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Interest rate risk in low-volatility strategies

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Introduction

Low-volatility stocks tend to benefit from falling rates, which is consistent with the notion that they can be regarded as 'bond-like' stocks. In this note we assess the magnitude of this interest rate sensitivity and to which extent it may be mitigated. We find that:

> Interest rate risk is inherently present in low-volatility strategies
> Interest rate risk does not explain the added value of low-volatility strategies
> Our active approach towards low-volatility reduces interest rate risk compared with generic approaches

Bond-like stocks

Low-volatility stocks behave differently from high-volatility stocks. First and foremost, their sensitivity to broad market movements differs. While market movements tend to be dampened by low-volatility stocks, they are typically amplified by high-volatility stocks. A less known phenomenon is that low-volatility and high-volatility stocks also exhibit different sensitivities to changes in interest rates. Low-volatility stocks tend to benefit from falling interest rates, which is consistent with the notion that they are 'bond-like' stocks, due to their stable cash flows and high dividends.[1] High-volatility stocks, on the other hand, tend to do better than expected when interest rates rise, which is consistent with the notion that they bear more resemblance to call options.[2]

Research question

In this note we examine to which extent low-volatility strategies in general, and our low-volatility approach in particular, are exposed to interest rate risk. We conduct both a long-term analysis of the US equity market, and a more recent analysis of a global universe.

[1] See also Baker and Wurgler (2012), "Comovement and predictability relationships between bonds and the cross-section of stocks", *Review of Asset Pricing Studies* 2(1), 57-87. The authors offer three non-exclusive explanations for the empirically observed bond-like characteristics of low-volatility stocks: (i) comovement in real cash flows: for instance, a business cycle contraction is often associated with lower inflation and rising bond prices and will generally have less of an impact on the cash flows of stable, mature firms versus more speculative growth firms or already distressed firms, (ii) comovement in risk-based required returns: a change in discount rates is likely to affect bonds and bond-like stocks in the same manner, and (iii) common sensitivity to overall risk aversion: increased risk aversion (e.g. a flight to quality, in the extreme case) leads to better performance of long-term bonds and the stocks of stable, mature firms than the stocks of more speculative firms.

[2] The Black-Scholes formula for the price of a call option implies a higher price if interest rates go up, ceteris paribus.

Long-term interest rate risk

A long sample, covering multiple business cycles, is needed in order to reliably estimate the interest rate sensitivity of low-volatility stocks, and to assess to which extent this exposure might explain their added value. We therefore consider the US equity market, for which we have data from January 1929 to December 2010. We consider both a generic low-volatility strategy, based on plain past 3-year volatility (lowvol), and an enhanced low-volatility strategy (lowvol+), which also takes valuation and momentum factors into account. The latter approach resembles our Conservative Equities strategy, although it is less sophisticated due to data limitations.

In the table below we first report the annualized performance characteristics with interest rate risk open. We also report the betas with respect to both the equity market portfolio and the bond market portfolio. For the latter series we use a 50/50 combination of the Ibbotson intermediate-term and long-term government bond return series. In the second part of the table we consider low-volatility strategies in which interest rate risk would be hedged to the level of the market portfolio.

Exhibit 1. Interest rate risk of market portfolio and low-volatility strategies

	Interest rate risk open			*Interest rate risk hedged*	
	Market	*Lowvol*	*Lowvol+*	*Lowvol*	*Lowvol+*
Excess return	5.2%	6.2%	8.5%	5.8%	8.2%
Volatility	19.0%	14.2%	14.6%	13.9%	14.4%
Beta to bonds	0.34	0.57	0.51	0.34	0.34
Beta to equities	1	0.67	0.66	0.66	0.65
Sharpe ratio	0.28	0.44	0.58	0.42	0.57

Source: Robeco Quantitative Strategies; excess returns are returns above risk-free rate on a compounded basis

Consistent with the intuition that low-volatility stocks resemble bond-like stocks, we find that low-volatility strategies have a higher exposure to bond returns (0.57 and 0.51) than the equity market portfolio (0.34), which, it should be noted, already has a positive bond exposure. Interestingly, the increase in bond exposure appears to be about a quarter lower for the enhanced low-volatility strategy than for the generic low-volatility strategy. This suggests that enhancing a low-volatility strategy is not only attractive from a long-term alpha perspective, but also has the nice side effect of reducing the short-term interest rate risk of the strategy.

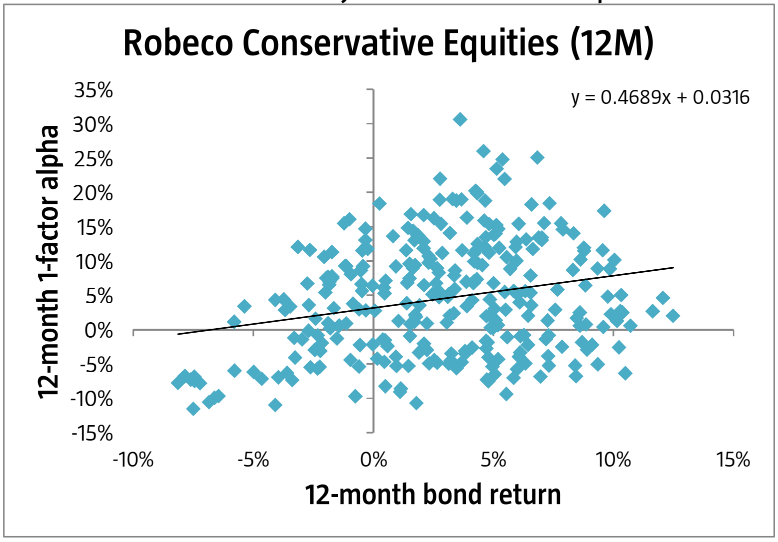
Bond exposure does not explain the added value of low-volatility

In the last two columns we add hypothetical short bond overlays to the low-volatility strategies, with the weights being such that their interest rate risk is brought in line with the equity market portfolio. For the generic low-volatility strategy this means that we add a 23% (0.57 minus 0.34) short bond overlay, and for the enhanced low-volatility strategy a 17% (0.51 minus 0.34) short bond overlay. The results in the last two columns of Exhibit 1 show that this has a slightly negative impact on long-term average returns (as bonds carry a positive risk premium in the long run), but also results in a slightly lower volatility. As a result, the Sharpe ratios are hardly affected. From these results it is evident that the bond exposure of low-volatility strategies does not explain their long-term added value.

Global analysis: Robeco Conservative Equities

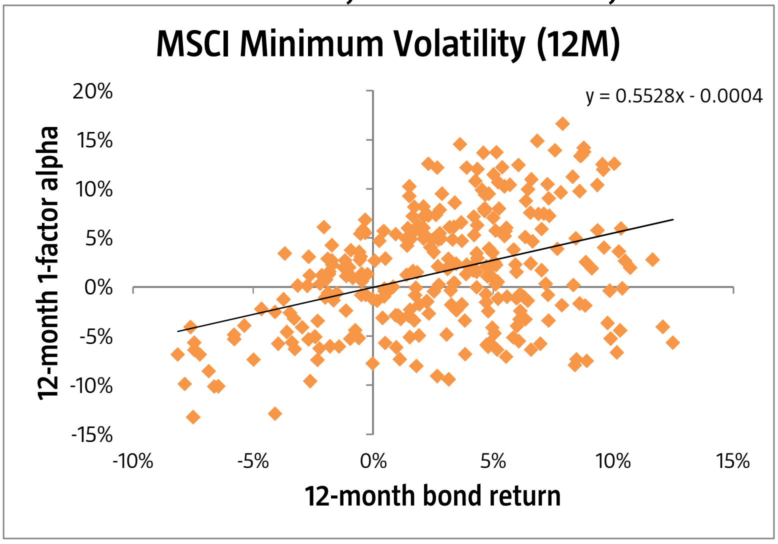
We continue by examining the interest rate sensitivity of real-life low-volatility strategies over a more recent period for a global universe. To this end, we consider our active global low-volatility strategy, Conservative Equities, which was launched in September 2006, and the first generic global low-volatility index, the MSCI World Minimum Volatility index, which was launched 1½ years later in April 2008. As this 5-7 year period is too short for reliably estimating interest rate sensitivities, we augment this data with simulated returns for both strategies going back to June 1988, the longest available period for the MSCI World Minimum Volatility index. Our sample period ends in September 2013.

Exhibit 2A. Interest rate sensitivity Robeco Conservative Equities at 12-month horizons



Source: Robeco Quantitative Strategies

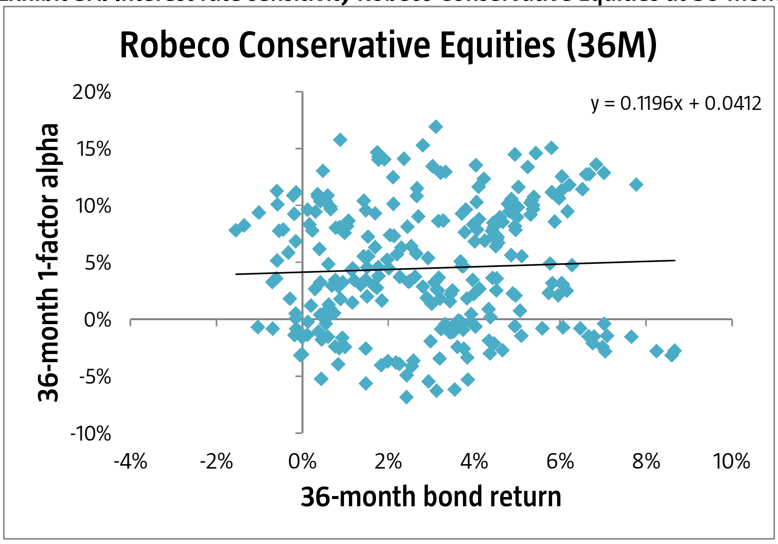
Exhibit 2B. Interest rate sensitivity MSCI Minimum Volatility index at 12-month horizons



Source: Robeco Quantitative Strategies, MSC I

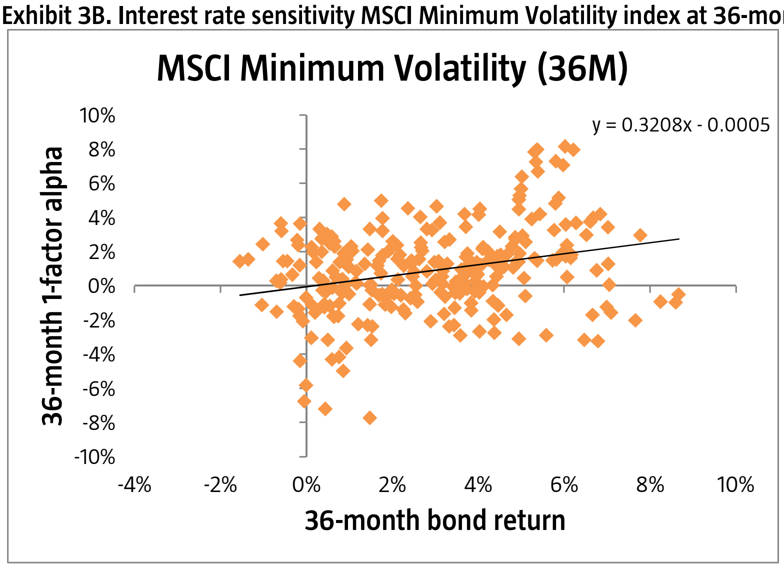
In Exhibits 2A and 2B we plot the 12-month rolling 1-factor alphas of Conservative Equities and the MSCI index alternative against the returns on US government bonds over this 25-year sample period. Several conclusions can be drawn from these figures. For one, they confirm our earlier result that the performance of low-volatility stocks is positively related to the return on bonds. In addition, the slopes of the regression lines again suggest that this interest rate sensitivity is lower for our active approach than for the generic alternative.

Exhibit 3A. Interest rate sensitivity Robeco Conservative Equities at 36-month horizons



Source: Robeco Quantitative Strategies

Exhibit 3B. Interest rate sensitivity MSCI Minimum Volatility index at 36-month horizons



Source: Robeco Quantitative Strategies, MSC I

Long-horizon perspective

Exhibits 3A and 3B are similar to Exhibits 2A and 2B, except for being based on a 36-month instead of a 12-month investment horizon. Comparing these results suggests that the sensitivity to interest rate changes is reduced over longer investment horizons. For Conservative Equities the relation even appears to become virtually flat if we consider a 36-month horizon. In other words, the initial losses that are experienced as a result of rising interest rates appear to be mitigated or even entirely offset as time progresses. We hasten to add, however, that these results should be interpreted with care, as the effective number of independent 36-month return observations is small.

Alpha cushion offers protection

Finally, the pictures confirm that Conservative Equities has a higher average alpha than the MSCI index alternative, and also show that this makes it less likely for the alpha to turn negative in adverse market conditions. The finding of a higher average alpha is perhaps not surprising given that the Conservative Equities strategy was designed to that end. It is important to realize though that this also provides a cushion which can help to absorb the possible negative impact of rising interest rates.

Reflection: interest rate risk mitigated, but not eliminated

The results show that compared with a generic low-volatility strategy our active low-volatility strategy offers the benefits of low-volatility investing, with reduced sensitivity to interest rate changes. In other words, we are able to mitigate interest rate risk, but not fully eliminate it. We can draw a parallel here with the finding that our active low-volatility strategy exhibits an improved up-capture in bull markets. If equity markets go up sharply, our active low-volatility strategy remains likely to underperform, but less so than a generic low-volatility strategy. If one would like to fully eliminate this weak up-capture, the beta would become one and the risk reduction on the downside would be lost as well. Similarly, our research shows that fully eliminating the interest rate sensitivity is not possible without 'removing the heart' of the low-volatility strategy.

How an active approach helps

Which factors are driving the reduced interest rate sensitivity of our active strategy? What are the mechanics and what is the economic intuition? Our research shows that most of the reduction comes from the inclusion of valuation and especially sentiment factors. These combined factors have less interest rate sensitivity, so using a part of the available risk budget for these factors automatically waters down the interest rate sensitivity. In addition, the forward-looking, non-statistical distress risk measures which we employ next to traditional historical volatilities and correlations also turn out to be less sensitive to interest rate changes. Thus besides increasing the Sharpe ratio and improving the up-capture the Robeco low-volatility model enhancements have the added advantage that interest rate risk is reduced.

Managing interest rate risk

Although our active low-volatility strategy appears to be able to mitigate the interest rate risk of low-volatility strategies, it is not able to eliminate this risk altogether. Thus, an investor can wonder whether it is attractive to invest in the strategy if he or she expects a strong rise in interest rates in the near-term future. In our view, the decision to invest in a low-volatility strategy should be a strategic decision aimed at capturing the low-volatility premium which the data strongly suggests is there in the long run. If the investor also has a tactical view on interest rates, the best way to implement this view is using instruments that provide direct exposure to interest rate changes, such as bond futures or interest rate swaps. This is more efficient and effective than trying to manage the interest rate risk of the portfolio by relying on the indirect relation that is empirically observed for low-volatility stocks.

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