

TIME SERIES PROJECT TEMPLATE: LIBOR RATES

LIBOR, or “London Inter-Bank Offered Rate.” is the rate that large London banks offer each other for inter-bank deposits. Deposits are funds loaned to banks, so LIBOR is the rate at which a fellow London bank can borrow money from other banks.

- LIBOR rates incorporate variables such as time, maturity and currency rates.
- Hundreds of LIBOR rates are reported each month in numerous currencies.

LIBOR is a risk-free rate with maturities of twenty-four hours (overnight) to five years. It is reported each day at 11 a.m. London time and then fluctuates based upon the market’s expectations for economic activity and the future direction of interest rates.

LIBOR loans are expressed in Eurodollars: United States currency held by foreign entities, such as a British or German banks or insurance companies.

Eurodollars reflect American firms paying dollars internationally-domiciled firms for goods, service, and merchandise purchased.

CHOOSE A LIBOR RATE

The NEAS web site has 7 LIBOR for U.S. dollars, ranging from over-night to one year.

- LIBOR rates with maturities of one month or longer have the longest history (21+ years) and less day-to-day fluctuation. If you want a smooth time series with many observations, choose six month or twelve month LIBOR.
- LIBOR rates with short maturities are mostly likely to show seasonality and cycles, and they reflect other macroeconomic variables. To examine the effects of U.S. GDP or the demand for money on interest rates, use over-night LIBOR.

Take heed: We do not say that over-night LIBOR definitely shows cycles or seasonality. Examine the ARIMA process of over-night rates, and explain what you conclude.

The actuarial examinations cover financial economics: forward rates at various maturities. The Eurodollar market is extremely liquid and closed tied to the LIBOR market. For a student project, you can search the internet for Eurodollar futures rates and compare those rates to LIBOR rates.

LIBOR rates are expressed in numerous currencies. We show only U.S. dollar rates, but you can search the internet for other currencies as well. You can do a student project on interest rate parity, putting together exchange rates and risk-free rates in each currency.

DAY INDEX AND SEASONALITY

Rates are shown for business days. You may examine two types of seasonality:

- Weekly seasonality: the average Monday rate vs the average Friday rate
- Annual seasonality: using the business days in the year.

The number of business days varies from year to year, ranging from about 242 to 250.

The day of the week is clear from the file. Rows are sets of five consecutive days: Monday through Friday.

Take heed: Excel has built-in functions to identify the day of the week.

- Convert the year, month, and day to an Excel date: =DATE(year, month, day).
- Convert the date to a weekday: =WEEKDAY(date).

Excel also computes the calendar days and the workdays between any two dates.

For annual seasonality, use five day moving averages.

Illustration: January 10 may be a weekday some years and a weekend other years. Instead of January 10, use a five day moving average of January 8 – January 12.

MATURITY SPREAD

You can form a time series of LIBOR maturity spreads, such as 12 month LIBOR minus 1 month LIBOR. The maturity spreads eliminate some of the random fluctuation in LIBOR rates, leaving a more stable time series for ARIMA modeling.

Take heed: You may also use $(1 + 1 \text{ month LIBOR}) / (1 + 12 \text{ month LIBOR})$

REAL LIBOR RATES

For a time series of real LIBOR rates, use 1 month LIBOR – CPI inflation the previous month. (Alternatively, divide by $1 + \text{the inflation rate}$.)

The nominal interest rate depends on expected inflation. We do not have a daily index of expected inflation, so we don't have a daily time series of real LIBOR rates.