



Financial Risk Management

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Types of Rates

- In this section, we explain a number of interest rates that are important to financial institutions.

1. *Treasury Rates:*

Treasury rates are the rates an investor earns on Treasury bills and Treasury bonds. These are the instruments used by a government to borrow in its own currency. Japanese Treasury rates are the rates at which the Japanese government borrows in yen, U.S. Treasury rates are the rates at which the U.S. government borrows in U.S. dollars, and so on.

It is usually assumed that there is no chance that a government will default on an obligation denominated in its own currency. Treasury rates are therefore usually regarded as risk-free rates in the sense that an investor who buys a Treasury bill or Treasury bond is certain that interest and principal payments will be made as promised.

2. **LIBOR:**

LIBOR is short for *London interbank offered rate*. It is an unsecured short-term borrowing rate between banks. LIBOR rates are quoted for a number of different currencies and borrowing periods. The borrowing periods range from one day to one year. LIBOR rates are used as reference rates for hundreds of trillions of dollars of transactions throughout the world. One popular and important derivative transaction that uses LIBOR as a reference interest rate is an interest rate swap.

LIBOR rates are compiled by asking 18 global banks to provide quotes estimating the rate of interest at which they could borrow funds from other banks just prior to 11:00 a.m. (UK time). The highest four and lowest four of the quotes for each currency/borrowing period are discarded and the remaining ones are averaged to determine LIBOR fixings for the day. The banks submitting the quotes typically have an AA credit rating. LIBOR is therefore usually assumed to be an estimate of the unsecured borrowing rate for an AA-rated bank.

- It is now recognized that LIBOR is a less-than-ideal reference rate for derivatives transactions because it is determined from estimates made by banks, not from actual market transactions. The derivatives market is investigating the use of other reference rates such as OIS rates.

3. *The LIBOR/Swap Zero Curve:*

LIBOR quotes last between one day and one year. They therefore define in a direct way the zero-coupon LIBOR yield curve for maturities up to one year. How can the LIBOR yield curve be extended beyond one year? There are two possible approaches:

- Create a yield curve to represent the rates at which AA-rated companies can today borrow funds for periods of time longer than one year.
- Create a yield curve to represent the future short-term borrowing rates for AA-rated companies.

- It is important to understand the difference. Suppose that the yield curve is 4% for all maturities. If the yield curve is created in the first way, this means that companies rated today can lock in an interest rate of 4% regardless of how long they want to borrow.
- If the yield curve is created in the second way, the forward interest rate that the market assigns to the short-term borrowing rates of companies that will be rated AA at a future time is 4%.
- When the yield curve is created in the first way, it gives the forward short-term borrowing rate for a company that is AA-rated today. When it is created in the second way, it gives the forward short-term borrowing rate for a company that will be AA at the beginning of the period covered by the forward contract.

4. *LIBOR vs. Treasury Rates:*

Risk-free rates are important in the pricing of financial contracts. Treasury rates might be thought to be natural rates to use as risk-free rates, but in practice they are regarded as artificially low because:

1. The amount of capital a bank is required to hold to support an investment in Treasury bills and bonds (typically zero) is substantially smaller than the capital required to support a similar investment in other very-low-risk instruments.
2. In the United States, Treasury instruments are given a favourable tax treatment compared with most other fixed-income investments because they are not taxed at the state level.

Prior to the credit crisis that started in 2007, financial institutions used LIBOR and swap rates as a proxies for risk-free rates. Since the crisis, they have switched to using overnight indexed swap (OIS) rates for this purpose.

5. *The OIS Rate:*

An overnight indexed swap (OIS) is a swap where a fixed interest rate for a period (e.g., one month, three months, one year, or two years) is exchanged for the geometric average of overnight rates during the period. The relevant overnight rates are the rates in the government-organized interbank market where banks with excess reserves lend to banks that need to borrow to meet their reserve requirements.

In the United States, the overnight borrowing rate in this market is known as the *fed funds rate*. The *effective fed funds rate* on a particular day is the weighted average of the overnight rates paid by borrowing banks to lending banks on that day. This is what is used in the OIS geometric average calculations. Many other countries have similar overnight markets. For example, the Eonia (Euro OverNight Index Average) is the European equivalent of the effective fed funds rate; the SONIA (Sterling OverNight Index Average) is the British equivalent; and so on.

- If during a certain period a bank borrows at the overnight rate (rolling the loan and interest forward each day), it pays the geometric average of the overnight interest rates for the period. Similarly, if it lends at the overnight rate every day, it receives the geometric average of the overnight rates for the period. An OIS therefore allows overnight borrowing or lending to be swapped for borrowing or lending at a fixed rate for a period of time. The fixed rate is referred to as the OIS rate.

6. Repo Rates:

Unlike LIBOR and federal funds rates, repo rates are secured borrowing rates. In a repo (or repurchase agreement), a financial institution that owns securities agrees to sell the securities for a certain price and to buy them back at a later time for a slightly higher price. The financial institution is obtaining a loan, and the interest it pays is the difference between the price at which the securities are sold and the price at which they are repurchased. The interest rate is referred to as the repo rate.