

## EXPERT ANALYSIS

### The Dynamics of Rising Interest Rates

By Robert M. Anderson, Ph.D., Stephen W. Bianchi, CFA, and Lisa R. Goldberg, Ph.D.

Prompted by Federal Reserve Chairman Ben Bernanke's suggestion early in May that the Federal Reserve might end quantitative easing, markets pushed the 10-year Treasury bond rate up by more than a percentage point in the span of a few weeks, even as the Fed maintained low short-term interest rates and struggled to reign in long-term interest rates. At the same time, the VIX index, which gauges the market's perception of risk, increased from 12.5 percent to 20.5 percent. Volatility has abated somewhat in the wake of the Fed's reassurance that short-term rates will remain low for an extended period. However, the recent increase in medium- and long-term rates provides a glimpse of the impact that a change in interest rates can have on investments. Strategies that involve leverage are especially vulnerable to interest-rate increases.

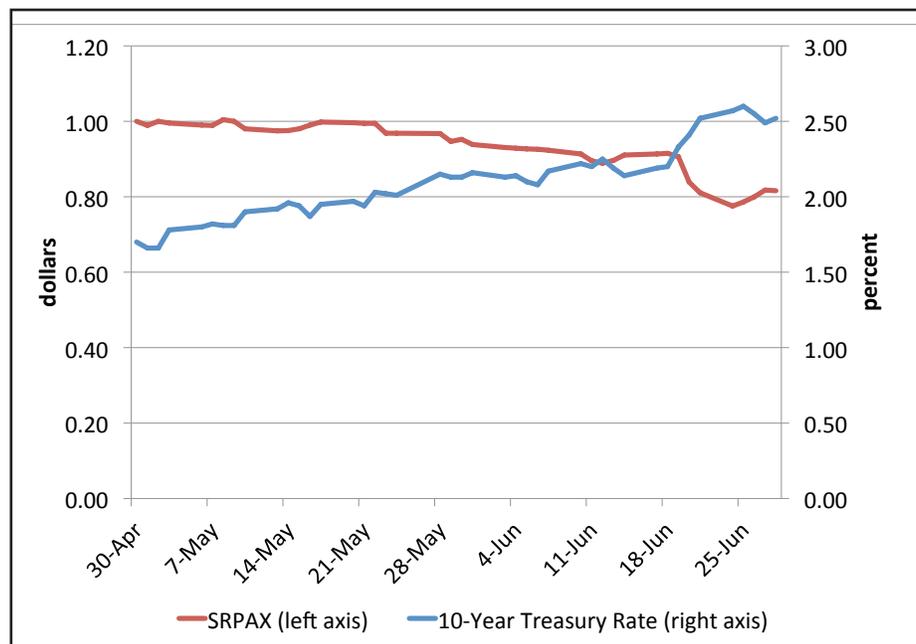
When interest rates go up, the cost of financing also goes up, and the profits of a levered strategy are eroded. But financing costs are not the only concern: leverage also magnifies investment returns. When prices rise, leverage enhances gains, and that is naturally attractive to investors. The flip side is that leverage magnifies losses as well. Notably, the severity of losses depends on the interactions among the drivers of return to the levered strategy.

Think about what happens to a portfolio of bonds purchased with borrowed money when interest rates go up. The cost of financing goes up at the same time that the strategy suffers capital losses, magnified by leverage, from the decline in bond prices. A subtle but important point arises when leverage is set dynamically, in response to market conditions. In this case, leverage may go up at the same time that the bond portfolio loses value. When this happens, the decline in bond prices is magnified further by even greater leverage.

Why would anyone invest in a risky strategy like that? Some investors believe that the upside potential in a dynamically levered strategy is adequate compensation for the risk. Others are simply unaware. Leverage is implicit rather than explicit in many investments — notably, financial derivatives and alternatives such as real estate and hedge funds. It is also an essential feature of so-called "levered low-risk" strategies such as risk parity, which boast tens of billions of dollars in assets under management.

Some market participants think of risk parity strategies as an antidote to an imbalance in traditional asset allocation, where weights are based on capital allocation. An example of the latter is a fixed mix strategy that targets a capital allocation of 50 percent bonds and 50 percent equity. Because stocks are much more volatile than bonds, the equity component of this 50-50 fixed mix strategy typically accounts for as much as 80 percent of its risk. To equalize the risk contributions in a risk parity strategy, much more than 50 percent of the capital is invested in bonds. The precise fraction varies over time. The percentage allocated to equity is dictated by the condition that equity accounts for half the total risk, and it results in a greater capital allocation to bonds. The placement of greater emphasis on bonds relative to stocks reduces the overall portfolio risk, but it also limits the strategy's long-term return potential. Hence, investors lever the strategy in the hope of earning greater return at an acceptable level of risk.





The graph shows the evolution of the 10-year U.S. Treasury rate (blue, right axis) over the months of May and June, and the value of a dollar invested in Salient Partners SRPAX Risk Parity fund (red, left axis) on April 30, over the same time period. At the end of the period, the interest rate was up roughly 1 percent and the dollar invested in SRPAX had lost 20 cents.

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According to a study we published in *Financial Analysts Journal*, simple, putatively safe, levered strategies such as risk parity have done well in some periods and poorly in others.<sup>1</sup> In our study, we divided the 82-year period between January 1929 and December 2010 into four economically consistent sub-periods. During the earliest of the four periods, which ended in 1946, and the most recent period, which began with the new millennium, markets were turbulent while bonds and risk parity strategies performed relatively well. The bull market, which began in the mid-1980s and ended in 2000, was positive for many strategies including all the ones we considered in our study.

However, the post-World War II period, which began in 1946 and ended in 1982, witnessed inflationary spikes and high interest rates that translated into poor bond performance. Risk parity strategies suffered as a consequence. Their performance was further degraded by the high and variable leverage required to maintain their volatility target in the early 1960s, when bond volatility was unusually low. The leverage ratio in the risk parity strategy we looked at reached a peak of \$13 borrowed for every dollar of capital in September 1965, when bond volatility bottomed out at 50 basis points per year. In summary, risk parity often performed well when bonds performed well (the correlation was 0.65 over the 82-year period) but risk-parity strategies carry additional risks due to their dynamic leverage. In the long run, when realistic trading and borrowing costs are taken into account, the average performance of risk parity appears similar to that of conventional portfolio strategies, which carry no leverage and are less sensitive to rising interest rates.

In a follow-up study we carried out at the Center for Risk Management Research at University of California, Berkeley, we laid out the mechanics of levered strategies.<sup>2</sup> We compared the performance of different dynamically levered strategies, in which the leverage is set to match a particular risk profile, and we benchmarked dynamically levered strategies against fixed leverage strategies. Fixed leverage strategies differ from risk parity and other dynamically levered strategies in an important respect: The level of leverage is fixed, so it does not vary no matter what happens in the markets. In contrast, the level of leverage in risk parity is subject to both the vagaries of the market and the discretion of the fund manager. As in the case of risk parity versus traditional asset allocation, we found that the relative performance of fixed versus dynamic leverage strategies to be period dependent. However, the correlation of leverage with return to the underlying levered portfolio is a key factor in both the return and the risk to a

dynamically levered strategy. This factor drives return contributions that are large in magnitude and also highly sensitive — small changes in the correlation translate into large swings in the performance. Over the two decades beginning in 1960, a tiny but negative correlation of -0.01 between leverage and the return to the underlying portfolio led to dramatic underperformance of a dynamically levered strategy. Over the 40-year period beginning in 1980, a tiny but positive correlation between leverage and the return to the underlying portfolio led to the outperformance of a dynamically levered strategy. Such is the nature of leverage.

With the intent of providing liquidity that might stimulate stagnant financial markets, the Fed has maintained Treasury rates at historically low levels since the 2008 global financial crisis. The three-year Treasury bill rate has been less than 50 basis points for the past two years, and the Fed has exerted downward pressure on long interest rates by buying in excess of \$85 billion worth of Treasury bonds and mortgage-backed securities per month. However, with inflation and short-term interest rates near zero, there is little prospect of a further rise in bond prices and a substantial risk of falling bond prices. We do not know when the Fed will increase short-term rates or cease to purchase long-term securities. What we do know is that rising rates have the potential to degrade the performance of levered strategies from a number of angles. This is true despite the fact that those strategies prospered in periods of low interest rates and stable leverage. Pension funds, endowments, wealth funds and individual investors who have entrusted their precious capital to levered strategies may want to consider how they will be affected by rising interest rates. The performance of levered strategies over the past three months is a hint.

## NOTES

<sup>1</sup> *Will My Risk Parity Strategy Outperform?* FIN. ANALYSTS JOURNAL, 68 (6): 75-93. (November/December 2012).

<sup>2</sup> Robert M. Anderson, Stephen W. Bianchi & Lisa R. Goldberg, *The Decision to Lever*, Working Paper # 2013-01, Ctr. for Risk Mgmt. Research, Univ. of Calif., Berkeley (July 2013).

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