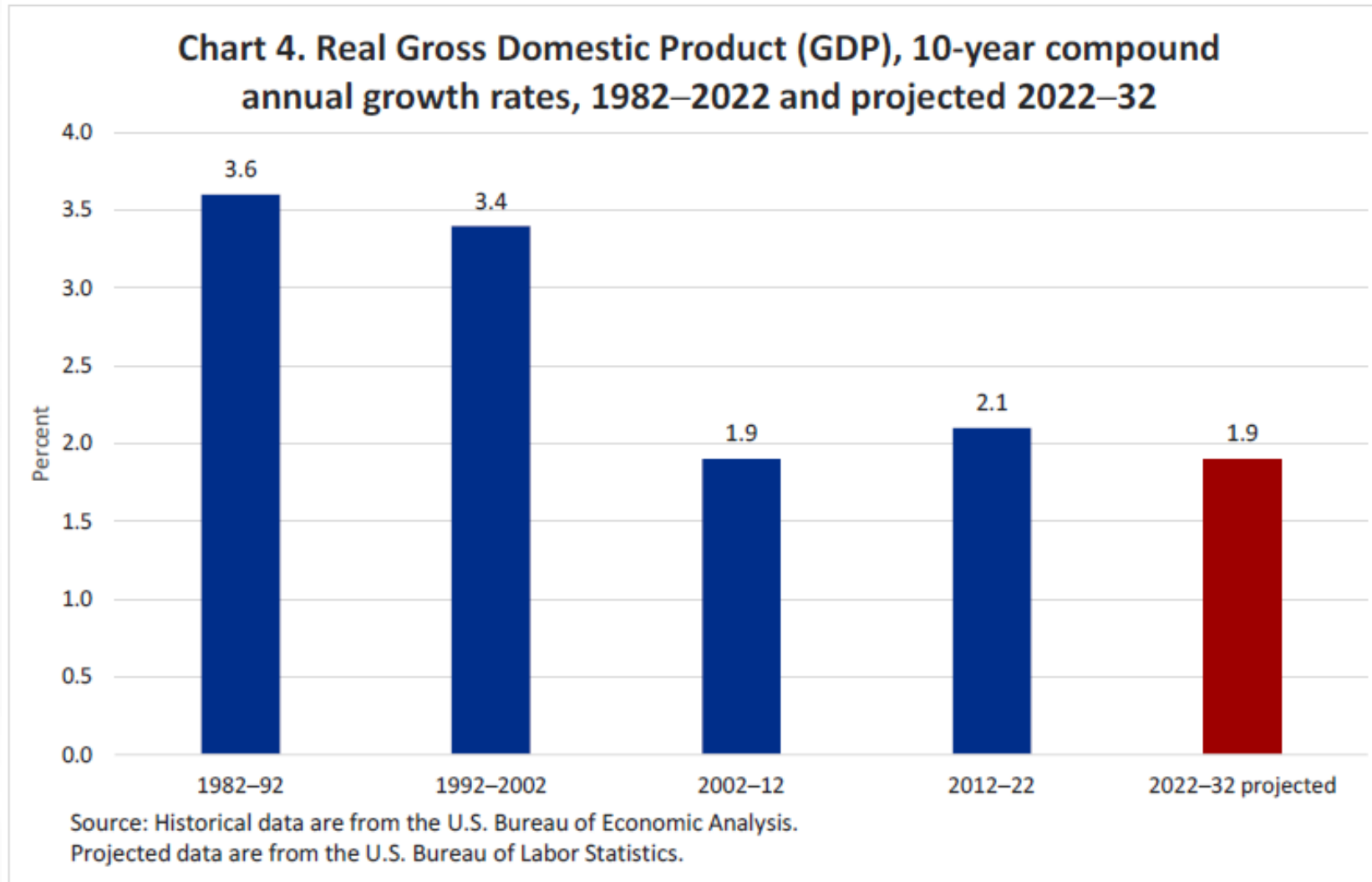


Major household  
appliance manufacturing



- The Employment Projections (EP) program develops information about the labor market for the nation as a whole for 10 years in the future.
  - Supply and use tables from 1997-2022, 2032
  - Output and employment by sector, 2032
  - Employment by occupation, 2032
  - Labor force participation rate projections, 2022-2032

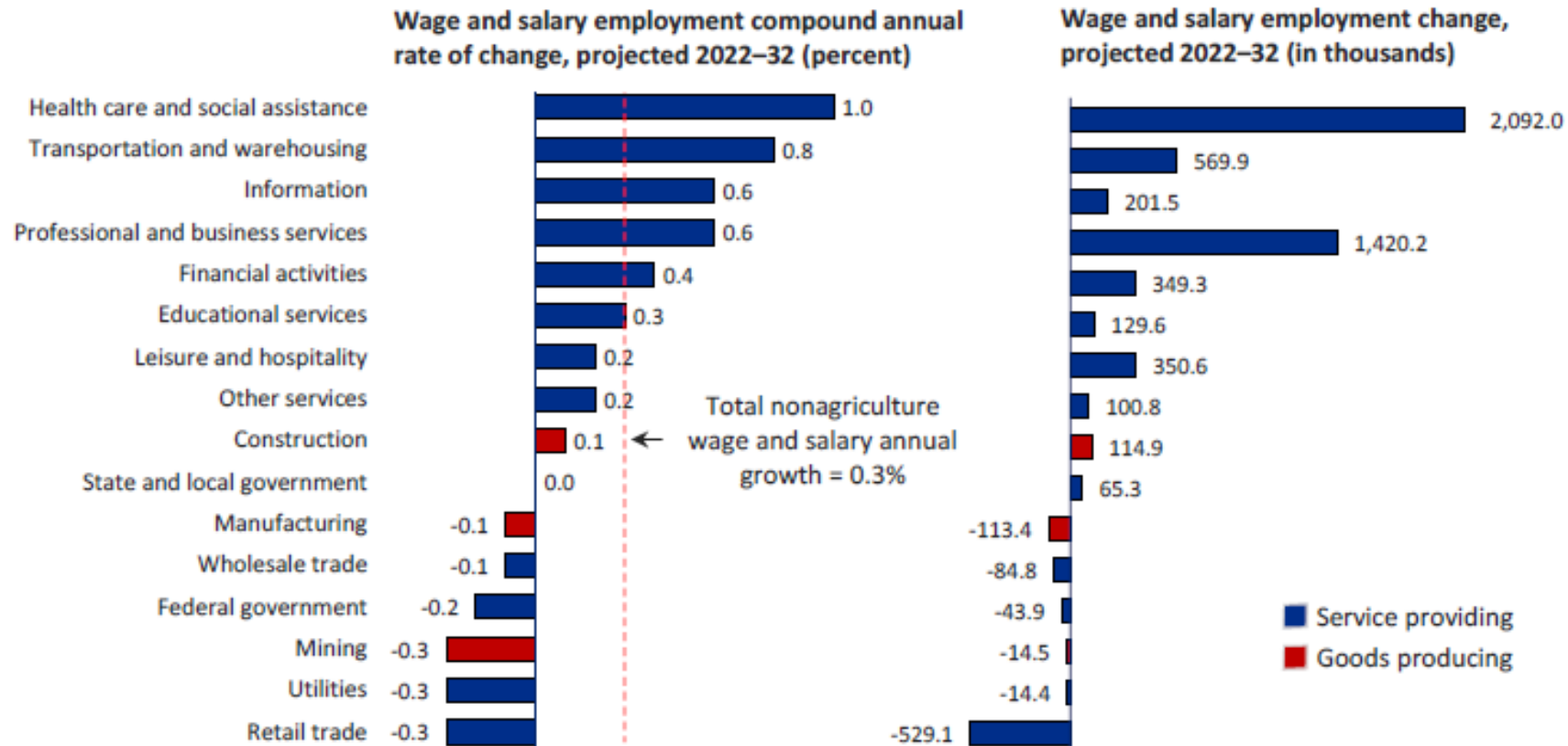
# BLS 2022-2032 Employment Projections



what does **REMI** say?<sup>sm</sup>

# BLS 2022-2032 Employment Projections

Chart 5. Employment change by industry sector, projected 2022–32



Note: Nonagriculture wage and salary employment includes wage and salary data from the Current Employment Statistics (CES) survey, except private households, which is from the Current Population Survey (CPS). Logging workers are excluded.

Source: U.S. Bureau of Labor Statistics



# Beverage and Tobacco Manufacturing

- Supply and Use tables no longer support the 'Beverage Manufacturing' and 'Tobacco Manufacturing' as separate sectors for the 160 sector model. Retail trade will be split to maintain 160 sectors.

Beverage Manufacturing  
Tobacco Manufacturing

- Beverage and Tobacco Manufacturing

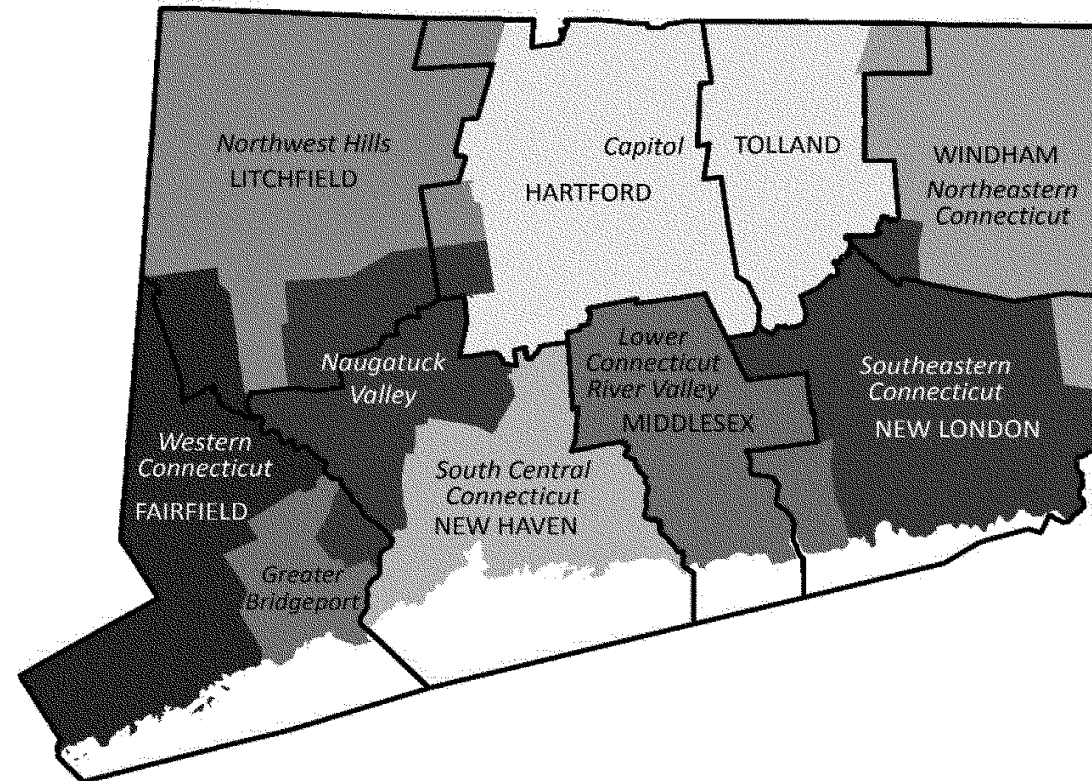
Retail Trade

- Retail trade (excluding motor vehicle and parts dealers)
- Motor vehicle and parts dealers

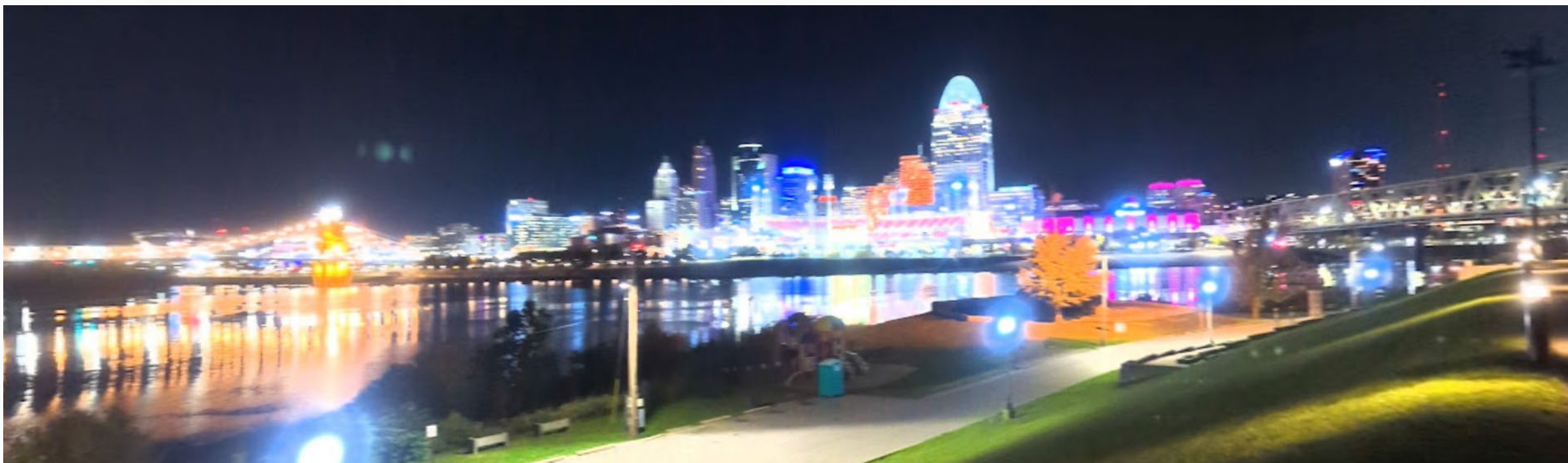
# Connecticut

- The 8 counties have been replaced with 9 county equivalents in Census data, but the BEA has not made a change yet

Figure 1. Relationship between Counties and Planning Regions. County boundaries are shown as thick lines; names are labeled in standard font in all caps. The planning regions are shaded; names are in italics.



# Thank you for attending!



what does **REMI** say?<sup>sm</sup>

# Users' Roundtable Discussion

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

