Long-Dated Yield Curve Flatteners

Years of research have led to the irrefutable conclusion there are two types of people in the world, those who care about convexity and those who do not. The research required to determine which category is larger should not take years to complete unless a government grant is involved.

Conventional bonds have only a few moving parts, essentially just the coupon rate and payment schedule and the time to maturity. The longer a bond's maturity and the lower its yield to maturity, the greater its interest rate sensitivity is. The principal measure of this interest rate risk is duration, or the weighted average maturity of the bond's cash flows. The longer the duration of a bond, the greater its percentage price volatility will be. The duration of a zero-coupon bond is its maturity.

If duration is the first derivative of a bond's price with respect to yield, then convexity is its second derivative. Option traders often analogize duration and convexity to delta and gamma, respectively. A bond whose price rises more when yields decline than its price declines when yields rise has positive convexity. This makes convexity a valuable attribute to own. Given the attraction of convexity for longer-maturity bonds, investors are willing to accept lower yields than they would otherwise. This implies a natural tendency for yield curves to be inverted, or to have lower yields at longer maturities. However, as bond investors have to price in other risks such as expected inflation or currency volatility, yield curves are positively sloped most of the time.

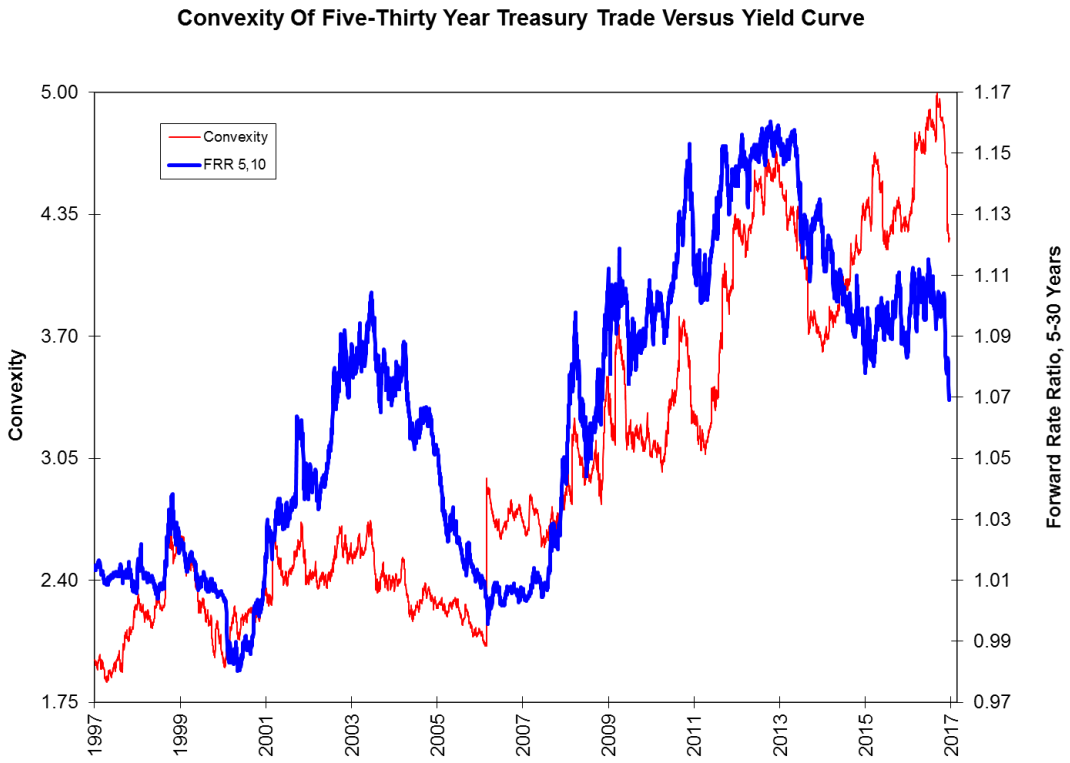
The short end of the yield curve gets most of the attention, and deservedly so, as this is where expected changes in monetary policy are reflected most quickly. But changes at the long end of the yield curve are quite important, too, as pension funds, insurance companies, endowments and other institutional investors have to use long-maturity bonds to try to match their liabilities. This was made more difficult by the drive toward record-low yields between the end of the financial crisis in 2009 and the post-Brexit peak of sovereign bonds in July 2016. Not only did yield-seeking investors watch yield disappear, they watched the duration and therefore the interest rate risk of their holdings rise.

Duration-Neutral Bullish Flatteners

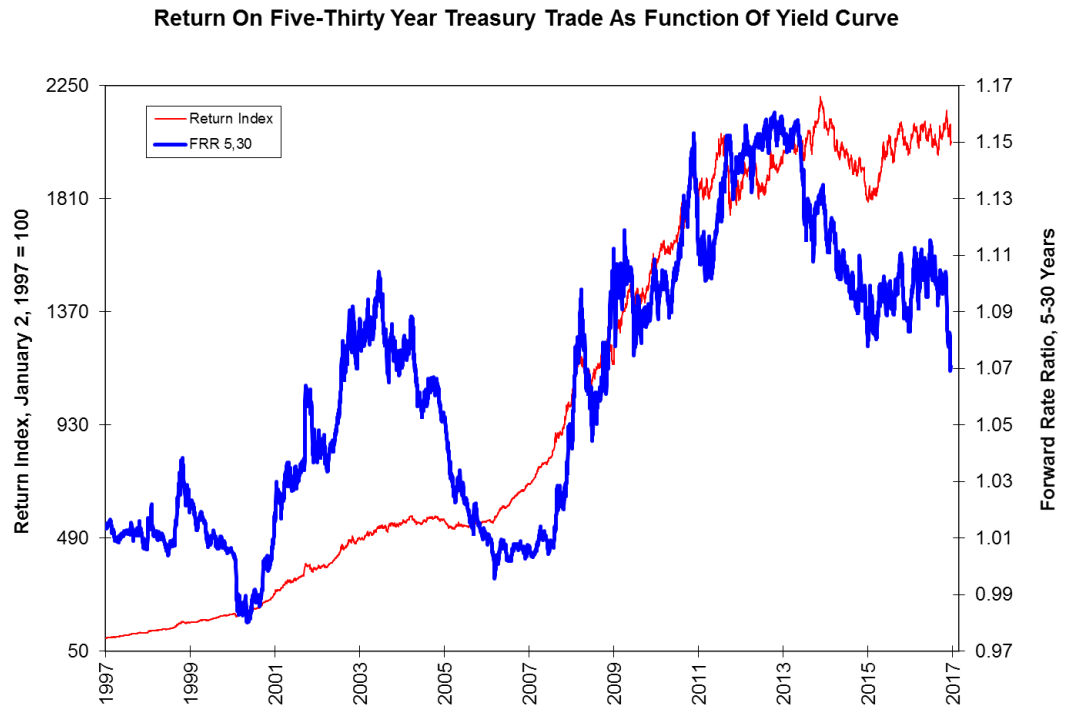
A common bond trade involves borrowing a shorter-maturity issue and lending a longer-maturity issue in a duration-neutral ratio. This isolates the profit and loss profile of the trade at its initiation from interest rate fluctuations and leaves it much more exposed to subsequent changes in the yield curve. These trades also tend to have positive net convexity, something very desirable for accelerating gains in a declining-rate environment and slowing losses in a rising-rate environment.

Let's take a look at the flattening trade over two different segments at the long end of the yield curve, the one between five and thirty years and the one between ten and thirty years. The forward rate ratio for the two segments can be calculated. This is the rate at which we can lock in borrowing for 25 years starting five years from now, divided by the thirty-year rate itself for the $FRR_{5,30}$ and the rate at which we can in borrowing for twenty years starting ten years from now for the $FRR_{10,30}$. The steeper the yield curve, the more these FRR measures exceed 1.00; inverted yield curves have FRR measures less than 1.00.

Net convexity measures can be calculated as well by subtracting the total convexity of the short bond position from the convexity of the long bond position. Please note how the net convexity measure in the charts below move in a stairstep pattern as each new on-the-run Treasury bond moves into the calculation.



Source: Bloomberg

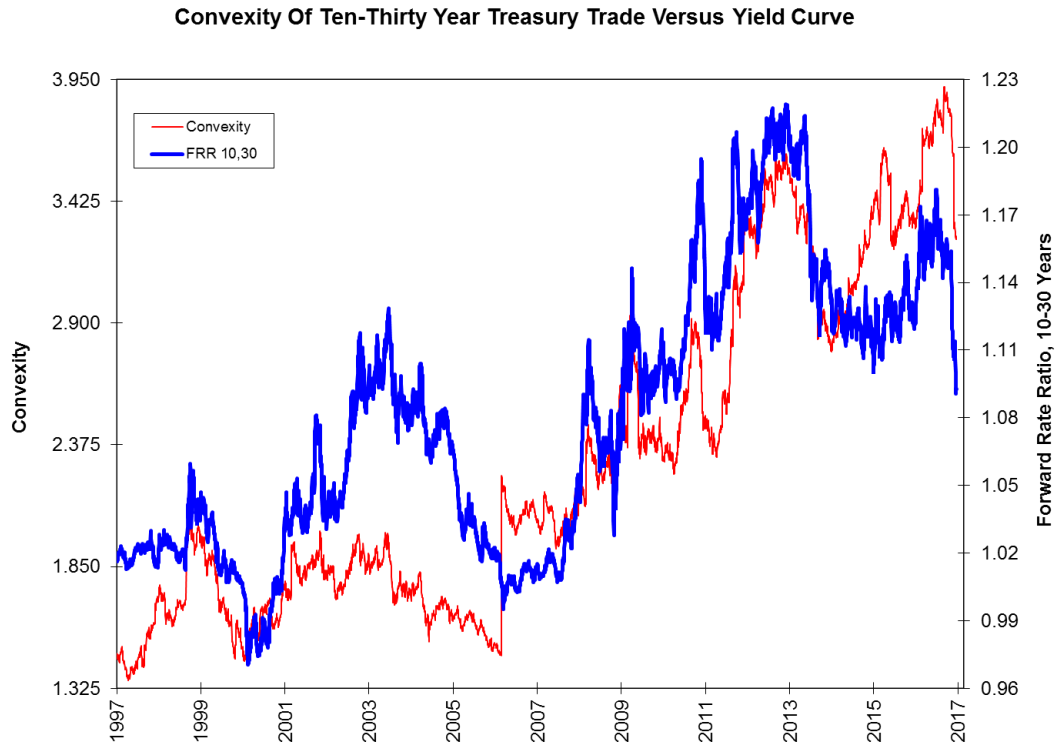


Source: Bloomberg

The net convexity of the five/thirty flattener peaked at 4.99 on September 6, 2016, just over a week after the annual Federal Reserve jamboree at Jackson Hole. Its decline to 4.22 at the late December 2016 time of this writing was accompanied by a sharp flattening of the $FRR_{5,30}$ from 1.1004 to 1.0706. The return on the flattener was 0.567% over this period; contrast that to a loss of 16.581% on the thirty-year Treasury index itself.

The positive return on the flattener over one of the worst periods for long-term Treasuries in years was attributable to the net convexity of the trade starting from an observed high combined with a massive flattening, albeit a bearish flattening, of the yield curve in a flattening trade.

Now let's repeat the exercise for the ten/thirty flattener. Here, too, net convexity peaked on September 6, 2016 at 3.92 before declining to 3.27. The $FRR_{10,30}$ fell from 1.1566 to 1.0928 over the same period. The return on the flattener was -1.92%, a much lower loss than the thirty-year bond index' loss. Once again, the high net convexity at the trade's initiation and the massive flattening of the yield curve worked exactly as intended.



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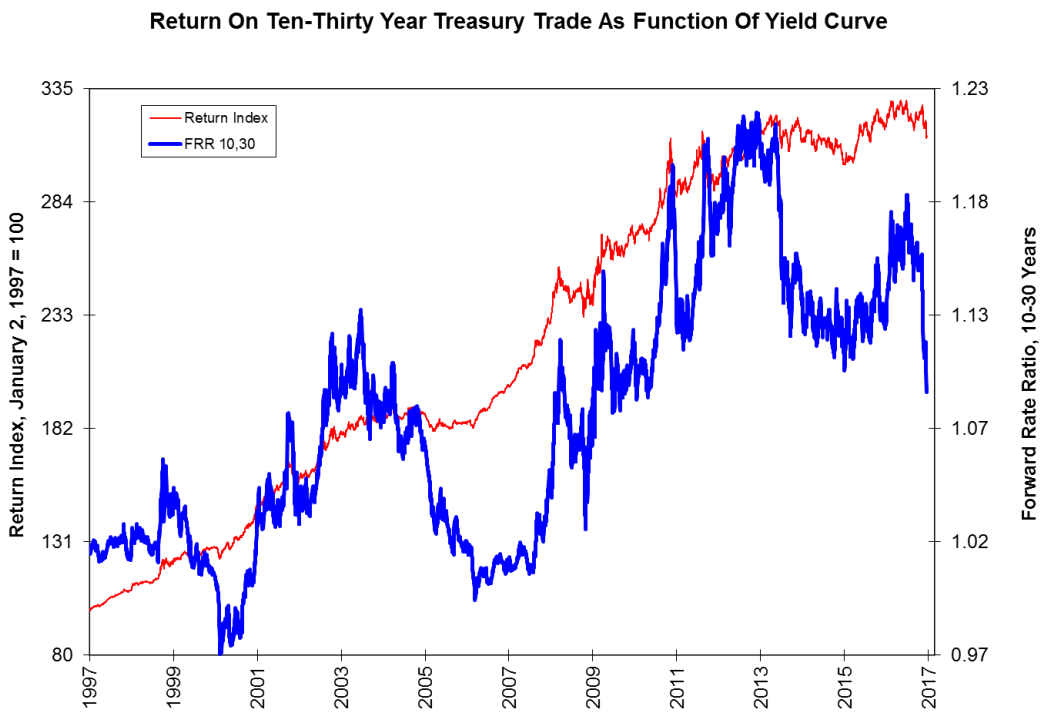
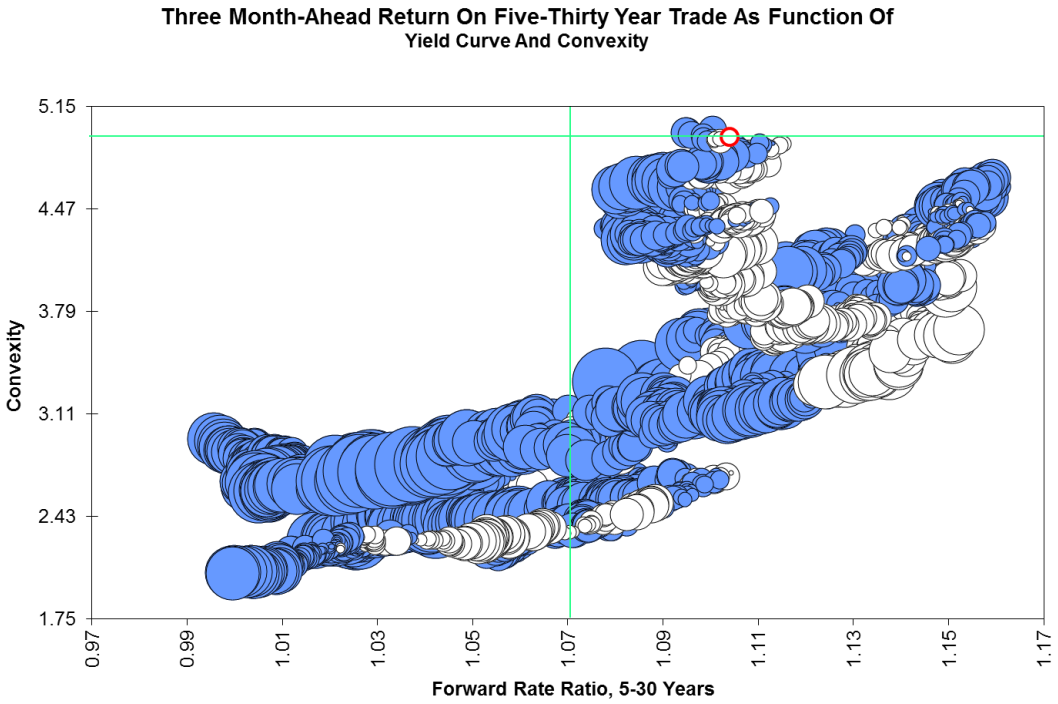


Source: Bloomberg

Prospective Returns

Do the net convexity and FRR variables have any sort of predictive capacity for the flatteners' returns? The answer is somewhat mixed. First, even though there are two decades of data in this analysis, these are two of the most unusual decades in fixed-income history. When else have we seen two market crashes, three rounds of quantitative easing, more than seven years of near-zero short-term rates in the U.S. and negative short-term rates globally combined with multiple central bank attempts at shaping and reshaping the yield curve to its liking? The net result of all this has been an extremely strong long-term bias toward gains on the flattening trades.

Let's map three month-ahead gains for each of these trades as a function of their respective FRR levels and net convexities. Positive returns are depicted with blue bubbles, negative returns with white bubbles; the diameter of the bubbles correspond to the absolute magnitude of the return. The environment on December 21, 2016 is noted with a bombsight and the datum from three months' prior is highlighted.



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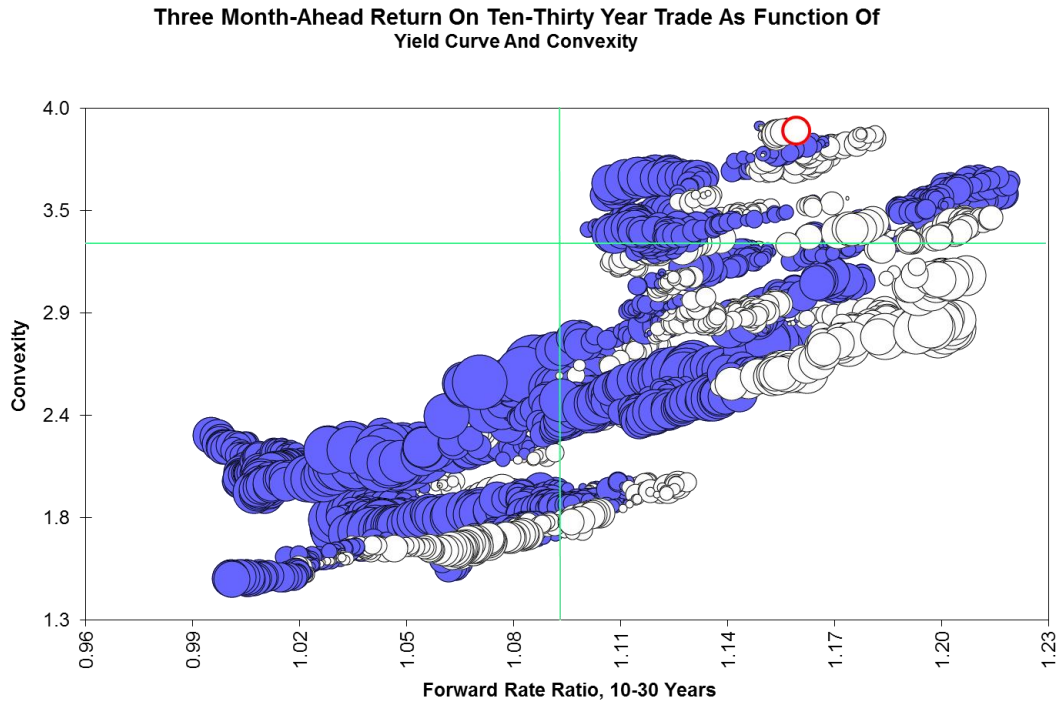

Source: Bloomberg

In both cases, the locations of negative prospective returns appear to be more anecdotal than systematic. Restated, the posited initial conditions for trade success can be defeated by the interventions of external forces, central bank interventions in particular. We cannot run an alternative history to demonstrate the principle that a flattener emplaced when net convexity is high and the yield curve is steep should work. All we can do is play the odds such a set of initial conditions will provide superior returns in a declining yield environment and superior defense in a rising yield environment. You could do worse.