

Literature Review

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Papers on Trend Following

##(Thomas et al. 2012) - Breaking into the blackbox

The authors test whether a simple trend following strategy can outperform a buy and hold strategy on the S&P500. They alter the complexity of rules, trading frequency, and risk management rules, of the underlying strategy and analyze whether the modifications can improve returns. Finally, the technical strategy is compared with strategies that use fundamental metrics.

The authors analyze the following types of indicators:

- 1) Simple moving averages (10 to 450 day SMA analyzed)
- 2) Moving average crossover (25/50 to 150/350 day crossovers analyzed)
- 3) Breakout signals - index value at a 'x' day high (x ranges from 10 to 450)

The authors find that:

- i) simple indicators and signals such as the 200 day SMA dominate the long only investment strategy,
- ii) monthly trading frequency is superior to any higher trading frequencies,
- iii) there is no benefit to using stop-loss rules,
- iv) there is no evidence suggesting that fundamental metrics provide superior trading signals than technical indicators.

##(Lo, Mamaysky, and Wang 2000) - Foundations of Technical Analysis

The authors analyze a systematic and automatic approach to technical analysis using nonparametric kernel regression. They apply this method to a large number of US stocks from 1962 to 1996. They compare the unconditional empirical distribution of stock returns to the conditional distribution, conditional to specific technical 'patterns' such as 'head and shoulders' and 'double bottom.' They find that several technical indicators provide incremental information and may have practical value.

- 1) The authors estimate the nonlinear relationship between time and prices using the following equation:

$$P_t = m(X_t) + \epsilon_t$$

X_t is a state variable, which, in this case, is set equal to time

- 2) Smoothing Estimators try to smooth the noise out to identify historical patterns. Nadaraya-Watson kernel estimator is used to generate an estimate ($\hat{m}(\cdot)$) of true underlying price history (P_t)
- 3) Automated technical algorithm
 - a) Define technical patterns in terms of geometric properties
 - b) Construct kernel estimator ($\hat{m}(\cdot)$) to numerically identify geometric properties
 - c) Analyze ($\hat{m}(\cdot)$) for occurrences of each technical indicator

The authors conclude that:

- i) 7/10 technical patterns analyzed provide incremental information, especially on Nasdaq stocks. However, this does not necessarily imply that the information can be successfully used to generate excess trading profits.
- ii) It may be possible to detect ‘optimal’ patterns to predict phenomena in a financial time series, for e.g. a change in regime.

##(Bruder et al. 2011) - Trend Filtering Methods for Momentum Strategies

The paper analyzes different trend filtering methods and their advantages and disadvantages. Trend filtering methods studied include:

- 1) Linear Methods
 - a) Convolution representation - A linear trend kernel is applied to the time series to extract a smoother time series
 - b) Measuring Trend and it’s derivative - Apply the black schoeles model and Brownian motion
 - c) Moving average filters
 - d) Least squares filters
- 2) Non-linear Methods
 - a) Non-parametric regression - Kernel regression, Loess regression, Spline regression, local polynomial regression
 - b) L1 filter - Hodrick-Prescott generalization
 - c) Wavelet filtering - Fourier transformation
 - d) Other methods - singular spectrum analysis, support vector machines, empirical mode decomposition

Bruder, Benjamin, Tung-Lam Dao, Jean-Charles Richard, and Thierry Roncalli. 2011. “Trend Filtering Methods for Momentum Strategies.” *Available at SSRN 2289097*.

Lo, Andrew W, Harry Mamaysky, and Jiang Wang. 2000. “Foundations of Technical Analysis: Computational Algorithms, Statistical Inference, and Empirical Implementation.” *The Journal of Finance* 55 (4): 1705–65.

Thomas, Steve, James Seaton, Andrew Clare, and Peter N Smith. 2012. “Breaking into the Blackbox: Trend Following, Stop Losses, and the Frequency of Trading: The Case of the s&P500.” *Stop Losses, and the Frequency of Trading: The Case of the S&P500 (March 10, 2012)*.