# The blsplotGG package

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**Seasonal Adjustment Practitioners Workshop**

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***Views expressed are those of the author and do not necessarily reflect the views or policies of the U.S. Bureau of Labor Statistics***

# Outline

- Introduction
- ggplot2 package
- Types of plots available
- Examples
- Further Work

# Introduction

- Began working at BLS in 2019 as a rehired annuitant
- Taught myself how to generate R packages to help with my work
- R package for seasonal adjustment graphics
  - based on Tom Evans' blsplot SAS package
  - called blsplotR

# Introduction

- Became disenchanted with base R plots
  - wanted to create professional looking graphics
  - needed to specify a number of graphics parameters controlled by `par`
- Decided to convert functions from `blsplotR` to use the `ggplot2` package

# ggplot2 package

- Created by Hadley Wickham (see Wickham (2016))
- Based on Wilkinson (2005)
- Creates plots in layers
  - Manipulate data into a data frame
  - Map variables into an aesthetic (x, y, groupings)
  - Add types of plots (line, points, histograms, etc)
  - Add attributes like color, titles, axis labels
- Returns a ggplot object which generates a plot

# Types of plots in blsplotGG

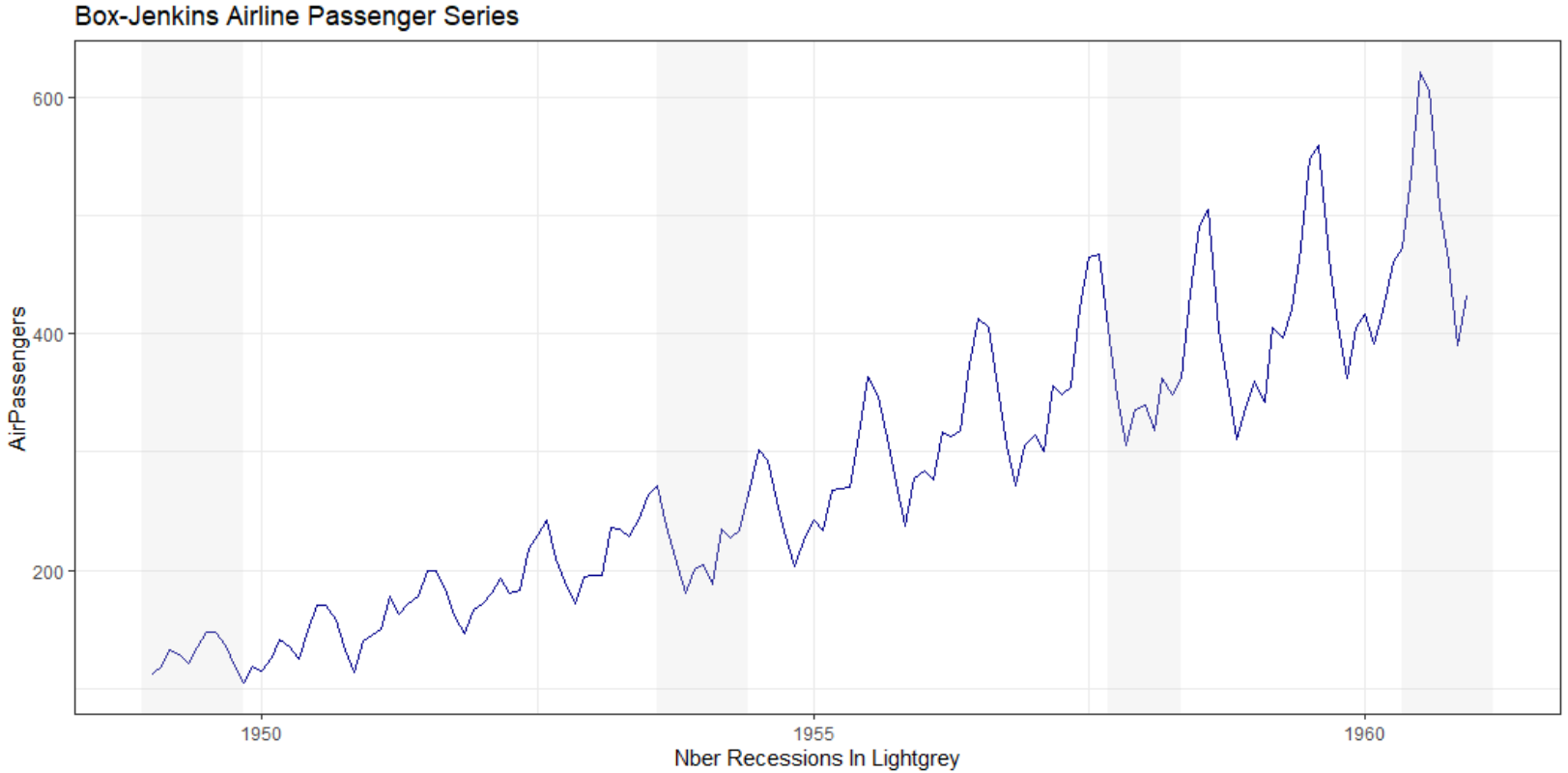
- Time series plots
- Factor plots
- Spectral plots
- Revision history plots
- SEATS diagnostic plots

# Time series plot

```
air_p <-
  blsplotGG::plot_series(AirPassengers,
      this_series_name = "AirPassengers",
      main_title = "Box-Jenkins Airline Passenger Series",
      do_grid = TRUE,
      draw_recess = TRUE,
      line_color = "darkblue")

air_p
```

# Time series plot

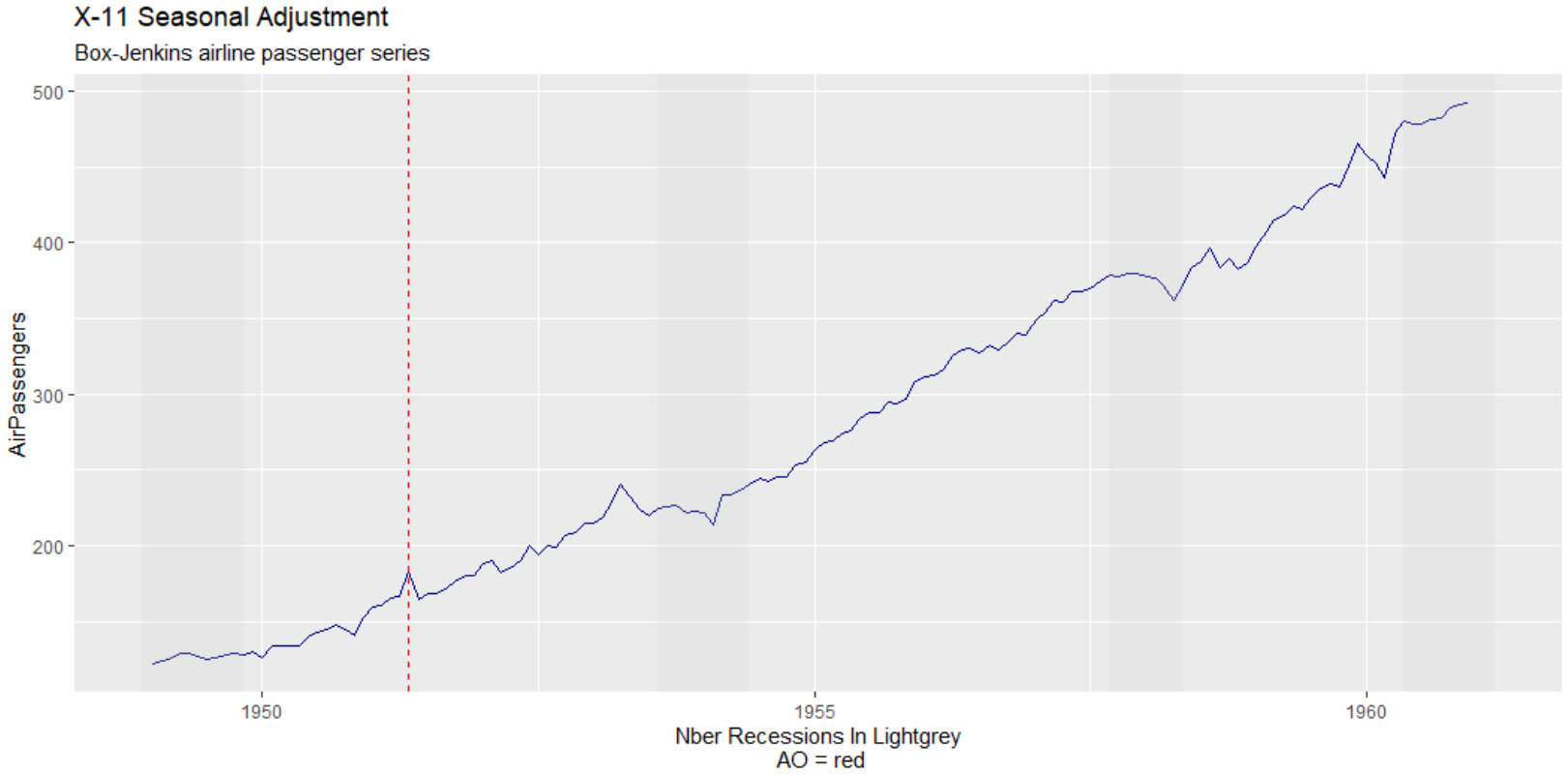


# Time series plot, X-13 table

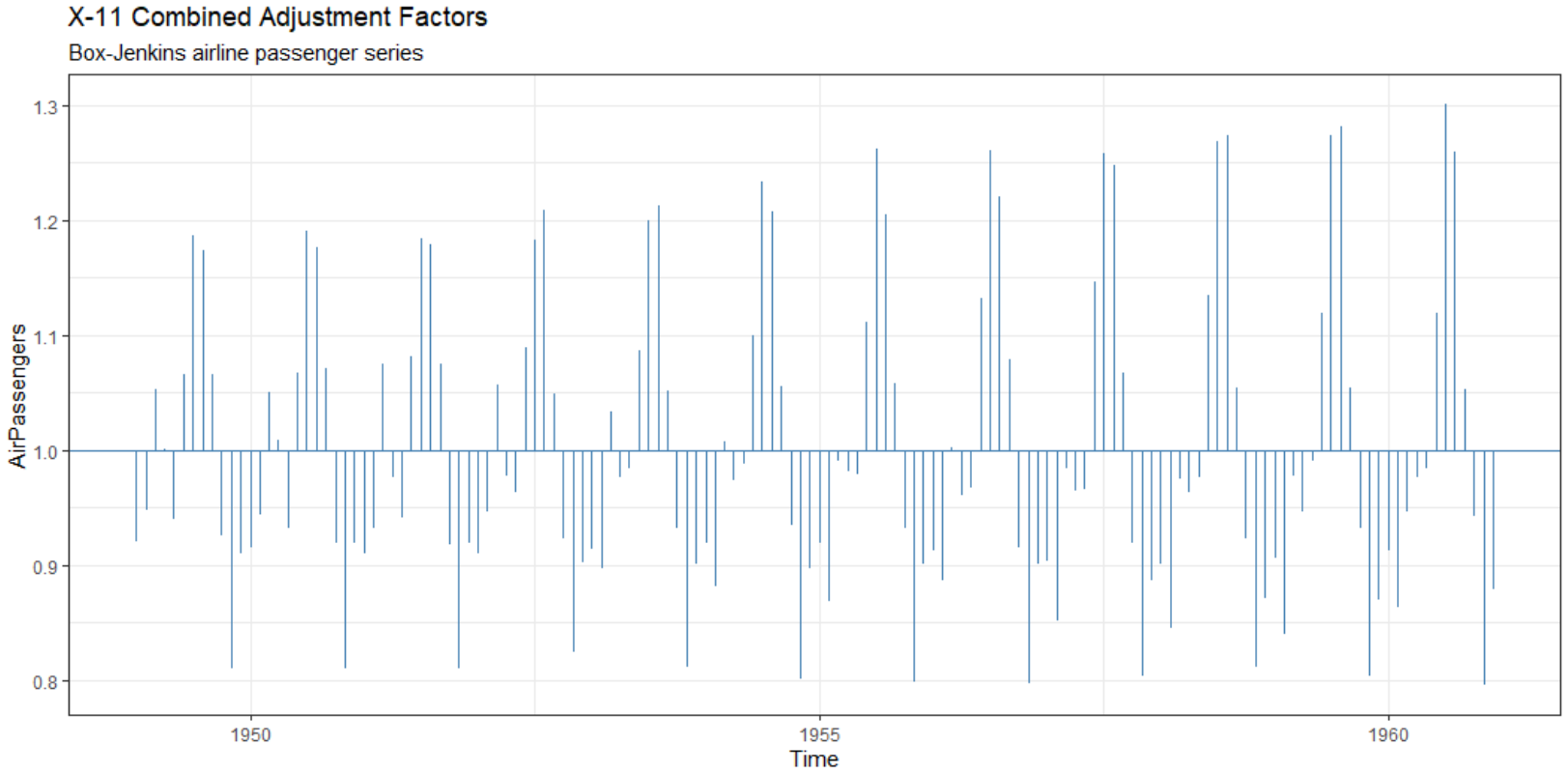
```
air_seas <-
  seasonal::seas(AirPassengers, arima.model = "(0 1 1)(0 1 1)", x11="",
                 series.save = 'b1', transform.function = "log",
                 x11.save = c("e3", "d12", "d16"))
air_d11_p <-
   blsplotGG::plot_table(air_seas, "d11",
         this_y_label = "AirPassengers",
         main_title = "X-11 Seasonal Adjustment",
         sub_title = "Box-Jenkins airline passenger series",
         do_grid = TRUE, draw_recess = TRUE, do_background = TRUE,
         use_ratio = FALSE, add_outlier = TRUE,
         line_color = "darkblue")

air_d11_p
```

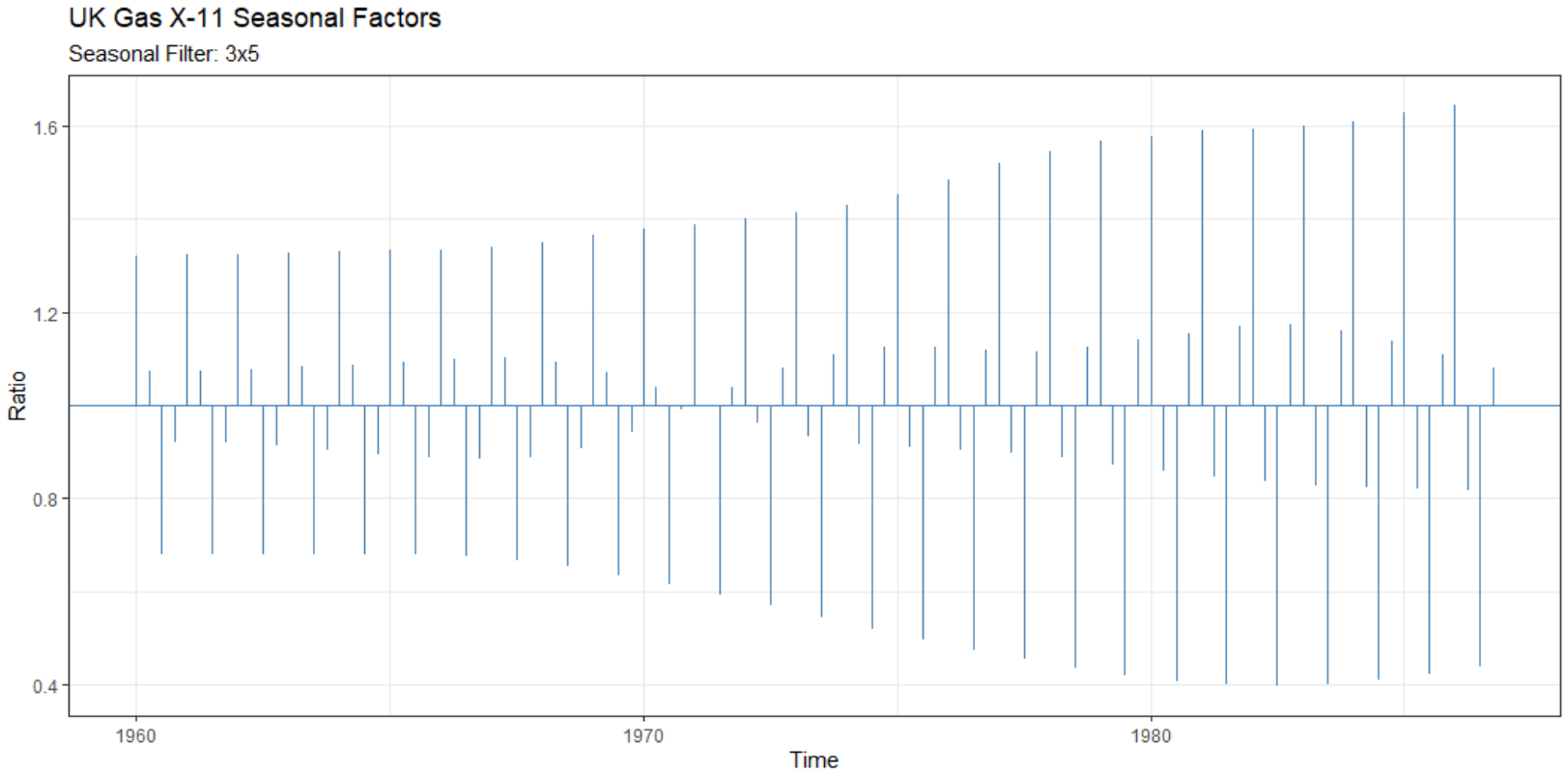
# Time series plot, X-13 table



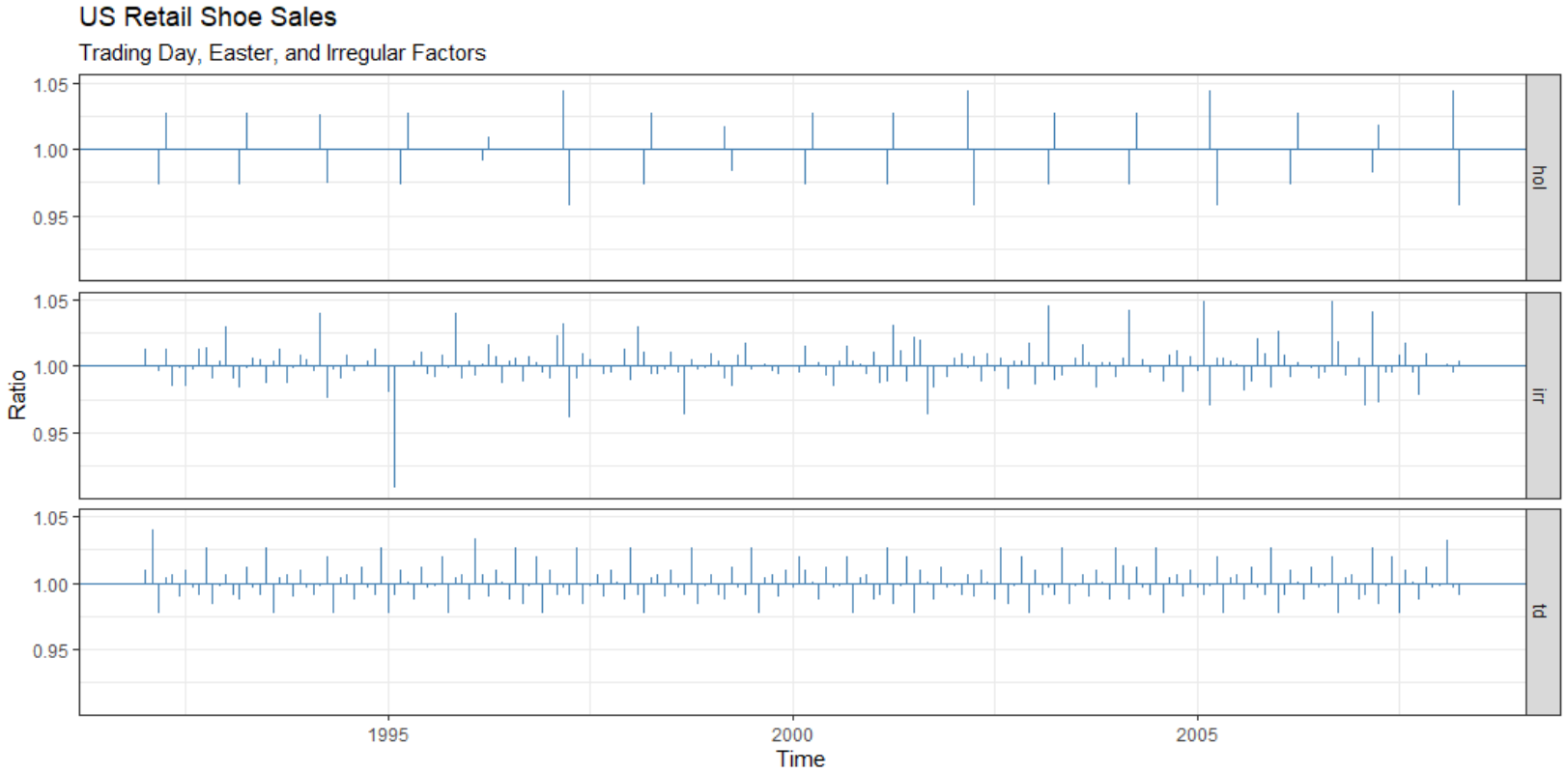
# Time series plot, X-13 factor table



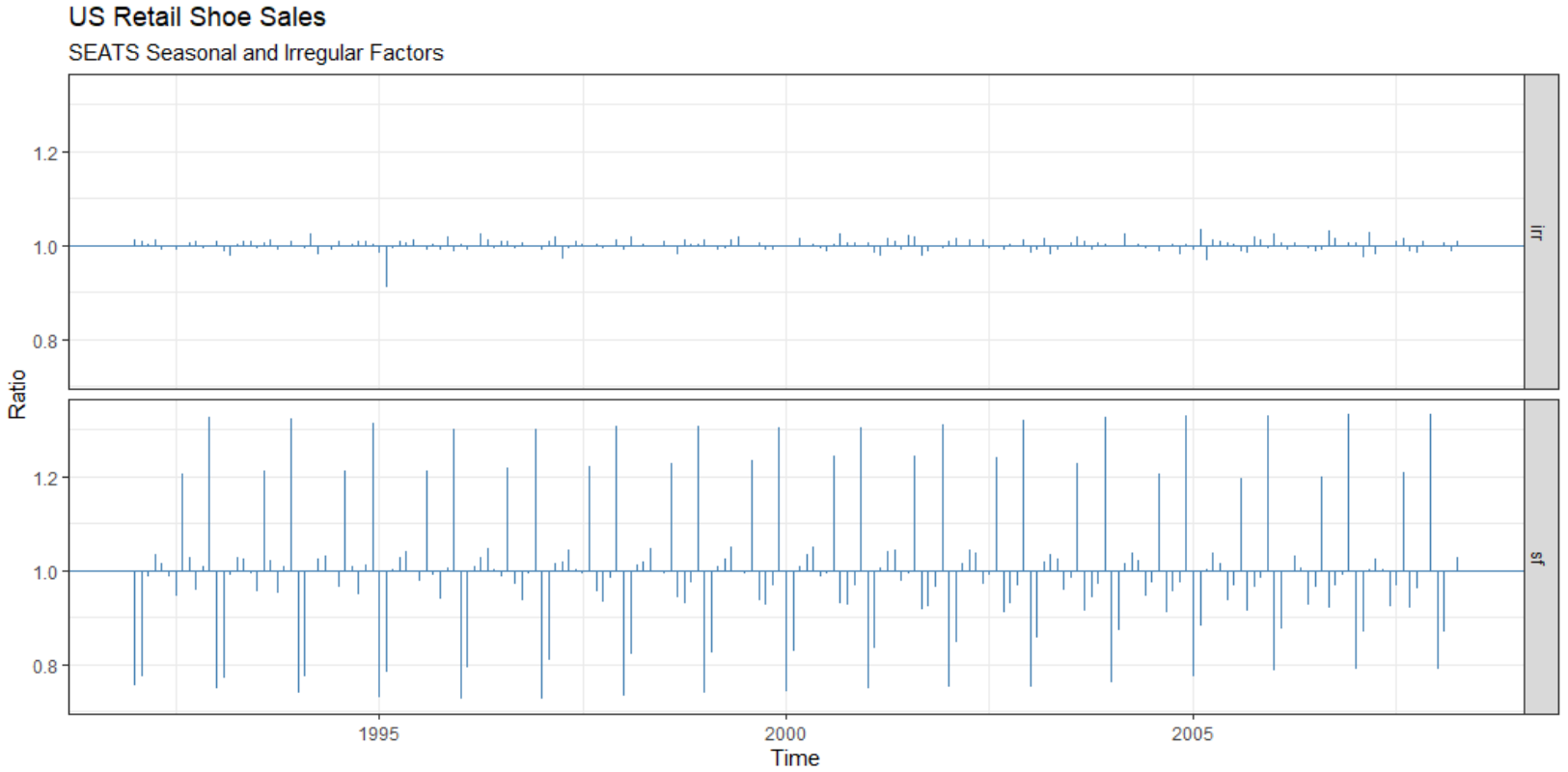
# Ratio Plot


UK Gas X-11 Seasonal Factors
Seasonal Filter: 3x5
Ratio
1.6
1.2
0.8
0.4
1960
1970
1980
Time

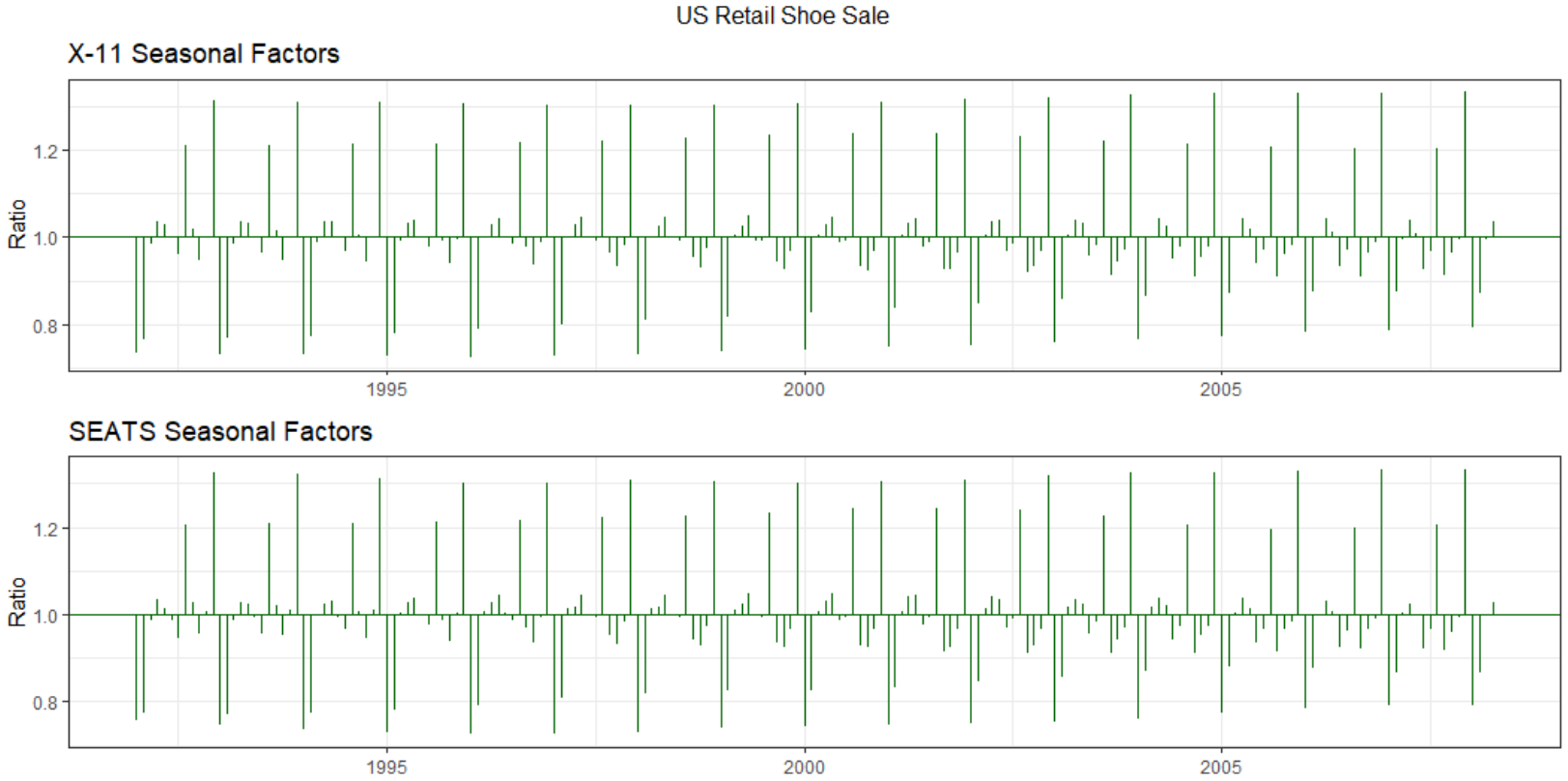
# Component plots: factors



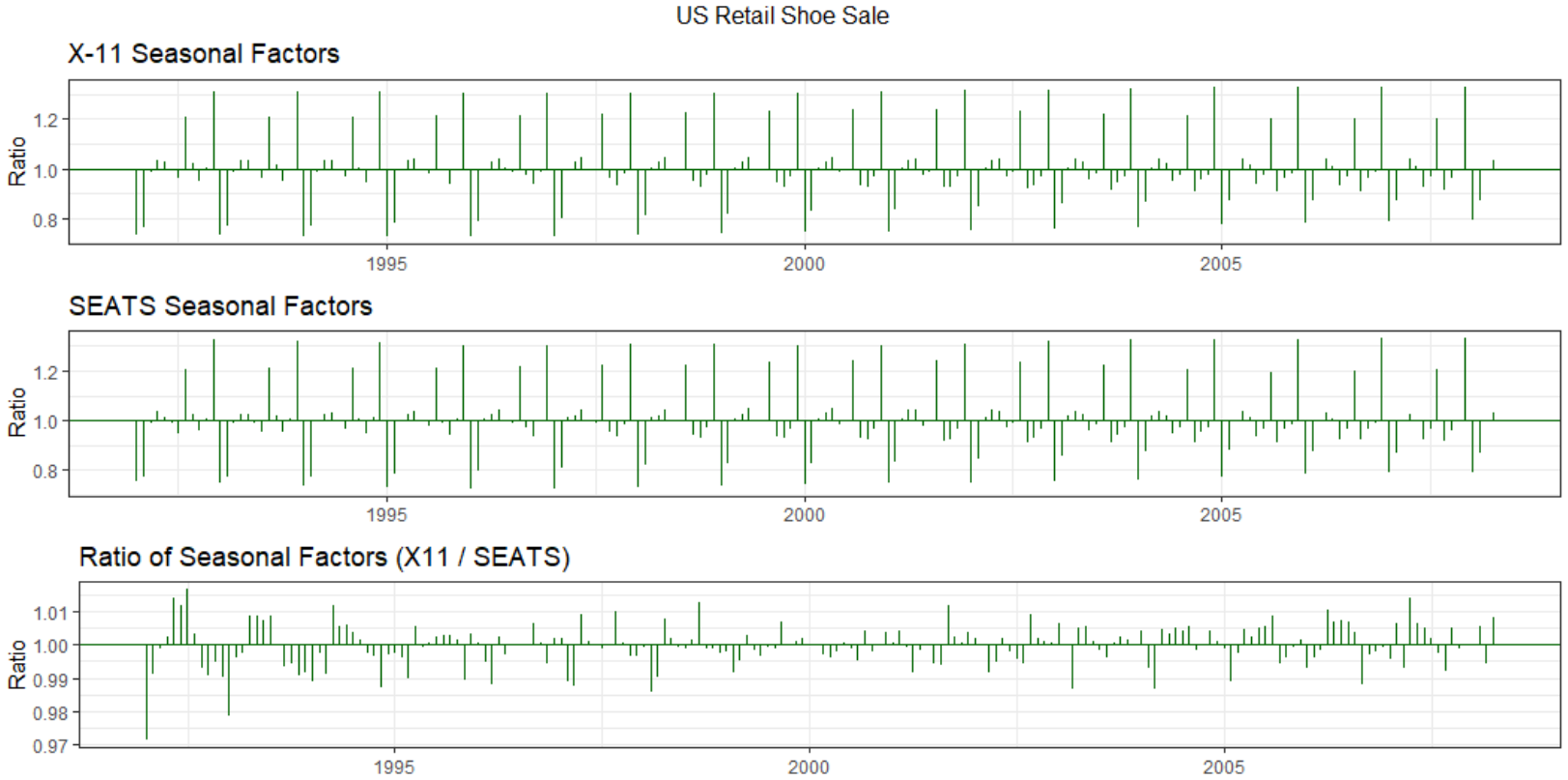
# Component plots: factors



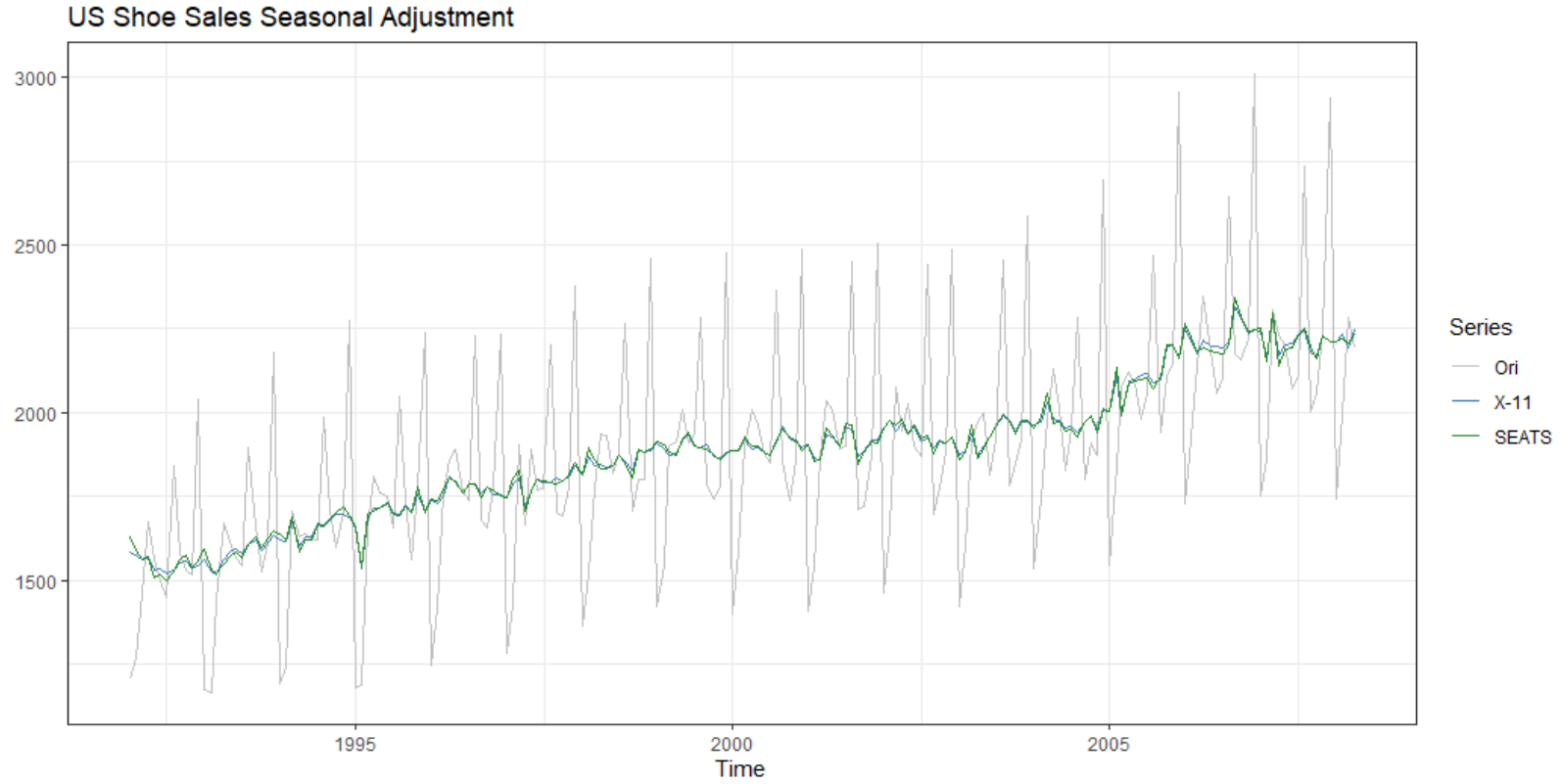
# Comparison plots: factors



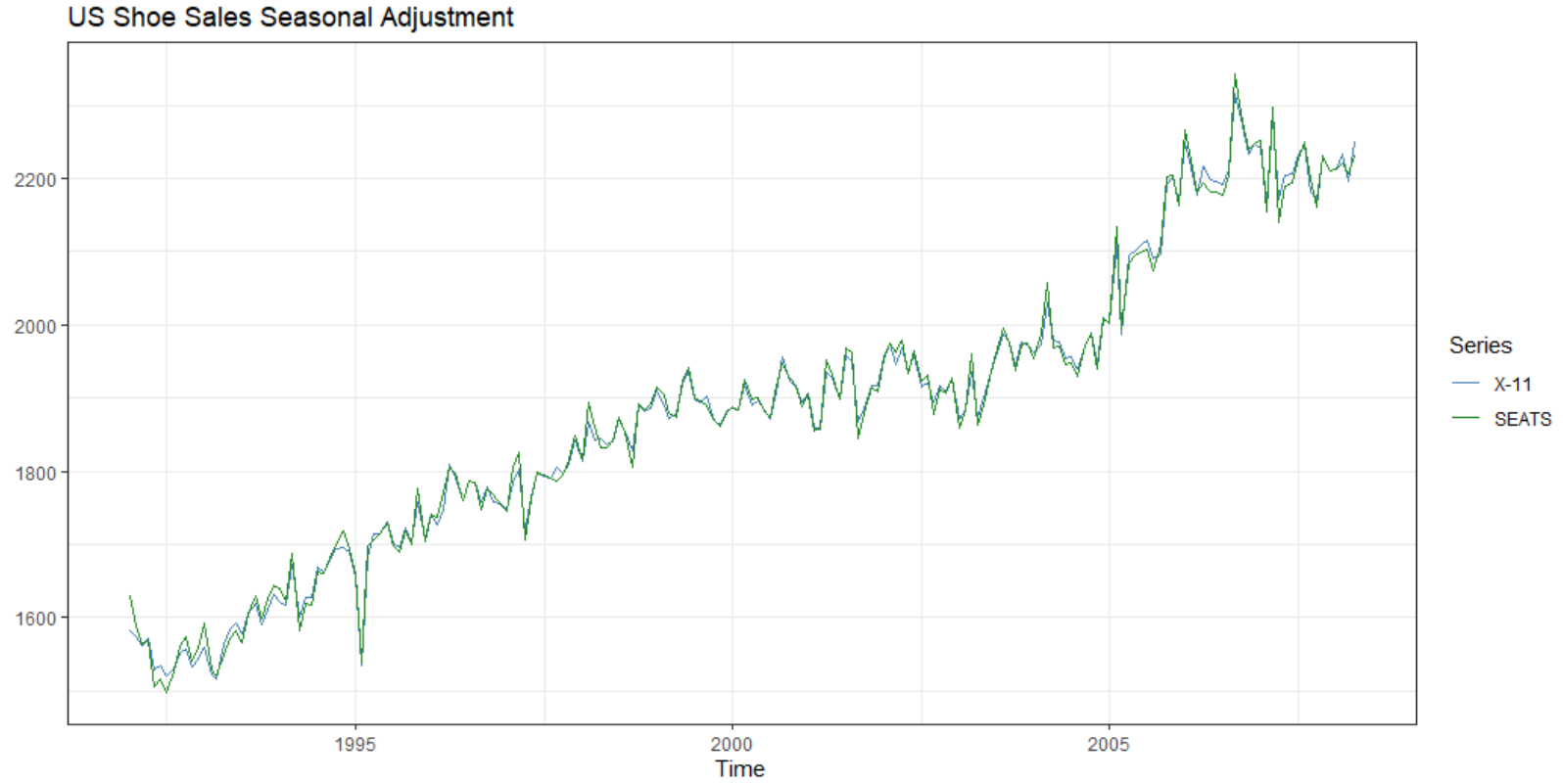
# Comparison plots: factors



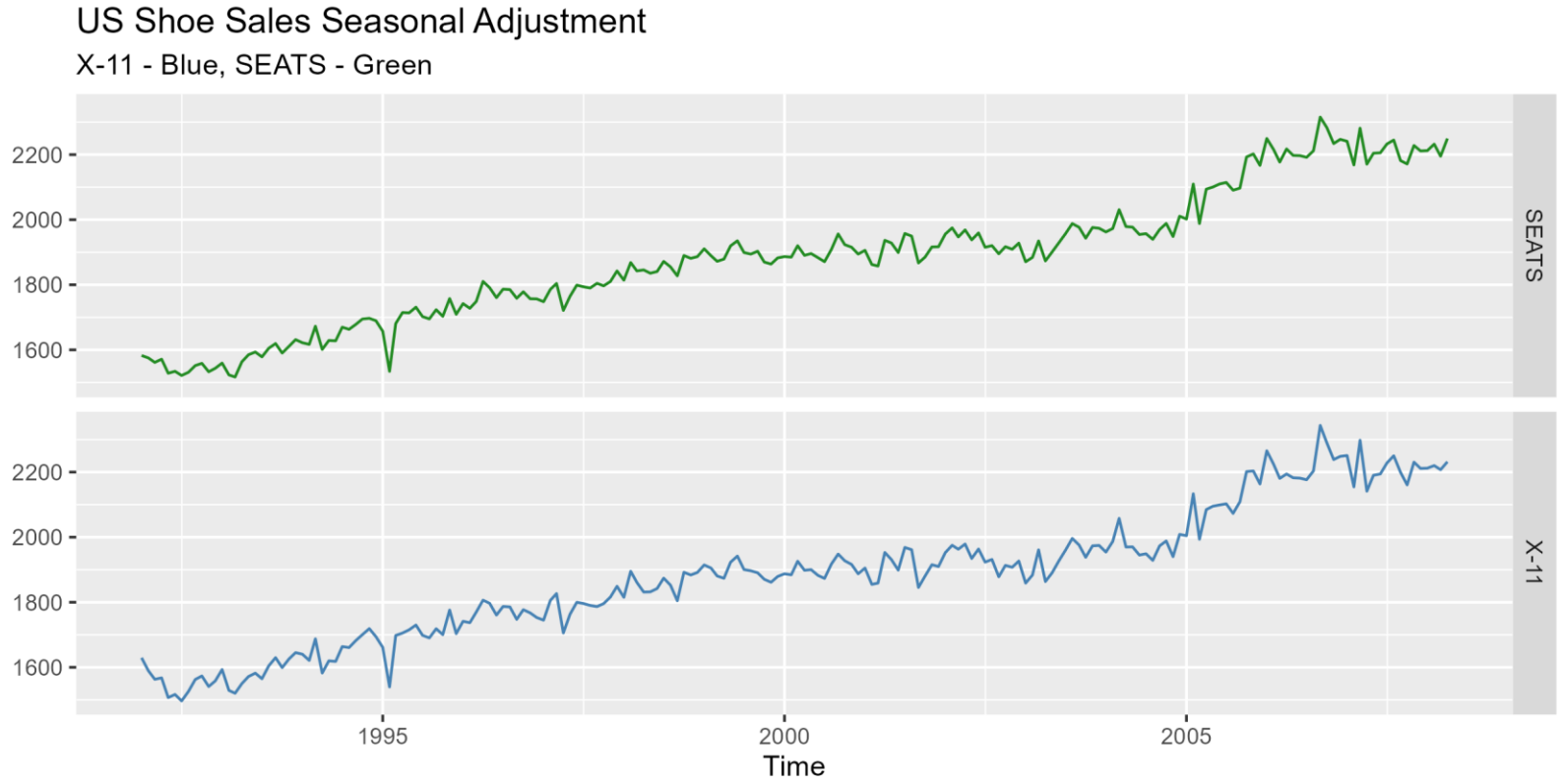
# Compare X-11 vs SEATS Seasonal Adjustments



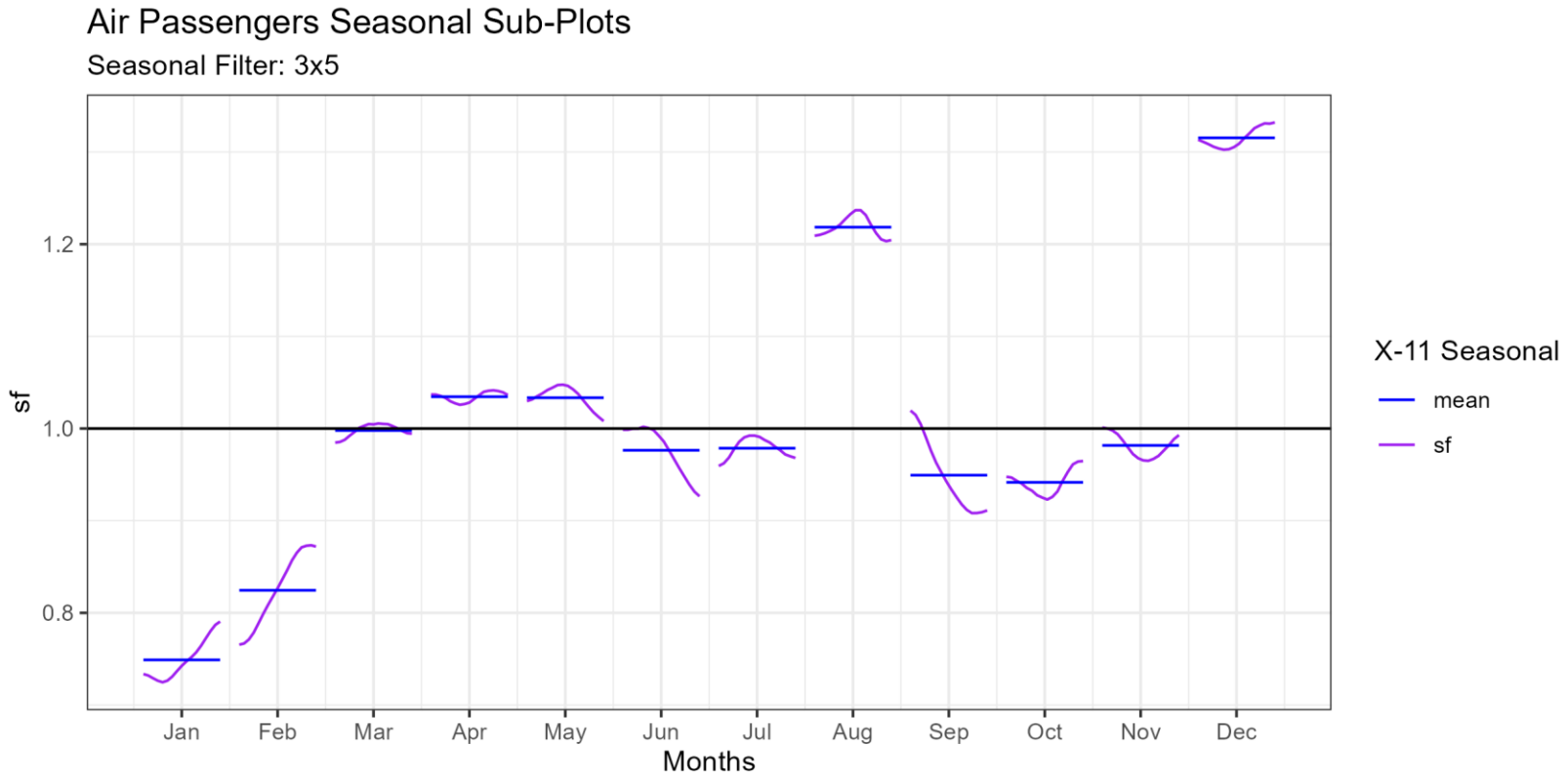
# Compare X-11 vs SEATS Seasonal Adjustments



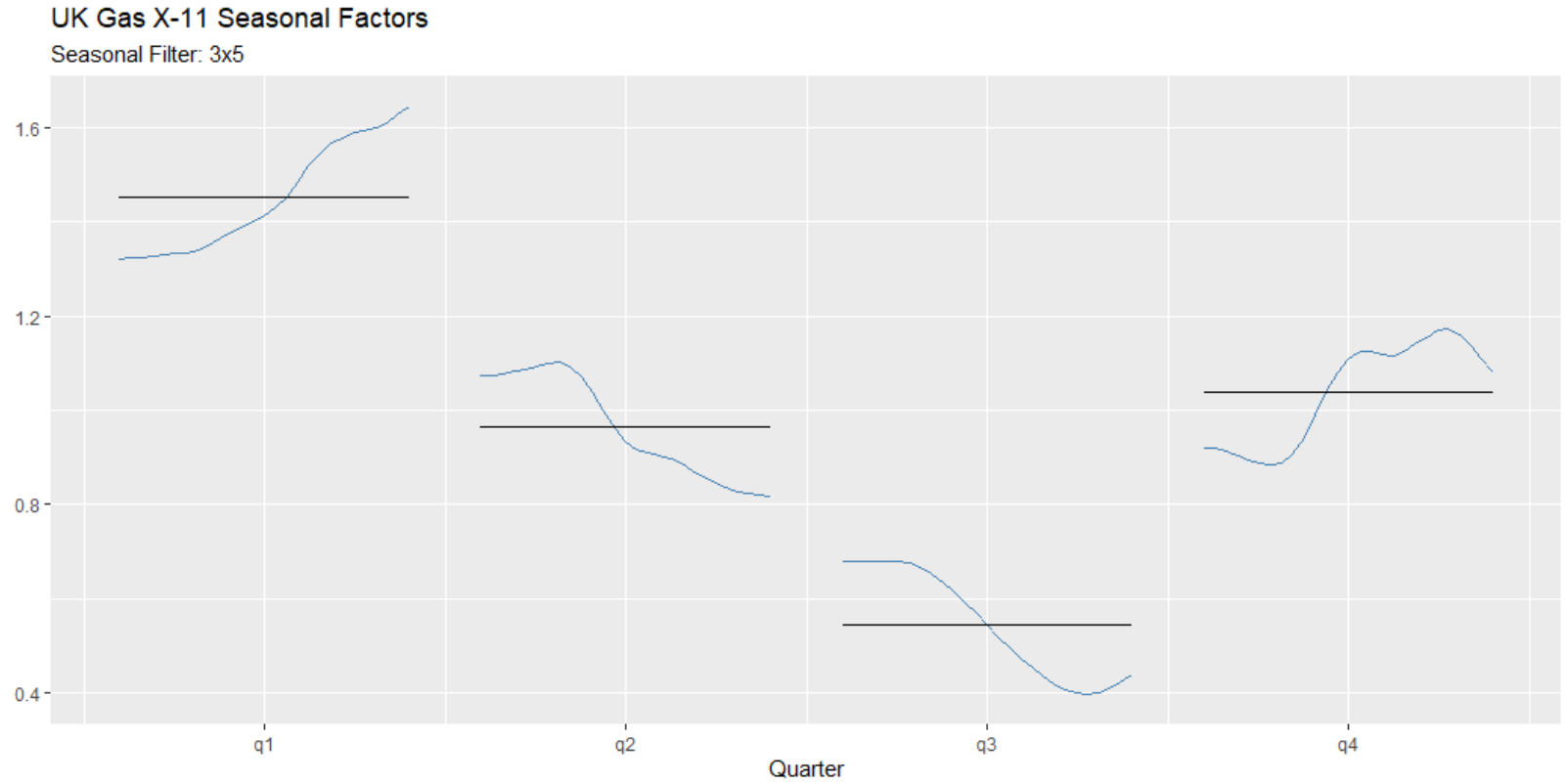
# Compare X-11 vs SEATS Seasonal Adjustments



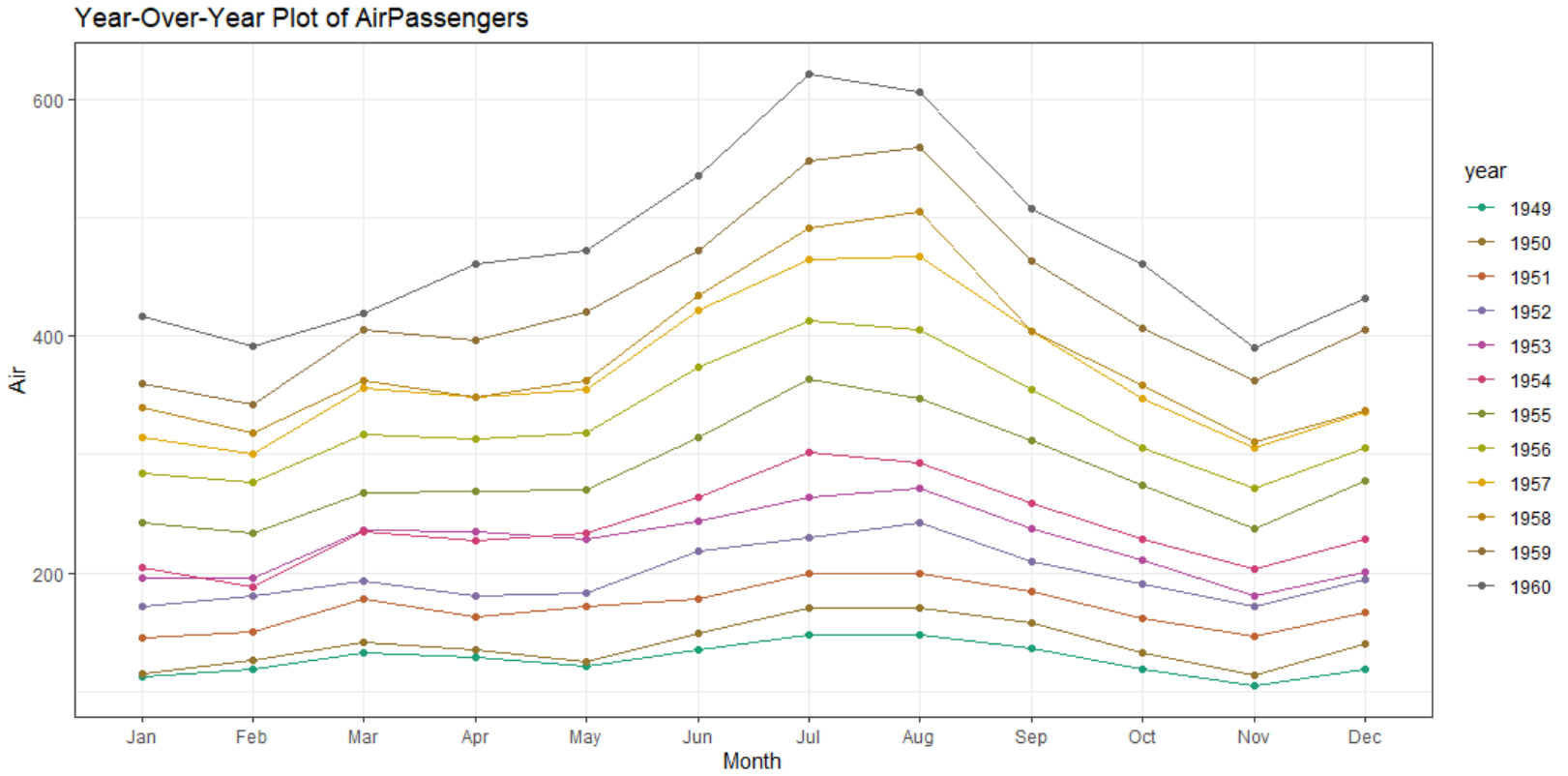
# Seasonal Factor Subplots



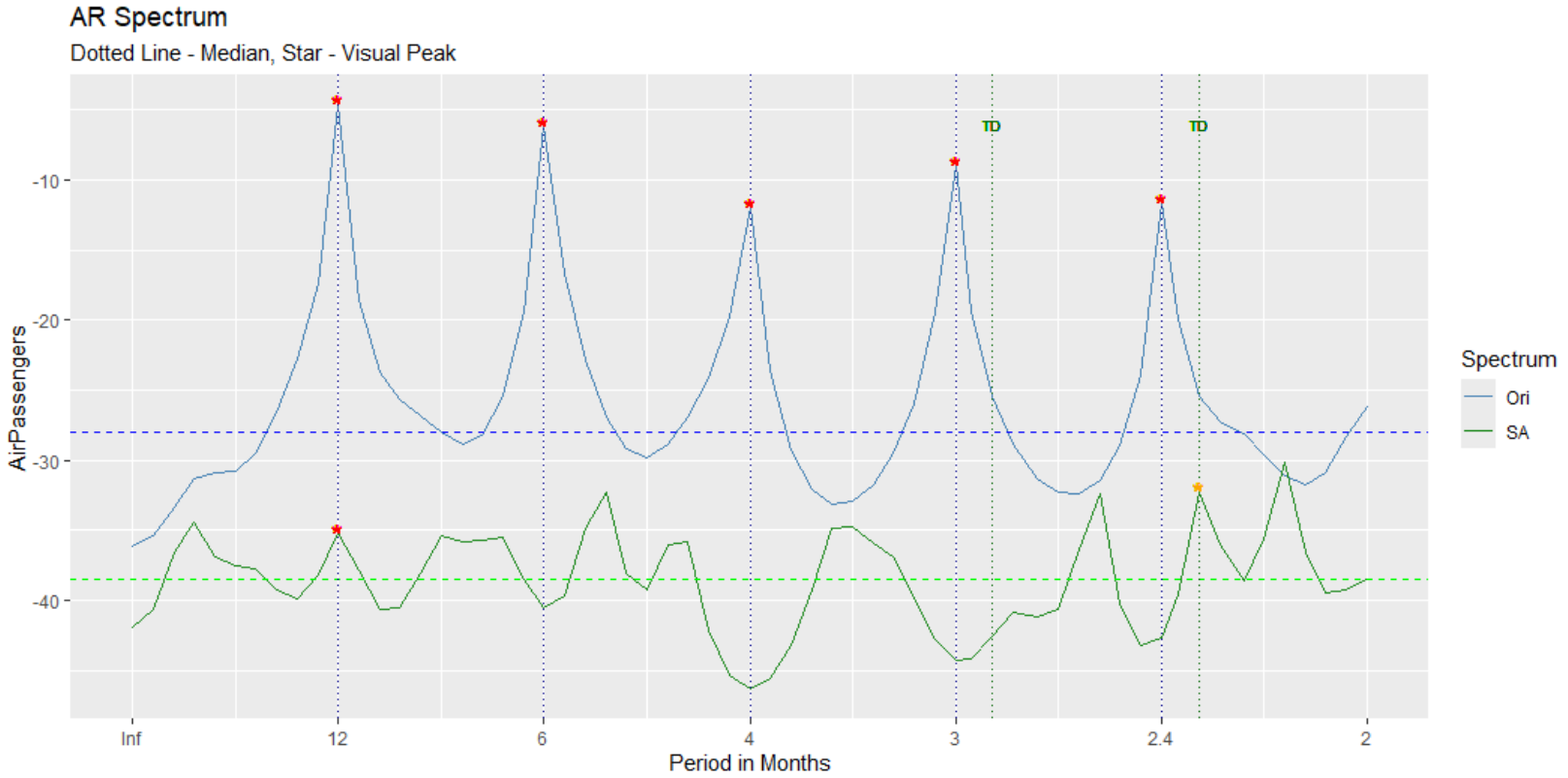
# Seasonal Factor Subplots



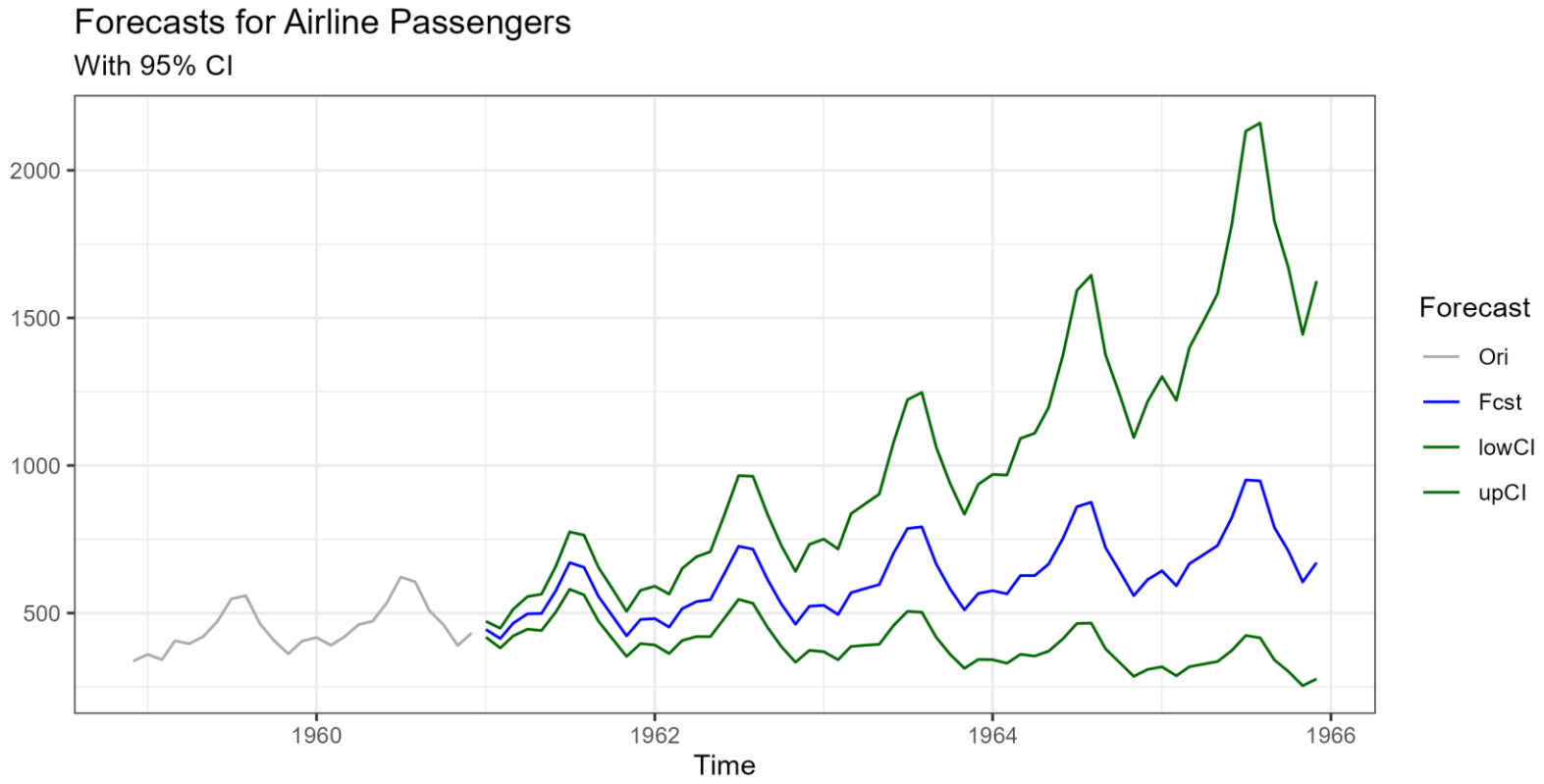
# Year-Over-Year Plots



# Double Spectrum Plot



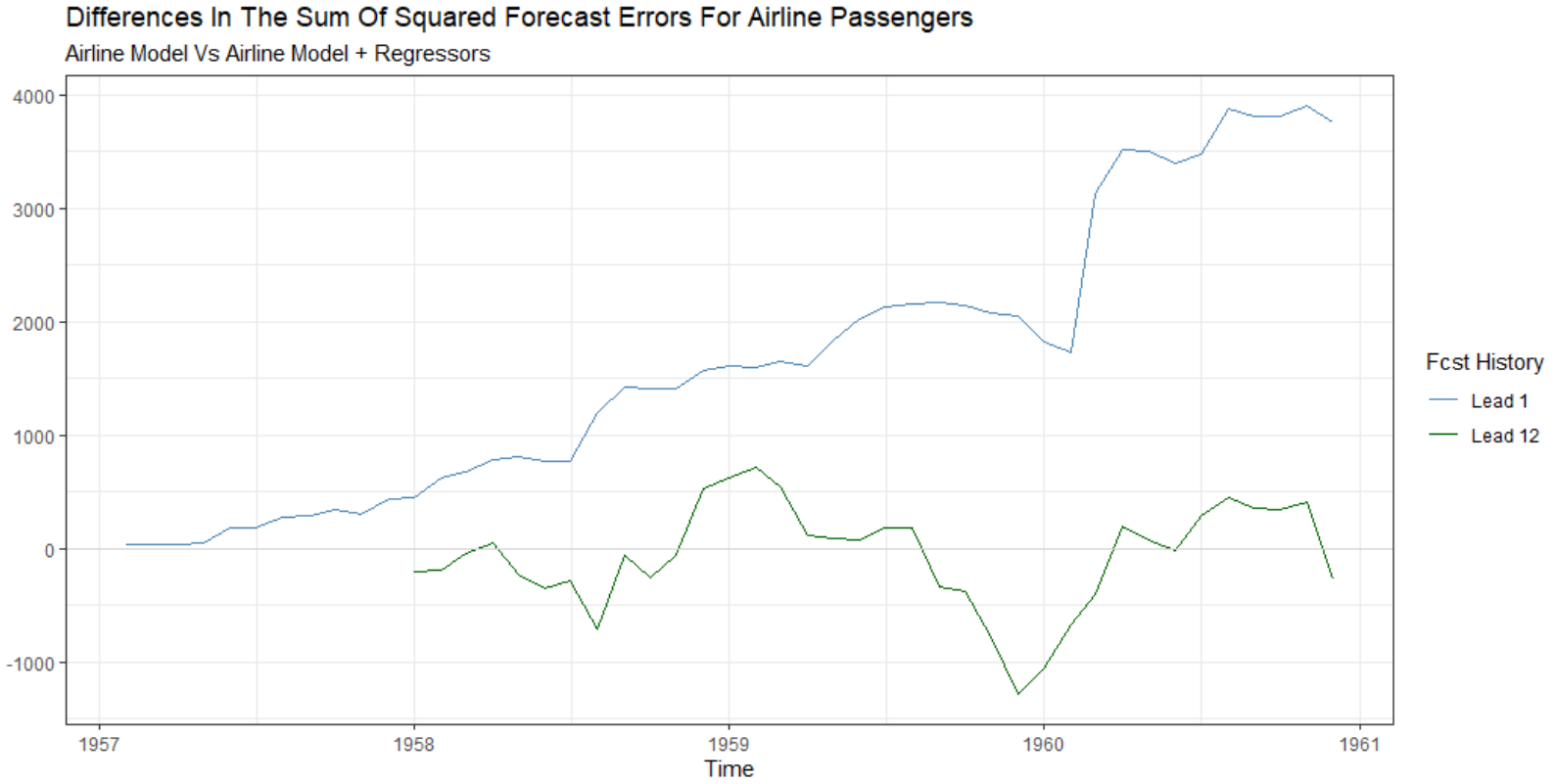
# Forecast Plot



# History Plots

- Seasonal Adjustment Revisions History
- Changes Revisions History
- All Trend Lags Plot
- Forecast History Plot

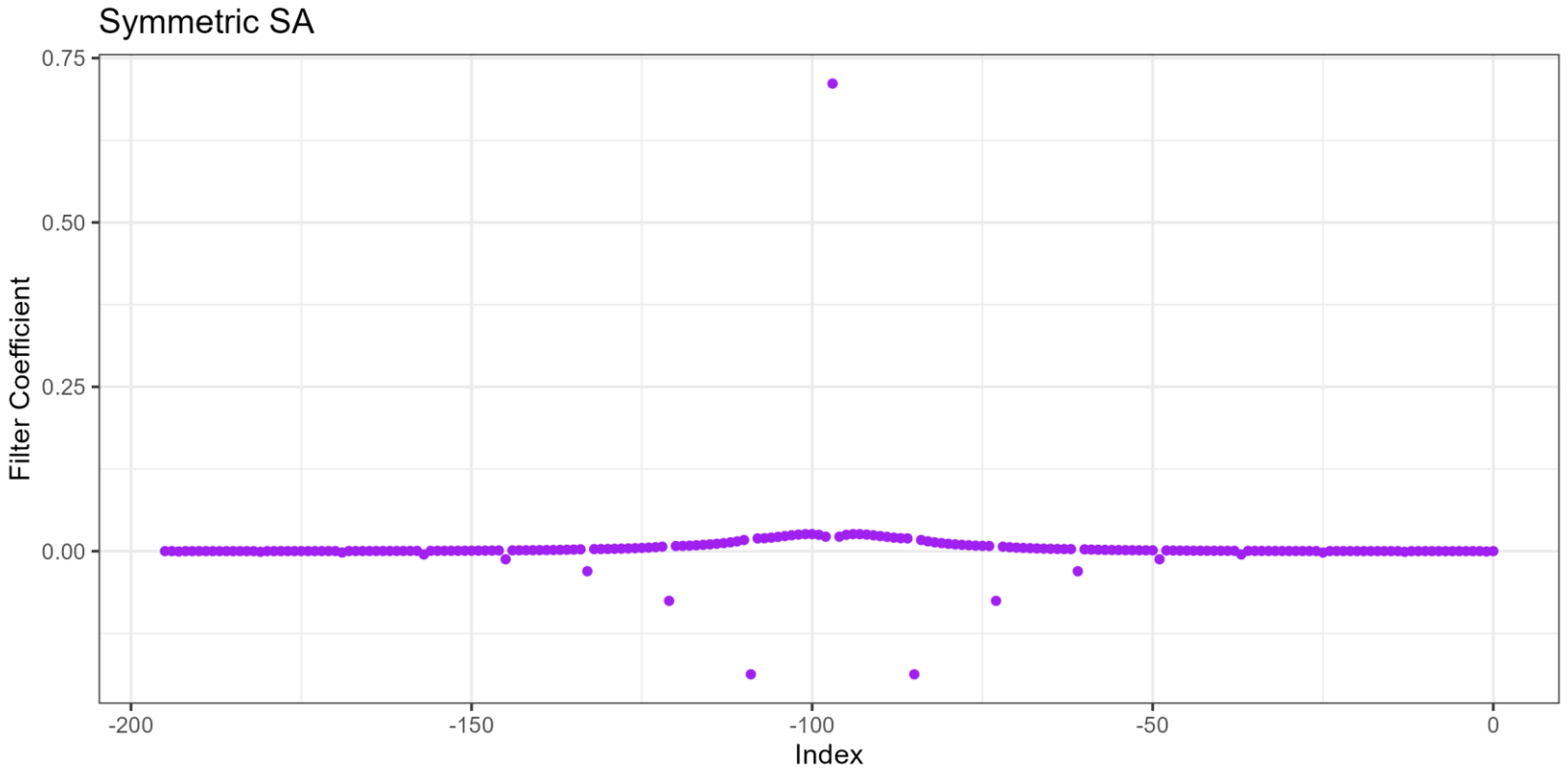
# Forecast History Plot



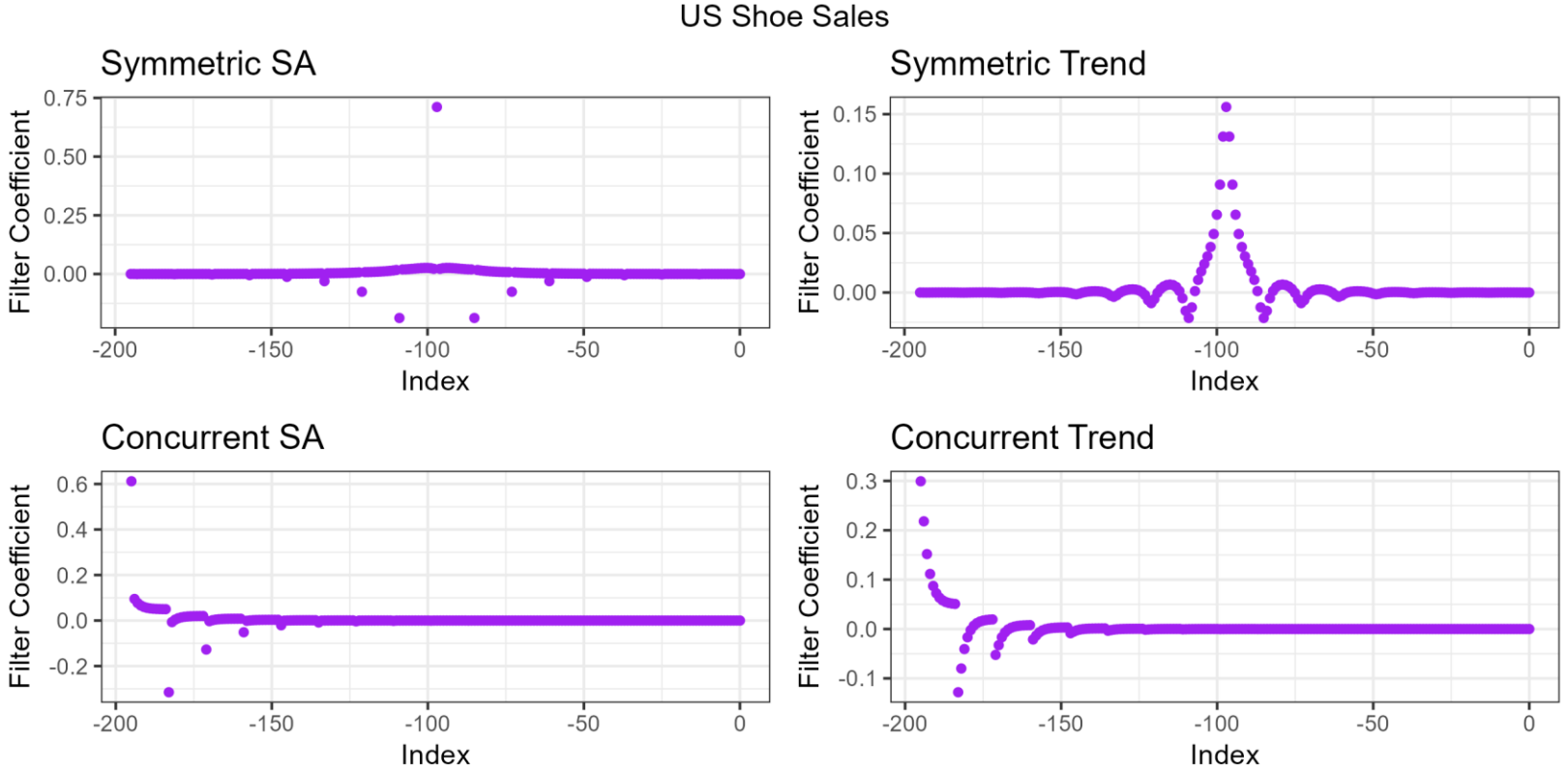
# SEATS Diagnostics Plots

- Filter Plots
- Squared Gains plot
- Time Shift plots for Seasonal Adjustments, Trends
- Seasonal Sums plot

# SEATS Filter Plot



# SEATS Filter Plots



# Utility Functions

- Extract information from a `seas` object generated from the `seasonal` package
- Highlight the `generate_alt_text` function

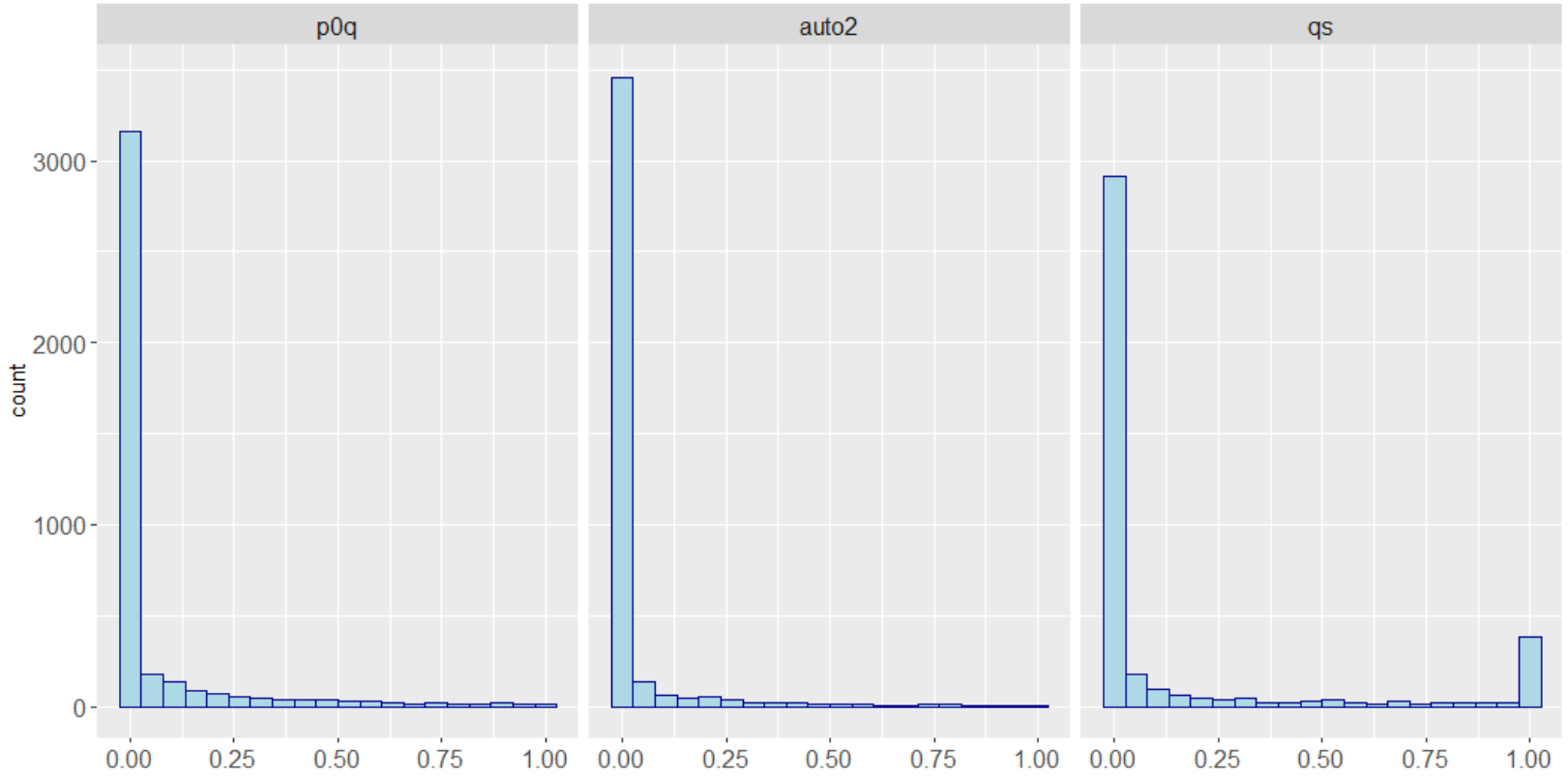
# generate_alt_text - Two Methods

- `VI` function in the `BrailleR` package
  - Alt text for ggplot object is one of the outputs
  - This can be too granular for most purposes
  - See Godfrey et al. (2023)

# generate_alt_text - Two Methods

- Inspired by Amy Cesal's article "Writing Alt Text for Data Visualization"
  - Suggests a rubric for generating alt text for plots
  - User specifies the plot type, the type of data, and the reason for doing the plot
  - See Cesal (2020)

# Example



# Example

```
p3_p0q_f_alt_short <-
 blsplotGG::generate_alt_text(p3_p0q_f,
  chart_type = "Facet plot of histograms",
  data_type = "p-values for F-tests and QS statistics",
  reason_text =
     paste0("it shows the distribution of the diagnostics",
            " are heavy left-tailed"),
  short_alt = TRUE)

p3_p0q_f_alt_short
[1] "Facet plot of histograms of p-values for F-tests and QS
statistics where it shows the distribution of the diagnostics
are heavy left-tailed"
```

# References


Cesal, Amy. 2020. “Writing Alt Text for Data Visualization.” *Nightingale: Journal of the Data Visualization Society*. https://nightingaledvs.com/writing-alt-text-for-data-visualization/.

Godfrey, A. Jonathan R., Debra Warren, James Thompson, Paul Murrell, Timothy Bilton, and Volker Sorge. 2023. *BrailleR: Improved Access for Blind Users*. https://CRAN.R-project.org/package=BrailleR.

Wickham, Hadley. 2016. *ggplot2: Elegant Graphics for Data Analysis*. Springer-Verlag New York. https://ggplot2.tidyverse.org.

Wilkinson, Leland. 2005. *The Grammar of Graphics*. 2nd ed. Statistics and Computing. Hardcover; Springer. http://www.amazon.fr/exec/obidos/ASIN/0387245448/citeulike04-21.

# Contact Information

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