Candlestick Technical Trading Strategies: Can They Create Value for Investors?

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Abstract

This thesis examines the profitability of the oldest known form of technical analysis, candlestick trading strategies. Unlike traditional technical analysis which is based around close prices, these strategies generate buy and sell signals that are based on the relationship between open, high, low and close prices within a day and over consecutive days. Traditional technical analysis, which has been the focus of previous academic research, has a long-term focus with positions being held for months and years. In contrast, candlestick technical analysis has a short-term focus with positions being held for ten days or less. This difference is significant as surveys of market participants indicate that they place 50 per cent more importance on technical analysis for horizons of a week than they do for horizons of a year.

Candlestick technical analysis was developed on rice data in Japan in the 1700s so the tests in this thesis, using Dow Jones Industrial Index (DJIA) component stock data for the 1992 - 2002 period, are clearly out of sample tests. These tests are more robust to criticisms of data snooping than is the existing technical analysis literature. Proponents of technical analysis in the Western world would have had the opportunity to have become aware of candlestick trading strategies by this study's timeframe and would also have had the opportunity to source the data and software necessary to implement these strategies. So, a direct test of market efficiency is possible. This was not achievable by authors of many previous papers, who used data starting in the early 1900s and techniques that could not have been implemented at that time.

Using an innovative extension of the bootstrap methodology, which allows the generation of random open, high, low and close prices, to test the profitability of candlestick technical trading strategies showed that candlestick technical analysis does not have value. There is no evidence that a trader adhering to candlestick technical analysis would out-perform the market.

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A.3.11. EGARCH Function

```
function R = egarch_function(N,returns,residuals,C,MA,AR,K,GARCH,ARCH,L,sigma)
%EARCH_BOOTSTRAP bootstraps an egarch model.
%Input is residuals and fitted parameters from original egarch model. N is
%the number of realisations to create. Returns a T by N matrix of N return
%series of length T.

lead = 1000;

T = length(residuals);
R = zeros(T+lead,N);

for n=1:N

    epsilon = resample([residuals; residuals; residuals]);
    ht = std(residuals.*sigma)^2;
    R(1,n) = 0;

    for t=2:T+lead

        old_ht = ht;
        ht = exp(K  + GARCH*log(ht) + ARCH*(abs(epsilon(t-1)*sqrt(old_ht))/sqrt(ht)-sqrt(2/pi)) +
L*(epsilon(t-1)*sqrt(old_ht))/sqrt(ht));
        R(t,n) = C + AR*R(t-1,n) + MA*(epsilon(t-1)*sqrt(old_ht)) + epsilon(t)*sqrt(ht);

%         old_ht = ht;
%         ht = exp(K  + GARCH*log(ht) + ARCH*(abs(epsilon(t-1))/sqrt(ht)-sqrt(2/pi)) + L*(epsilon(t-
1))/sqrt(ht));
%         R(t,n) = C + AR*R(t-1,n) + MA*(epsilon(t-1)) + epsilon(t);

    end;

end;
```

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