

## INTRODUCTION

Fixed Income makes up a significant portion of many of our portfolios. With interest rates and bond yields at or near record lows, the volatility of fixed income funds has been increasing, and with the prospect of rate rises increasing it is important to understand how the asset class will react in this environment and how we can structure a portfolio to cope with this behaviour.

## THE ADVANTAGES OF A BOND ANCHOR

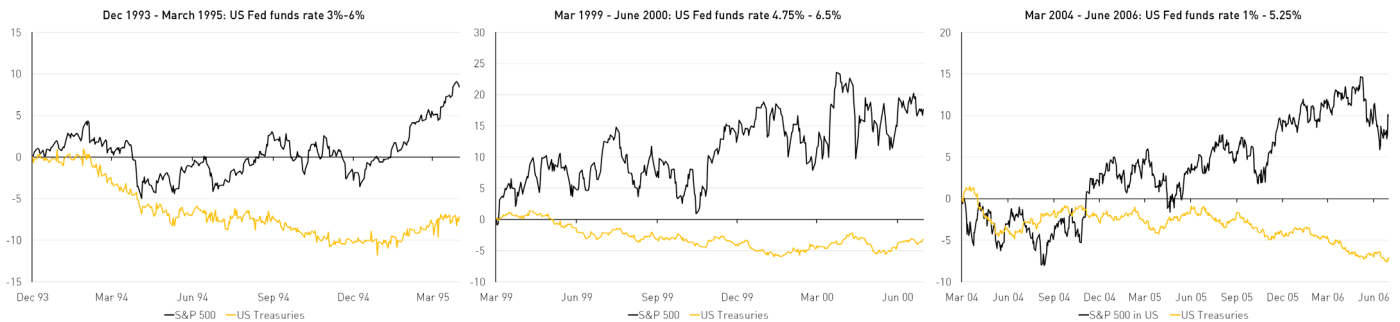
The inverse relationship between equities and bonds forms the basis for a portfolio management technique known as a "bond anchor". It uses the asymmetrical nature of the returns to each asset class to offset the risk of each. When equity markets fall, the rotation into safer assets means higher quality bonds such as gilts make higher than expected returns. When bonds fall, equities typically gain. This relationship has held true over multiple time periods, the below correlation table shows that in each of the last 11 years gilts have had low or negative correlation to equities.

### Correlation of Gilts to Equities over the Last Eleven Years

| 2006  | 2007  | 2008 | 2009 | 2010  | 2011  | 2012  | 2013 | 2014 | 2015  | 2016 |
|-------|-------|------|------|-------|-------|-------|------|------|-------|------|
| -0.35 | -0.52 | 0.22 | 0.17 | -0.45 | -0.22 | -0.75 | 0.24 | 0.28 | -0.08 | 0.16 |

## HISTORICAL EVIDENCE OF LOW CORRELATION

While rates have been low for a decade, there have been multiple tightening cycles in the past that can give us some idea how bonds and equities might react in rising rate environment. The three examples below are some of the more aggressive periods of tightening and the low correlation between the two asset classes can clearly be seen to hold.

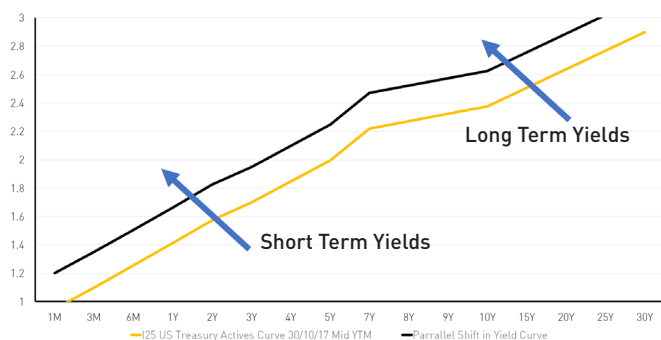


|                              | Dec 1993 - Mar 1995 | Mar 1999 - Jun 2000 | Mar 2004 - Jun 2006 |
|------------------------------|---------------------|---------------------|---------------------|
| S&P 500 (Price)              | 8.40                | 17.67               | 9.88                |
| S&P 500 (Total Return)       | 12.50               | 19.02               | 13.06               |
| US Treasuries (Price)        | -7.18               | -3.19               | -7.07               |
| US Treasuries (Total Return) | 1.62                | 5.37                | 3.06                |

## YIELD CURVE REACTION

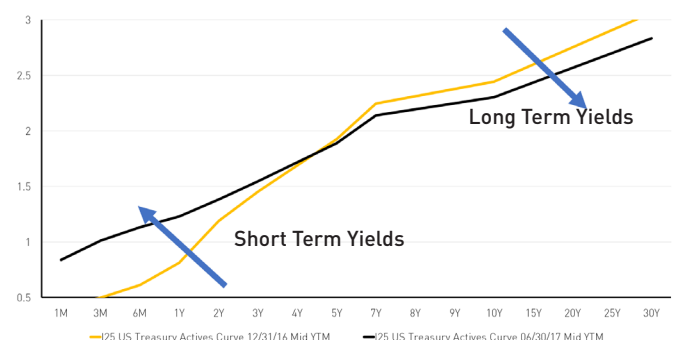
### Theoretical Parallel Shift

When analysing sensitivity to interest rates we look at a theoretical case where a change in base rate of interest has an equal effect on bond yields of all maturities. So that a 25-basis point hike in interest rates would manifest as a 25-basis point increase on a one year bond and a 20 year bond. This is known as a parallel shift in the yield curve. In reality short dated bonds and long dated bonds are bought by very different investors who seldom react the same way.



### US Experience - Flattening Curve

Rate changes have the biggest impact on short term yields, but less of an impact on long term yields. When the market sets the price of long term bonds, the bigger factors are inflation expectations and broader economic growth outlook. This is because over the life of a longer dated bond, analysts expect multiple rate changes and need to factor in these additional factors. It is possible for longer term bonds to react differently to short term bonds.

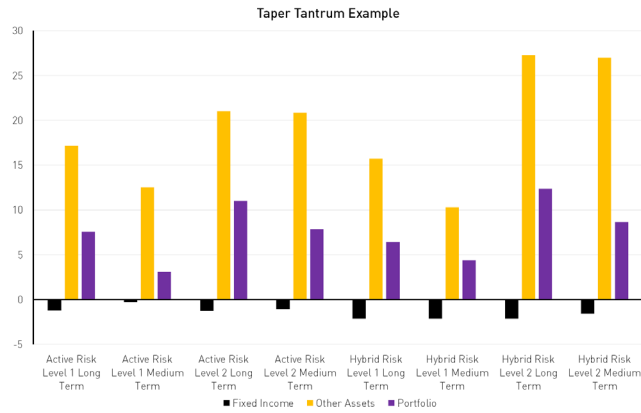


There have been two US rate hikes in 2017. This has seen an increase in short term yields, but initially a decrease in long term yields as expectations for growth and inflation deteriorated. We see in the chart that past a maturity of 4 years yields fell as longer-term expectations for the economy worsened. In the short term, longer dated bonds made money from the rate hike. More recently longer dated bonds have fallen as yields increased as investors become more positive about the economy; exactly the environment that is positive for equities.

## PORTFOLIO EXPERIENCE OF RISING YIELDS

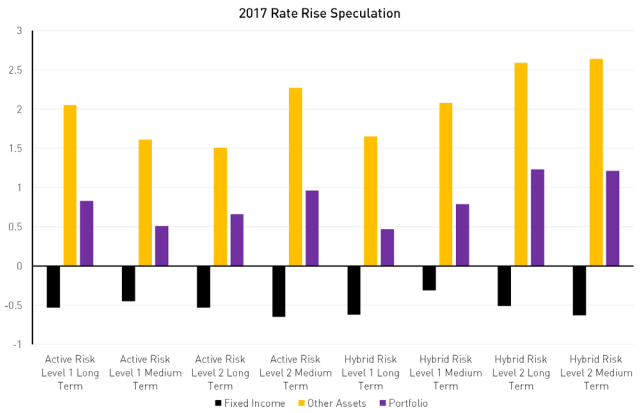
### Taper Tantrum example

In 2013, there was a significant sell off in the bond markets as the US Federal reserve announced it was ending its quantitative easing program. Gilt Yields started the year at 1.6% and had risen to 3% by December. The market settled down the following year and yields steadily fell back to close to their original levels. This gives us a useful natural experiment to examine the impact of a sudden increase in yields in a short space of time.



### 2017 Rate Expectation Rise

In the run up to the November Monetary Policy Committee meeting, market expectations of the Bank of England making its first rate hike since the financial crisis increased steadily. Gilt yields climbed 28 basis points between the start of September and the end of October, almost completely pricing in the effects of the hike. This gives us a good opportunity to examine the effects of a quarter point increase in rates, which is likely to be the most common policy action.

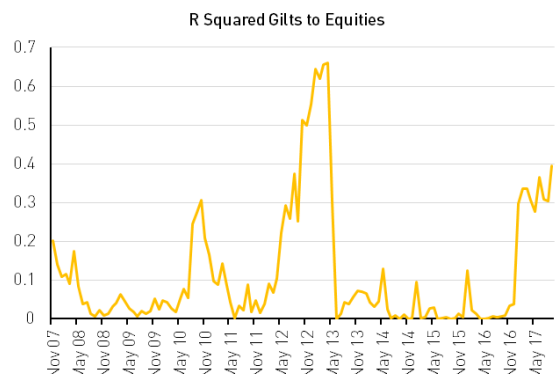
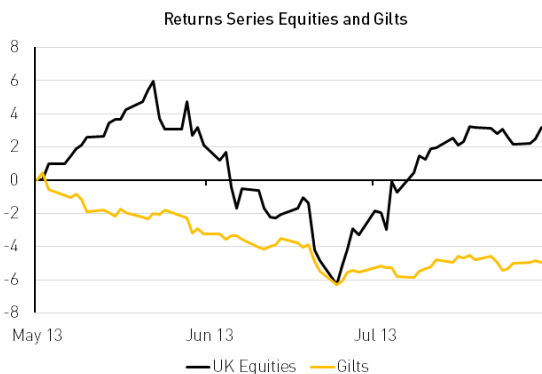


|                                 | Fixed Income Price | Fixed Income TR | Other Assets Price | Other Assets TR | Portfolio Price | Portfolio TR |
|---------------------------------|--------------------|-----------------|--------------------|-----------------|-----------------|--------------|
| Active Risk Level 1 Long Term   | -1.2               | -0.62           | 17.17              | 17.68           | 7.57            | 7.93         |
| Active Risk Level 1 Medium Term | -0.3               | 0.14            | 12.54              | 13.3            | 3.1             | 3.76         |
| Active Risk Level 2 Long Term   | -1.27              | -0.65           | 21.04              | 21.52           | 11.01           | 11.69        |
| Active Risk Level 2 Medium Term | -1.11              | -0.6            | 20.81              | 21.92           | 7.86            | 8.92         |
| Hybrid Risk Level 1 Long Term   | -2.14              | -2.14           | -13.55             | -13.7           | 6.41            | 6.6          |
| Hybrid Risk Level 1 Medium Term | -2.14              | -2.14           | 10.27              | 10.75           | 4.36            | 4.5          |
| Hybrid Risk Level 2 Long Term   | -2.11              | -2.11           | 27.25              | 27.3            | 12.38           | 12.64        |
| Hybrid Risk Level 2 Medium Term | -1.57              | -1.57           | 26.97              | 26.97           | 8.64            | 8.77         |

## DANGER OF INCREASING CORRELATIONS

At times or market stress there is a risk that all asset classes fall together, and the risk management benefits of low correlated investments evaporate. To a certain extent, this is an impossible event to plan for, as if everything falls, there is little you can do about it except hold cash – which is an expensive position to take as it guarantees a loss of capital after inflation. Spikes in correlation have historically been short lived, so it is important to match exposures to time horizons when managing for this scenario.

The taper tantrum of 2013 sparked the most severe correlation spike of recent times. Through June of that year the FTSE All Share lost 11.6% at the same time the FTSE All Stocks Gilt Index lost 4.6%. This is typical of a steady change in expectations in the bond markets coupled with an over the top reaction from the equity markets. Within a month the markets had corrected and correlations fell back to a normal range.



| Investment                      | 1 Month Max Drawdown | 50% Recovery Period | 100% Recovery Period | Average Expected Time Horizon |
|---------------------------------|----------------------|---------------------|----------------------|-------------------------------|
| Active Risk Level 1 Short Term  | -3.47%               | 2 months            | 9 months             | 5 years                       |
| Active Risk Level 1 Medium Term | -4.90%               | 2 month             | 15 months            | 11 years                      |
| Hybrid Risk Level 1 Short Term  | -3.42%               | 2 month             | 10 months            | 5 years                       |
| Hybrid Risk Level 1 Medium Term | -3.95%               | 1.8 month           | 12 months            | 11 years                      |

## THEORETICAL INTEREST RATE EXPOSURE AND RETURNS FROM INCOME

Duration is a statistical measure that represents an investment's sensitivity to interest rates. Bonds with a longer time to maturity are typically more sensitive to rate changes, as there is more interest to be paid over the life of the bond, thus changes in rates have a bigger impact. Shorter maturity investments are less sensitive as fewer interest payments are affected. For this reason, duration is expressed in years – and broadly translates to the expected movement in price for a 1% shift in rates. Crucially it assumes long-term and short-term rates move equally.

The tables below show the expected impact of a rate hike on the capital value of the fixed income portion of each portfolio based on duration, given a 0.25%, 0.5% or 1% hike in a 12-month period.

We have also taken into account the income paid on each portfolio and assessed the overall total return impact, assuming no other market movements. Finally we've looked at what would be required of the non-fixed income investments to make up for this potential downside.

| Active Portfolio         | Bond Allocation % | Duration | Impact of Rate Rise on Fixed Income |        |        | Required Growth Rates following 1% rise for non FI 1 year |
|--------------------------|-------------------|----------|-------------------------------------|--------|--------|---|
|                          |                   |          | 0.25%                               | 0.50%  | 1%     |   |
| Risk Level 1 Short Term  | 24.5              | 2.7      | -0.68%                              | -1.35% | -2.70% | 2%  |
| Risk Level 1 Medium Term | 46.0              | 5.8      | -1.45%                              | -2.90% | -5.80% | 8%  |
| Risk Level 1 Long Term   | 39.5              | 4.8      | -1.20%                              | -2.40% | -4.80% | 5%  |
| Risk Level 2 Short Term  | 30.0              | 3.7      | -0.93%                              | -1.85% | -3.70% | 4%  |
| Risk Level 2 Medium Term | 36.5              | 4.0      | -1.00%                              | -2.00% | -4.00% | 3%  |
| Risk Level 2 Long Term   | 38.5              | 4.1      | -1.03%                              | -2.05% | -4.10% | 4%  |
| Risk Level 3 Short Term  | 35.5              | 4.8      | -1.20%                              | -2.40% | -4.80% | 5%  |
| Risk Level 3 Medium Term | 24.5              | 2.8      | -0.70%                              | -1.40% | -2.80% | 2%  |
| Risk Level 3 Long Term   | 24.5              | 2.4      | -0.60%                              | -1.20% | -2.40% | 1%  |
| Risk Level 4 Short Term  | 32.0              | 5.0      | -1.25%                              | -2.50% | -5.00% | 5%  |
| Risk Level 4 Medium Term | 8.5               | 0.6      | -0.15%                              | -0.30% | -0.60% | 0%  |

| Hybrid Portfolio         | Bond Allocation % | Duration | Impact of Rate Rise on Fixed Income |        |        | Required Growth Rates following 1% rise for non FI 1 year |
|--------------------------|-------------------|----------|-------------------------------------|--------|--------|---|
|                          |                   |          | 0.25%                               | 0.50%  | 1%     |   |
| Risk Level 1 Short Term  | 27.5              | 3.0      | -0.75%                              | -1.50% | -3.00% | 3%  |
| Risk Level 1 Medium Term | 46.0              | 6.1      | -1.53%                              | -3.05% | -6.10% | 9%  |
| Risk Level 1 Long Term   | 47.5              | 5.6      | -1.40%                              | -2.80% | -5.60% | 8%  |
| Risk Level 2 Short Term  | 36.0              | 3.8      | -0.95%                              | -1.90% | -3.80% | 3%  |
| Risk Level 2 Medium Term | 36.5              | 4.4      | -1.10%                              | -2.20% | -4.40% | 4%  |
| Risk Level 2 Long Term   | 39.0              | 4.6      | -1.15%                              | -2.30% | -4.60% | 5%  |
| Risk Level 3 Short Term  | 31.0              | 4.5      | -1.13%                              | -2.25% | -4.50% | 5%  |
| Risk Level 3 Medium Term | 31.5              | 3.8      | -0.95%                              | -1.90% | -3.80% | 4%  |
| Risk Level 3 Long Term   | 25.0              | 2.4      | -0.60%                              | -1.20% | -2.40% | 1%  |
| Risk Level 4 Short Term  | 32.0              | 5.1      | -1.28%                              | -2.55% | -5.10% | 5%  |
| Risk Level 4 Medium Term | 11.5              | 0.9      | -0.23%                              | -0.45% | -0.90% | 0%  |