ISA 444: Business Forecasting

07: Using Basic Tools for Multiple Time-Series (Lab 01)

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What we Have Learned in Class So Far

- ✅ Explain the differences between **cross sectional**, **time series** and **panel** datasets.
- ✅ Describe the **components of time series** datasets.
- ✅ Access, subset, and create `ts()` objects in R.
- ✅ Examine a line chart for trends, seasonality, and cycles.
- ✅ Explain the grammar of graphics and how it can be used to create time series plots in R.
- ✅ Create interactive time-series plots by using the plotly package.

Learning Objectives for Today's Class

- Apply the basic tools for time-series analysis to many time-series.
- Be familiar with the concept of nesting, which we will capitalize on in our next lab.

Lab 01: Using Basic Tools for Multiple Time-Series

Step 0: A `tibble` of Stocks, Crypto and Macroeconomic Indicators

08:00

- Use the tidyquant package 📦 to extract data from 2018-01-01 to 2023-02-12 for the following:
  - **Stocks:**
  - **Crypto:** BTC-USD, ETH-USD,
  - **FRED:** UNRATE, GNP, and RHORUSQ156N. For both stocks and crypto, we will be using the `adjusted` column for our analysis and for the macroeconomic data, the time series of interest will be stored in `price`.
- Store the results from the (multiple) calls into a single tibble containing three variables: symbol, date, price (or adjusted).

Step 1: Explore the Time-Series

08:00

- How many observations do we have per each symbol? What conclusions can you make pertaining to the number of observations per each symbol? (e.g., freq, missing data, etc.)
- Compute the mean absolute deviation for each time-series.
- Plot all the different time-series.
- Based on the three points above, write down any comments you have pertaining trends, seasonality, cycles, etc.

Step 2: Transform All Time Series

04:00

- Perform a growth rate transformation on all the time-series. Add that in a new column titled `price_chng_frac` or `price_chng_perc`.

Step3: Compute Naive Forecast for Each TS

08:00

For each time-series, compute the nonseasonal naive forecast (for both the original and the transformed ts). Then, compute the ME, MAD, and MAPE for each time-series .

Let us Talk about Nesting

- See in-class code, and refer to nest.html for more details about this concept.

Recap

Summary of Main Points

By now, you should be able to do the following:

- Apply the basic tools for time-series analysis to many time-series.
- Be familiar with the concept of nesting, which we will capitalize on in our next lab.

Things to Do to Prepare for Our Next Class

- Complete Assignment 06 on Canvas.