Trend following is an alternative investment strategy capable of producing returns that differ from traditional investments over the long term. How a trend-following strategy interacts with markets – and ultimately performs – is driven by the decisions of the investment manager, who must consider various trade-offs when constructing the strategy.

The design of a trend-following system must also account for the fact that market behaviour is non-stationary and non-parametric. Winton has, for example, highlighted how the returns of three different speeds of trend-following strategy have changed since the 1980s [1]. And events such as Black Monday 1987 and the 2007 Quant Quake show how extreme losses occur more frequently than volatility-based models imply that they should. Ongoing research, a thorough understanding of the limitations of such models and a willingness to develop the system are therefore vital to ensure a trend-following strategy continues to meet its objectives.

In this paper, we examine four important components of trend-following system design – speed, leverage, beta caps and market selection – to assess their effect on performance. We also discuss how we consider these parameters in relation to the design of our own strategies.
Choosing a speed

Speed is a primary consideration in trend-following system design as it determines how quickly a strategy reacts to market moves. Faster strategies are more responsive to changes in market direction and will turn short quicker, incurring higher transaction costs. Slower strategies, meanwhile, trade less frequently and capture steady, long-term trends.

Given that investors tend to buy trend-following strategies to complement their wider portfolio, many are particularly interested in how quickly a trend-following system will turn short in an equity bear market. We explore this idea in Figure 1 by running a Monte Carlo simulation of a hypothetical equity market crash, creating 10,000 random 100-day, 30% drawdowns.

We use 1 January 2018 as a start point for the drawdown, when S&P 500 trend-following signals were strong and positive after a steady run-up in the stock market during 2017. We then average the signal across all 10,000 crashes and show the 5th and 95th percentiles to indicate the range, before assessing three different signal speeds.

Figure 1: Time for a trend-following signal to turn around. Signals have been rebased to have a common start point. The grey distribution shows the frequency of signal strengths observed for the three signals since 1962. The signal strength heading into 2018 is towards the top end of the distribution. Slow, medium and fast correspond to the speeds used in our multi-strategy portfolios, those applied to most markets in the Winton Trend Strategy and those applied to just stock indices in the Winton Trend Strategy, respectively.
This toy example illustrates that – all else being equal – faster systems will turn around more quickly than slower systems. More importantly, though, it shows there is much uncertainty in the turnaround time. Even under conditions where the depth and duration of the drawdown are fixed, a large range of outcomes ensue. This is due to the numerous possible paths the market could take. In the real world, there is even greater uncertainty as we don’t know how deep the drawdowns will be or what conditions will have preceded them.

A trend-following manager can, of course, increase the likelihood of a strategy turning around by trading faster systems, but this could come at the expense of performance. Figure 2 shows how this trade-off has emerged in recent years. Since 2010, faster systems have performed considerably worse than slower trend-following systems. However, prior to 1990, managers did not have to compromise: the fastest trend-following systems offered both the lowest average beta to the stock market and the highest returns.

At Winton, the speed of our trend-following systems is tailored to meet the objectives of the relevant strategy and its investors. In our multi-strategy portfolios, for example, Sharpe ratio maximisation is the priority, so our trend-following signals are generally slower. In the Winton Trend Strategy, however, we are aware that investors are seeking an investment that will perform differently to the rest of their portfolio, particularly long equity allocations. The speed of the trend-following signals is therefore faster, and faster still in stock indices.
Setting leverage

Leverage is one of the most important drivers of trend-following returns and it is often the most noticeable differentiator when comparing strategy performance. All else being equal, the more leverage a system is designed to use, the larger its returns, both positive and negative.

If trend following is expected to deliver a positive return in the long run, theory dictates that the manager should operate the strategy at higher levels of gearing to maximise these returns. But increasing risk also increases the probability of deep drawdowns or even a fund’s capital being wiped out by a catastrophic loss. Managers must therefore balance these competing objectives to determine how much risk both they and their investors are willing to tolerate.

Trend-following industry convention is to distil risk to volatility of returns, and to adjust leverage to realise a certain level of portfolio volatility, with position sizes increasing when market volatility falls and scaling back when volatility picks up. The benefit of targeting a level of volatility is that, over the long term, volatility scales approximately linearly with strategy returns and leverage.

The approach has drawbacks, though. Volatility is too simplistic a measure to make any predictions about portfolio risk. Such predictions assume returns are stationary and parametric, which history has repeatedly shown to be false. There is no single formula that provides the full picture when measuring risk, and relying solely on volatility to determine gross leverage can leave investors exposed to extreme losses when market volatility spikes and/or inter-market correlations suddenly change. We seek to address the limitations of volatility statistics by considering them alongside a range of other risk inputs when determining the level of gearing in our own portfolios.

Winton has tended to run strategies with lower levels of leverage compared to its peers. One reason for this is the non-linear relationship between leverage and the frequency of large losses. We illustrate this issue in Figure 3, overleaf, where we plot the frequency of a 5%, 7.5% and 10% rolling one-month loss for three trend-following strategies. Each strategy realises a different level of volatility over the long term. The analysis shows how the frequency of large losses scales up much more quickly than realised long-term volatility.
Figure 3: 20-day loss frequency for strategies operating at three different levels of leverage between 1971 and 2018. Simulation is based on the Winton Trend Strategy with new markets added as they become available. The strategy volatilities refer to their long-term realised volatilities – these simulations do not “target” a fixed level of volatility so realised volatilities vary over shorter time horizons. Returns are gross of transaction costs and fees; interest on earned cash is excluded.

Capping exposures

Gearing is not the only lever trend-following managers can use to shape a strategy’s risk profile. Capping exposures to certain factors offers a more targeted way to control risk.

Over long time-horizons, trend-following strategies tend to have a low beta to the markets in which the strategy invests, as periods of long exposure offset periods of short exposure. However, at times, the strategy can build up leveraged directional positions in markets as sustained trends emerged. For example, many trend-following strategies would have had large long positions in equities at the start of 2018, as we highlighted in Figure 1.

Taking on considerable risk in equities may not be desirable given that investors tend to already have large long equity positions in their portfolios. If the stock market reverses course then, rather than providing a source of diversification, the trend-following allocation is likely to exacerbate an investor’s losses.
Trend-following managers can mitigate this issue by introducing system constraints. One example of this is the implementation of “beta caps”, which seek to avoid large exposures to specific factors. They do this by capping positions that are correlated with the factor once a certain threshold has been reached. Should the market correlation structure change, this process could even extend to reducing beta-additive positions in a controlled manner.

The downside of constraining a trend-following system is the higher probability of poorer long-term performance, as the strategy is not able to capture trends to their fullest extent. Figure 4 shows the relationship between an MSCI World Index beta cap and a trend-following strategy’s Sharpe ratio. The more aggressive the beta cap, the lower the observed Sharpe ratio.

Figure 4: Overall trend-following strategy Sharpe ratio for a given MSCI World Index beta cap between 1985 and 2018. Simulation is based on the Winton Trend Strategy with new markets added as they become available. Returns are gross of transaction costs and fees. Sharpe ratio calculations exclude the risk-free rate as interest on earned cash is excluded. The uncertainty is estimated by bootstrapping the returns, with the error bars representing the 5th and 95th percentiles.
Selecting markets

Figure 5: Trend-following strategies invest long and short across global, multi-asset investment universes. Diagram shows a potential strategy universe, colour coded by sector.

A major appeal of a trend-following strategy is that it provides direct exposure to up and down moves in a wide range of markets, beyond the equities and bonds that dominate typical investment portfolios (see Figure 5).

This highly diversified approach is also critical for the strategy’s performance. The diversification benefits of combining many markets are considerable, as periods of strong or challenging trend-following performance across different markets offset one another, creating a smoother return profile (an idea that can be explored with our Future Tool [2]).

The range and number of markets traded can thus be another key differentiator between trend-following strategies. Some investors may wish to exclude certain markets due to investment constraints or to reduce overlap with the rest of the portfolio, while others may seek out strategies that offer further diversification through exposure to smaller and more esoteric markets.
We assess these two ideas in Figure 6, where we show the Sharpe ratio of a trend-following portfolio as markets are added from left to right on the x-axis. To do this, we simulate 10,000 $n$-sized portfolios, where $n$ ranges from five to 96. The portfolio markets are picked randomly from a basket of 96 markets. We look at the average Sharpe ratios of these portfolios, as well as the 95th and 99th percentiles. To explore the exclusion of certain sectors, we show the Sharpe ratio of the portfolio which excludes all markets from a given sector. These portfolios are plotted as the scatter points.

There are two main takeaways from this analysis. First, there are benefits to adding markets, but these gains diminish as the number of markets increases. Second, the portfolios that exclude sectors tend to perform worse than those that do not. Entire sectors should therefore only be removed from the portfolio with good reason, such as to meet regulatory requirements.

Additionally, we do not believe it is possible to “time” the inclusion of sectors. A sector can have a positive return but still detract from overall performance in a given period, if it is highly correlated with the rest of the portfolio or if the other sectors have higher Sharpe ratios (as is the case with stock indices in Figure 6). The manager should continue to trade that sector, however, as they are unlikely to predict correctly whether it will add value in subsequent periods: Figure 6 shows how excluding a sector weighs on returns, more often than not.
The operational efficiency of trading on margin at brokers with centralised clearing houses means that new markets can be added seamlessly, but how does a manager decide when to stop increasing the breadth of the portfolio? At a point, the benefit of adding a market is not worth the cost, be that trading costs, operational burden or another factor entirely.

In more niche markets, for example, there may be low speculative limits, resulting in positions so small that they are unable to have a meaningful effect on performance. Smaller markets may also suffer from a lack of liquidity and, when trading must be done on a new exchange, cash efficiency may take a hit, due to losing the benefits of cross-margining and higher margin requirements.

The Winton Trend Strategy covers a wide range of regions and sectors, capturing a large part of the diversification benefit available. We also place an emphasis on operational efficiency and keeping costs low, so exclude some of the more esoteric markets from our strategy.

We have explored some of the parameters and design choices that can differ between trend-following strategies. Each of these decisions has a material effect on a strategy’s performance characteristics. Investors must therefore assess the relevant trade-offs and consider which approach will be a good fit for both their portfolio and risk tolerance.

The points discussed in this paper explain why the Winton Trend Strategy is designed the way that it is and why we place so much emphasis on research and development. We acknowledge that the decisions we make for the standard implementation of the Winton Trend Strategy may not be aligned with every institution’s objectives, and that customisation may be appropriate for some.
References


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