Lethame Capital Management

Technology : Research : Investing

Why investors should like modern trend following systems

While the long term compound annual growth rate of trend following strategies should be reasonably well known[1]. Less well known is the highly attractive return distribution combined with close to zero average correlation to other asset classes, making the strategy highly complementary to vanilla investment portfolios. This attractive distribution can be shown in some part to be a function of portfolio construction techniques which mean that the structure of modern trend following systems share striking similarities with both option delta hedging and more importantly the architecture of neural networks.

While neural networks are commonly used for image recognition or natural language processing, trend following systems and option hedging strategies focus on determining optimal exposure to market prices.

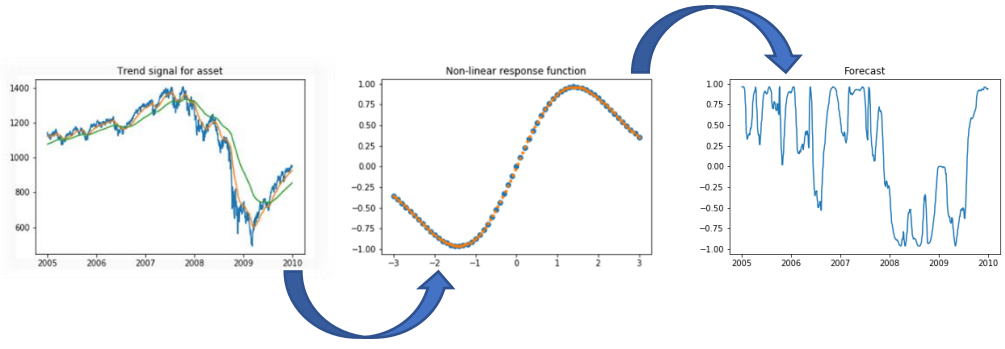
Unlike the majority of investment strategies available to investors trend following strategies exhibit positive skewness, a highly attractive property that helps explain the long term returns of the strategy.

This property of positive skewness is important when one considers that investors have a preference for 'lottery ticket' type return profiles. Kahneman and Tversky's[2] "prospect theory" in particular can be thought of as an explanation as to why this positive skewness should be attractive. By contrast the risk premia that can be observed in many of the asset classes which investors perceive to have the risk of "crashing", most notably equities, shows that investors should dislike negatively skewed strategies[2].

Lethame Capital Management would argue that for trend following systems the skewness in return's can be thought of as a function of the transformation step that both trend following and option delta hedging share with neural networks. In fact a modern trend following system almost miraculously transform a portfolio of negatively skewed assets (which investors should not like) into a positively skewed return stream (which investors should like) [3,4].

Specifically, like the hidden layer in a neural network, both trend following systems and option delta hedging involve the use of a function to transform raw data. This transformation step identifies underlying patterns in data, in the case of trend following these tools can generate profitable trading signals and help to manage risk[5].

The transformation of the price signal in a trend following system



In the case of trend following once the raw data has been transformed, a response function is applied to create a trading signal, similar to the way a neural network's output is transformed using a response function to produce a prediction or classification.

By transforming raw data in this way, trend following strategies are able to filter out short-term noise and identify longer-term trends in the data. This signal indicates the exposure to the underlying asset required depending on the strength of the systems signal. This allows the trend following system to take advantage of price momentum, by capturing gains from market trends while limiting losses from market reversals. Additionally, the ability to go both long and short allows trend following strategies to profit from both upward and downward market movements, further enhancing their positive skewness[6].

Similarly, option delta hedging involves transforming raw data, using a function such as the Black-Scholes model. This model uses an number of inputs including the underlying asset's price to generate the option delta, a measure of the sensitivity of the option's price to changes in the underlying asset's price. The delta is used as a signal to determine how much of the underlying asset needs to be held long or short as a hedge to the option.

Neural networks, on the other hand, are commonly used for image recognition or natural language processing. They use an activation function in the hidden layer to transform input data and identify patterns in the data. This transformed data is then fed into a response function to generate a prediction or classification.

Despite their different applications and specific mathematical functions, trend following systems, option delta hedging, and neural networks share the same underlying principles. For trend following, transforming raw data using a mathematical function and then applying a response function, can generate profitable trading signals and help to manage risk. The similarities highlight the importance of understanding the underlying principles behind each. Understanding this can help trend-followers optimize their investment strategies filtering out short-term noise and identifying longer-term trends, trend following systems offer a simple yet powerful way to achieve long term compound growth with low correlation to other asset classes.

[1]Hurst, B., Ooi, Y.H., Pederson, L.H. (2017) "A Century of Evidence on Trend Following Investing" - SSRN

[2]Kahneman, D., and Tversky, A., (1979) "Prospect Theory: An Analysis of Decision Under risk" – *Econometrica.*

[3]*Jacobs, K., and Vasquez, A., (2011) "Do Realized Skewness and Kurtosis Predict the Cross-Section of Equity Reurns?" Journal of Financial Economics*

[3]Martin, R., Bana, A. (2012) "Non-linear Momentum Strategies." - *Risk, 2012, Vol. November*.

[4]Martin, R., Zhou, D., (2012) "Momentum Trading: 'Skews Me." - *Risk, 2012, Vol September*.

[5]*Hillman, Dr. R., (2016) "Machine Learning, Option Trading and Trend Following" – Neuron Advisors*

[6]Baz, J., Granger, N., Campbell, R. H., Le Roux, N., and Rattray, S., (2015) "Dissecting Investment Strategies in the Cross Section and Time Series" *Man AHL*