THE IMPLICATIONS OF FORWARD RATES

August 2023

AN OVERVIEW OF THE IMPLICATIONS OF FORWARD RATES

TAKEAWAYS

- Forward rates should not be considered a pure prediction of future interest rates. They represent today's market-based pricing to lock in future rates based on a supply-demand equilibrium.[1] Future uncertain events will cause actual rates experienced to diverge from forward rates quoted today.
- Forward rates are generally most accurate at predicting rates over the near term – about a six-month horizon. Beyond this time, uncertain future events tend to limit accuracy. In addition, an inclining or declining yield curve causes forward rates to have an upward/downward bias that often overshoots actual rates.
- Although forward rates should not be viewed as a dependable prediction of future interest rates, the forward curve provides a market-based baseline that can be seen as a "base case" for analysis by market participants.

> Forward rates are best used to form the baseline and starting point for sensitivity analysis when forecasting future interest rates.

BACKGROUND ON THE FORMULATION OF FORWARD RATES

A forward rate is a current interest rate applicable to entering an agreement to buy or sell a bond at a future point.[2] Forward rates can be calculated using a yield curve, which is a line that plots yields of bonds with the same credit quality over varying maturities. All forward rates are derived from current market or spot rates along the yield curve. For instance, we can find the yield for a one-year bond one year from now by setting up an equation using current spot rates. We solve for the one-year yield one year forward ($f_{1,1}$) by chaining it together with the one-year spot rate and setting this equal to the two-year spot rate. The equation looks like this:

$$(1 + y_1)*(1+f_{1,1}) = (1+y_2)^2$$

In the above example, if we know that the spot rate for a one-year zero coupon bond is 2.0% (y_1) and the spot rate for a two-year zero coupon bond is 4.0% (y_2), then we can solve for the one-year yield one year forward rate as follows:

$$(1.02)*(1+f_{1,1}) = (1.04)^2$$

$$\downarrow$$

$$f_{1,1} = ((1.04)^2 / (1.02)) - 1$$

Here the one-year yield one year forward rate is 6.04%. This means that as of today, an investor can lock in pricing to buy this one-year bond in one year at a 6.04% interest rate.

The arbitrage-free principle of pricing is another means of thinking about forward rates. In the above example, there are two means of arriving at a compounded rate of return after two years: I can buy the two-year bond and hold, or I can alternatively buy a portfolio of 1) a one-year bond and 2) lock in a one-year bond one year forward. If there is no arbitrage available, these two assets will have to have the same price.

A third means of thinking about forward rates is as a hedge or betting line today for future interest rates. Similar to the concept that the arbitrage-free principle should adjust prices to eliminate any risk-free profits, forward rates represent today's market-based pricing based on supply-demand equilibrium to lock in future rates to borrow/lend. Thus, rather than being a pure prediction of future interest rates, forward rates represent the current pricing to lock in a future rate between willing buyers and sellers, bringing the market into balance based on the current yield curve.

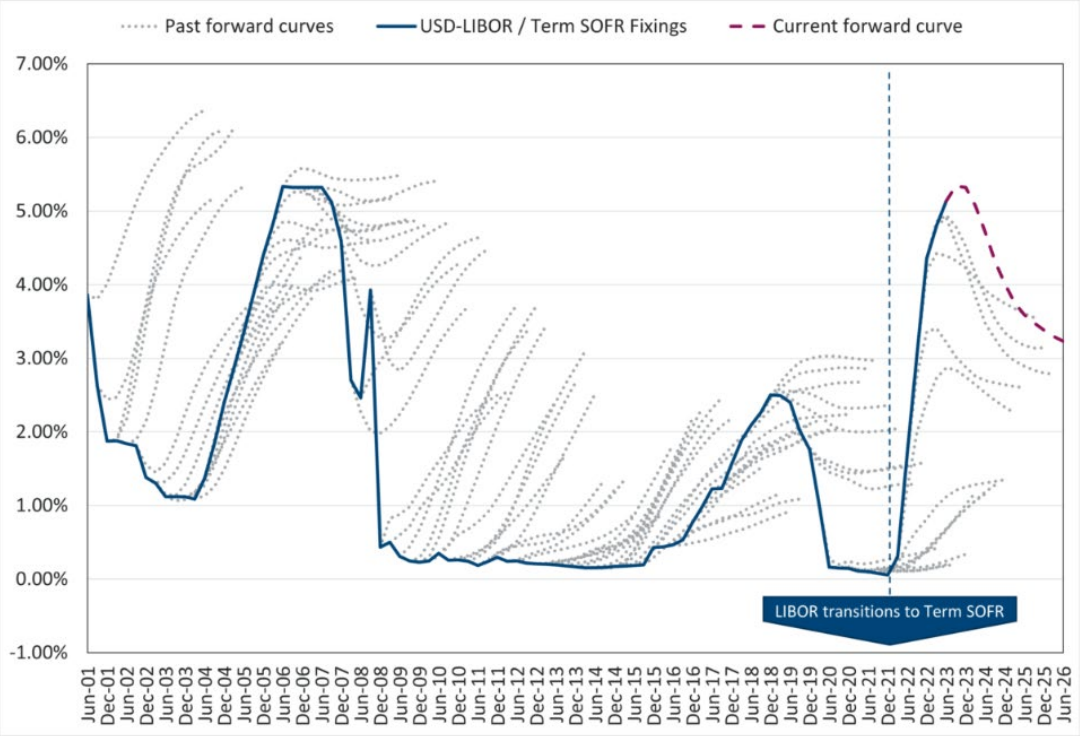
The above analysis of forward rates as a betting line is a bit like the efficient markets hypothesis of a stock price. This is the idea that stock prices incorporate all information that is currently known about the firm and that future price movements will be based on a random walk driven by future uncertain events. By comparison, the forward rate reflects the market's best knowledge of future spot rates, but allowing for the concession that future unknowable events will influence the actual rate by the time the exchange takes place.

If a forward rate can be thought of as incorporating all current knowledge and beliefs about future interest rates to form a market-based betting line, and if this means that uncertain future events are responsible for

Forward rates cannot be considered a completely accurate guide for interest rates that will prevail at future points in time; however, they can be informative for market participants in numerous ways.

the difference between forward rates and actual spot rates in the future, then we would expect that forward rates would become less accurate the farther into the future they are projected. This is what is experienced when looking at interest rates against historical forward curves. As reported by Chatham Financial, forward rates are fairly accurate when looking at predicting short term rate movements but lose accuracy when looking at longer term projections.[3] Chatham produces what they call the "hairy chart," which illustrates historical forward curves for one-month LIBOR/SOFR rates against actual one-month LIBOR/SOFR rates:

1-MONTH USD LIBOR VS. HISTORICAL FORWARD CURVES



Revised June 30, 2023

The "hairy chart" helps to visualize two concepts that are prevalent in assessing the accuracy of forward curves: (1) As mentioned in the previous paragraph, the chart shows that the forward curve is most accurate in the short term. Many of the past forward curves (gray dotted lines) were directionally accurate in predicting short term rates, even during a significant shift in the market; however, the curve was less accurate across all predictions over a longer horizon. (2) The "hairy chart" shows that the forward curve often overshoots in its prediction of future rates. In an upward or downward sloping yield curve environment, forward rates will appear to forecast accelerating rate increases or decreases moving forward. For instance, with an upward sloping yield curve, the two-year spot rate will be greater than the one-year rate. This means that the one-year rate one year forward must be greater than the two-year rate. (The one-year rate is less than the two-year rate, so to chain together the equivalent two-year rate, the one-year forward one year out must be greater than the two-year rate.) This forward curve would imply that the market thinks rates will continue to rise moving forward, but the rates likely instead reflect the term premium of longer dated bonds.

HOW FORWARD RATES CAN BE MOST USEFUL FOR MARKET PARTICIPANTS

Forward rates cannot be considered a completely accurate guide for interest rates that will prevail at future points in time. This fact notwithstanding, forward rates can still be useful for market participants in numerous ways.

Forward rates are best suited for use as a predictor of future interest rates when looking over a short time horizon – generally the next six months or so.[3] Beyond this time period, there are too many future events that will take place and will likely divert actual rates in the future from those that market participants are willing to lock in today. The current forward curve (i.e., the red dotted line on the hairy chart) is predicting a near-immediate decline in rates, which had not been the case until the past several months. This signal from the forward curve is most worthy of consideration.

Due to the nature of pricing forward rates based off the yield curve – linking together the forward rate with shorter duration spot rates on the yield curve to equate to a longer duration spot rate – forward rates tend to overshoot actual rate increases or decreases in an inclining or declining market, accordingly. There are other factors such as term premiums caused by duration risk that create a bias in forward rates, causing them to differ from that of a pure prediction of future interest rates.

Despite the level of future uncertainty that makes it impossible for forward rates to accurately predict the exact path of future interest rate movements, forward rates are still the market's best current assessment of spot rates that will be realized in the future. Market participants can still utilize forward rates as a "base case" for underwriting scenarios, understanding that they cannot be expected to be fully accurate. Forward rates are best used to form the baseline and a starting point for sensitivity analysis when forecasting future interest rates.

Sources

1. What is an interest rate forward curve?" Chatham Financial, revised June 30, 2023.

2. James Chen, "Forward Rate: Definition, Uses, and Calculations," Investopedia, December 28, 2020.

3. Edward Qian, "Investment Insight: Do Forward Rates Have Anything to Do with Future Rates?" Panagora, October 2014.

4. "The hairy chart: Historical accuracy of LIBOR forward curves," Chatham Financial, June 30, 2023

ABOUT CAPITAL SQUARE

Capital Square is a national real estate firm specializing in tax-advantaged real estate investments, including Delaware statutory trusts (DSTs) for Section 1031 exchanges, qualified opportunity zone funds, development funds and a real estate investment trust (REIT). As a vertically integrated company, Capital Square has also become an active developer of mixed-use multifamily and build-for-rent properties in the southeastern U.S. as well as a dedicated property manager through Capital Square Living, which launched in 2023. Since 2012, Capital Square has completed more than $7.5 billion in transaction volume. Capital Square's related entities provide a range of services, including due diligence, acquisition, loan sourcing, property/asset management and disposition, for a growing number of high-net-worth investors, private equity firms, family offices and institutional investors nationwide. Since 2017, Capital Square has been recognized every year by Inc. 5000 as one of the fastest growing companies in the nation. In 2017, 2018, 2020 and 2023 the company was also ranked on Richmond BizSense's list of fastest growing companies in central Virginia. In addition, Capital Square was named a "Top Workplace" by the Richmond Times in 2023. To learn more, visit www.CapitalSq.com.

CS