Seasonal Adjustment Post-Pandemic

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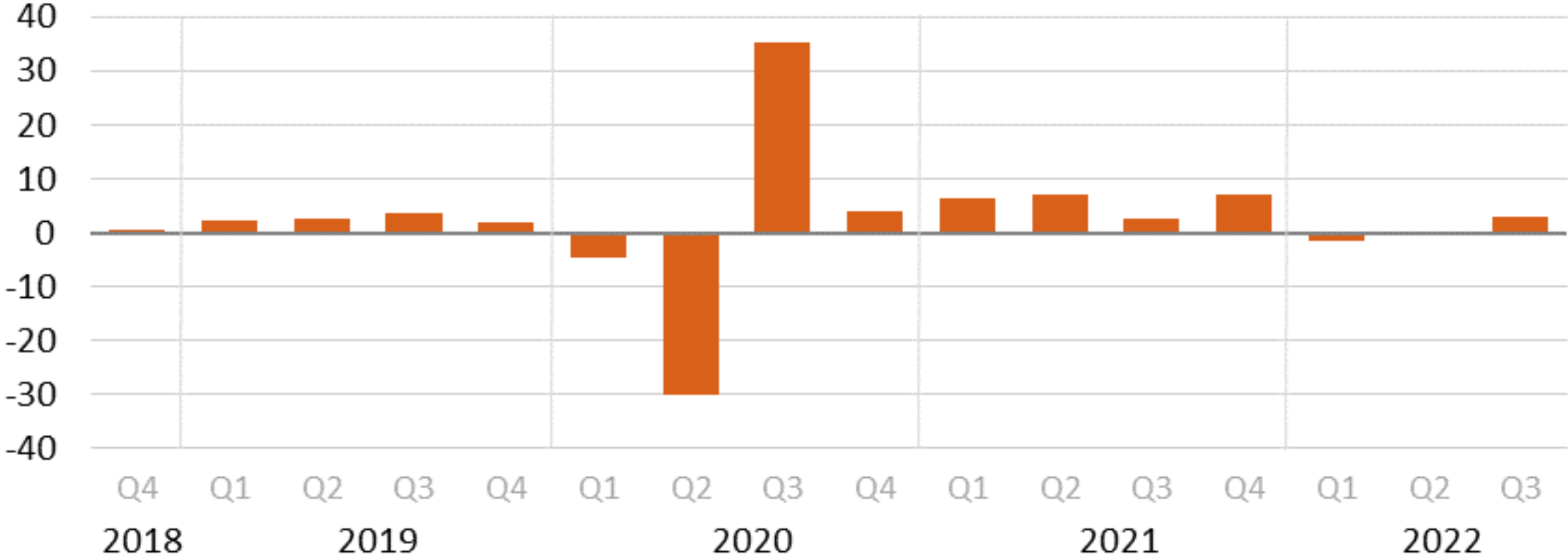
Federal Economic Statistics Advisory Committee

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Real GDP: Percent change from preceding quarter

U.S. Bureau of Economic Analysis

Seasonally adjusted annual rates

12/7/2022

- Remove seasonal effects from a time series
  - Seasonal effects occur with roughly the same timing, intensity, direction each year

- To better view underlying movements
  - Cycles and trends
  - Identify direction and turning points

- Improve comparability of data

How is seasonally adjusted GDP calculated?

- BEA uses an [indirect approach](#) to derive seasonally adjusted (SA) GDP
  - Detailed components are seasonally adjusted and then aggregated to top line GDP

- Most detailed components rely on source data that are already seasonally adjusted by the Census Bureau and Bureau of Labor Statistics
  - BEA analysts and subject matter experts carefully review the source data and their seasonal adjustments

- BEA seasonally adjusts only a portion of the detailed components of GDP

- Measuring the effect of extreme events on seasonal factors underlying GDP is not straightforward

Major source data and source of seasonal adjustment for real GDP

Current Dollar Data Sources		
Data Item	**Source Agency**	**Source of Seasonal Adjustment**
Monthly Retail Sales	Census	Census
Quarterly Services Survey	Census	Census and BEA
Construction Spending	Census	Census
Manufacturing and Trade Inventories	Census	Census
Manufacturers' Shipments	Census	Census
Exports and Imports of Goods	Census	Census and BEA
Exports and Imports of Services	BEA	BEA
Current Employment Statistics	BLS	BLS
Quarterly Census of Employment and Wages	BLS	BEA
Petroleum, utilities, and motor vehicle fuels	EIA	BEA
Motor Vehicle Unit Sales	Wards	FRB
Private trade data	Various	BEA

Price Data Sources		
Data Item	**Source Agency**	**Source of Seasonal Adjustment**
Consumer Price Indexes	BLS	BLS
Producer Price Indexes (Industry based)	BLS	BEA and BLS
Producer Price Indexes (Commodity based)	BLS	BLS
Export Price Indexes	BLS	BEA
Import Price Indexes	BLS	BEA
Employment Cost Indexes	BLS	BLS

Adapted from GDP Key Source Date and Assumptions Table and Summary of NIPA Methodologies, Nov. 2022 *Survey of Current Business*

12/7/2022

- BEA aims for consistency with approaches used by Census and BLS
  - For individual series, often confer with Census on specific treatments and interpretation of the diagnostics

- Seasonal adjustment "settings" evaluated once a year
  - Inputs (source data) are tested for extreme values (outliers)
  - Use the X-13ARIMA-SEATS statistical package
  - Seasonal status of series may change
  - Historical seasonal factors may be revised; even if the underlying unadjusted data are unrevised

- BEA's estimates largely reflect "concurrent" seasonal factors
  - A series seasonal factor is recalculated to account for new observations as they become available

- Priorities
  - Ensure that any given series reflect the events that occurred over the time period
  - Evaluate routine data and methods for gaps or lack of coverage
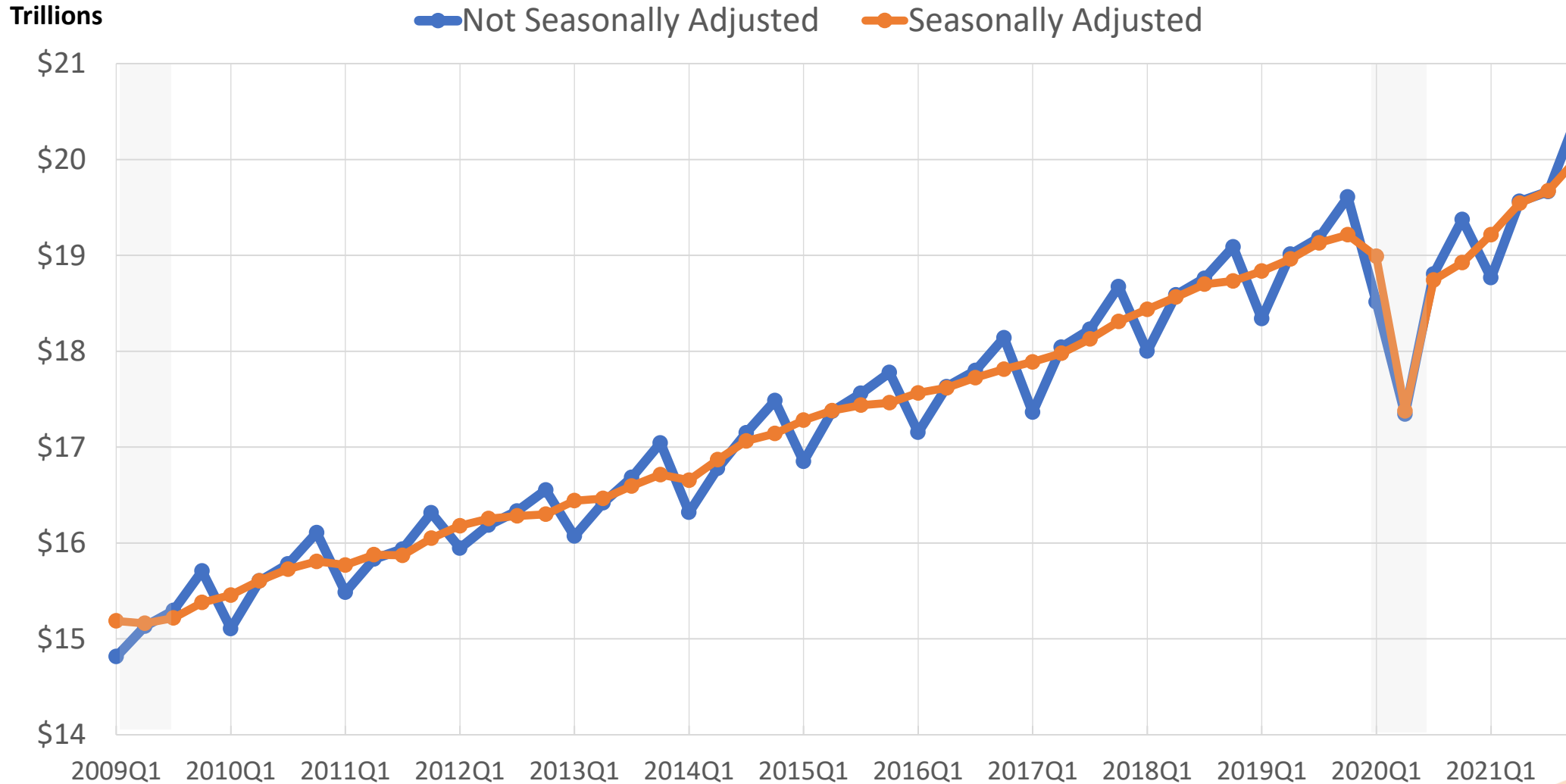 - Be transparent about methods and sources
- Mechanics
  - Seasonal analysis conducted on series through 2021
  - Accepted the seasonal adjustments performed by Census and BLS
  - Tested series using X-13ARIMA-SEATS "Additive Outlier" and "Level Shift" specifications
  - Relied on subject matter analyst's expertise to determine if additional interventions required
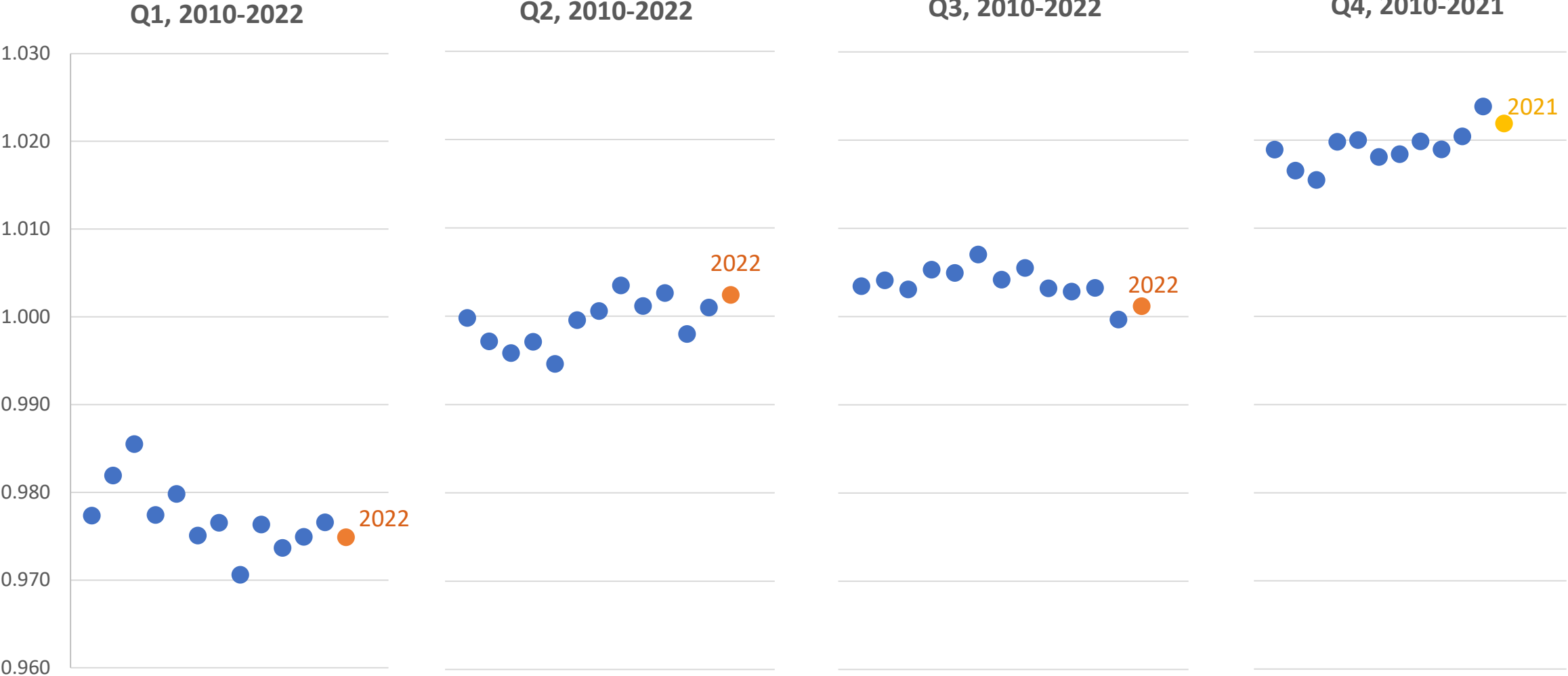- Outcomes
  - Many observations for 2020 recognized as outliers
  - For 2020-forward, seasonal factors updated but 2020 observations did not inform those factors
  - Generally, 2020 observations did not lead to historical revisions solely because of seasonal adjustment

Real GDP, 2009 Q1–2021 Q4

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Real GDP, 2010 Q1–2022 Q3: Ratio of NSA to SA

- Fundamental Question: Are seasonal patterns changing?

- More observations needed to draw a confident conclusion
  - Explore evaluation using temporary changes specification and seasonal "breaks" available in the X13 application
  - Done on a series-by-series basis

- Strategy includes:
  - Evaluation with each annual update
  - Continued collaboration and knowledge sharing with our data providers
  - Adoption of additional diagnostics and tests
  - Maintain transparency as methods and approaches evolve