Incorporating News in Real Time Trading: A High Frequency Trading Perspective

ARODH LAL KARN, QIANG YE and RAFIQ MUHAMMAD

ABSTRACT

Machines are the new breed of traders. This environment motivates a need to check in Helsinki stock exchange on event driven strategies proposed by Aldridge (2009). This paper is the first paper in its nature and thus contributes to the contemporarily embarked, upgrading form of practical paperwork on the take of News events in high economic science. The information difference is much enclosed in the ideal program trading practices thus validating our proposed event trading strategy. We find better prediction by the incorporation of news on Returns that event trading has significant effects on Finnish stock.

INTRODUCTION

Future status quo in real time program trading is info fundamental analysis and event trading, particularly in a high economic science frame of reference. It is albeit in its scholarly development. Directional trading or news based trading is best-known as the event trading. These days’ setup devices in trading industry are network-programmed to reread info news. It psychoanalyzes those estimable nifty words and being ill-advised words in the news based on algorithms fitted and does the trading accordingly. Those psychoanalyzed event-dynamics trend-analysis layer goes with time series of news content to key out several events and tests time series of augmented preconceived views for their possible causation. It executes event categorization and reliance simulation in order to outguess whether a given event can effectuate reposition in sentiment and for which bone of contention and at what instance this may take place.

Moderation, inclination and prospective outcome of textual information are used in News based dealing. Leaked information to the high frequency trading (HFT) corporations are strings to the trading venue because they are informed traders who can speculate the influence of the market events before it goes public showing and they haft the precise time of news announcement and they lead up the trading, securing lots of quick buck.

LITERATURE REVIEW

Technical trading has previously been used with the goal of financial forecasting as in [1, 2], thus motivating our choice for this approach. In [3] the connection between

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the number of tidings annunciation and trading action is studied. The relevance between news forecasts and monthly returns is also explored in reference [4]. Here the scholars agree that stocks possess freakish returns after public news. The program-trading behavior and price swinging before, on, and after the day of merger promulgation are realized in reference [5]. A solid jump in trading activity can be found before, on, and after the merger press release. The magnitude of uncertainty of information is researched in reference [6]. The concept is that greater information uncertainty will bring about to better charted stock returns after good news and lower charted returns after bad news.

The realism that a hook up exists between news and high finance markets is unquestionable. The competitive advantage in this market is most likely to come from developments in News Analytics - automated techniques for collecting, processing, and using the sentiments contained in news messages. The value of using information from news in Automated Trading comes from enabling (re)action to new information before it is incorporated into market prices.

The question that we answer is: how does the information communicated through news messages from direct news feeds and from historical stock data impact in the illustration of better trading strategies for generating alpha profit based on Aldridge Event trading strategies?

DATA RESEARCH METHOD AND MODEL

Data used here is from year 2013 for the month of November from Automated Trading and Information System of Helsinki Stock Exchange via File Delivery System (FDS). NASDAQ OMX Helsinki lists about 136 Finnish stocks.

For empirical research we selected Metso and Nordea stocks possessing distinctive HFT characteristics for event trading in Helsinki stock as shown in Table I.

In High-frequency strategies, the Sharpe ratio is:

$$SR = \frac{E[r] - r_f}{\sigma[r]}$$  (1)

Where, $E[r] = \frac{r_1 + \cdots + r_T}{T}$, and $\sigma[r] = \sqrt{\frac{(r_1 - E[r])^2 + \cdots + (r_T - E[r])^2}{T-1}}$

The maximum possible intra-day Sharpe ratio is:

$$SR = \frac{E[Range]}{\sigma[Range]} * \sqrt{(#\text{Intra-day periods}) * (#\text{Trading days in a year})}$$  (2)

In order to execute well, Real-life Sharpe ratios strategies with daily rebalancing typically fall in the 1–2 range.

Value at risk (VaRi) represents the executable default of an investment funds, with probability $1 - \alpha$ in time $t$.

$$VaR_i = -(E[r_1 + Z_{\alpha}\sigma_i])VaR = \frac{E[r] - r_f}{VaR_i}$$  (3)

Where $Z_{\alpha}$ is the $\alpha$-quantile of the standard normal distribution.

Excess $R on VaR$

$$VaR = \frac{E[r] - r_f}{VaR_i}$$  (4)

The VaR score substantially discloses t 90%, 95% or 99% Z-score cutoff in distribution of returns. The conditional VaR (CVaR), or expected loss (EL), quantifies
the average value of return within the cut-off tail. Mech (1993) and Hou and Moskowitz (2005), for example, propose to measure market efficiency as the difference between Adjusted R2 coefficients of an unrestricted model attempting to explain returns with lagged variables and of a restricted model involving no past data as in [7, 8].

The unrestricted model is specified as follows:

$$r_{i,t} = \alpha_i + \beta_{i,1}r_{i,t-1} + \beta_{i,2}r_{i,t-2} + \beta_{i,3}r_{i,t-3} + \beta_{i,4}r_{i,t-4} + \varepsilon_{i,t}$$ (5)

Where $$r_{i,t}$$ is the return on security $$i$$ at time $$t$$

The restricted model restricts all coefficients $$\beta_{i,j}$$ to be 0:

$$r_{i,t} = \alpha_i + \varepsilon_{i,t}$$

Market inefficiency is next calculated as the relative difference between Ordinary Least Squares (OLS) R2 coefficients of the two models:

$$\text{Market Inefficiency} = 1 - \frac{R^2_{\text{Restricted}}}{R^2_{\text{Unrestricted}}}$$ (6)

As the difference tends to 0, the smaller the influence of past price movements the higher the market efficiency is. Taking advantage of market inefficiency requires an understanding of the different tests that identified the inefficiency in the first place.

The model shown by Easley, Kiefer, O’Hara, and Paperman (1996) on event trading, which talks about the ability of informed traders to “pick off” uninformed market participants is built on the following concept as in [9]: Suppose an influential event happens to impact price levels but informed to a HFT brilliant analyst. Let its consequences on prices of circumstances. Informed investors put trades at a rate $$\mu$$, either buys or sells side as per knowledge while, uninformed traders put orders at a rate $$\omega$$. In such case, the model says, the informed probability of trading is:

$$P_I(t) = \frac{\mu(1 - P_n(t))}{\mu(1 - P_n(t)) + 2\omega}$$ (7)

Also, likelihood of observing $$B$$ buys and $$S$$ sells on a day of unknown type is

$$L((B, S) \setminus \theta) = (1 - \alpha) * e^{-\varepsilon} \left(\frac{(\varepsilon)^B}{B!} e^{-\varepsilon} \left(\frac{v}{s!}\right) + \alpha \delta \right)$$

* $$e^{-\varepsilon} \left(\frac{(\varepsilon)^B}{B!} e^{-\varepsilon} \left(\frac{v}{s!}\right) + \alpha (1 - \delta) \right)$$ (8)

Where,

$$1 - \alpha = \text{no-event day},$$

$$\alpha = \text{a bad-event day},$$

$$\alpha(1 - \delta) = \text{good-event day}$$

$$\alpha, \mu, \text{and } \omega \text{ over } T \text{ periods of time given by:}$$

$$L(B, S|\alpha, \mu, \omega, \delta) = \prod_{t=1}^{T} \ell(B, S, t | \alpha, \mu, \omega, \delta)$$ (9)

Where $$\ell(B, S, t | \alpha, \mu, \omega, \delta)$$ is the daily likelihood of observing $$B$$ buys and $$S$$ sells:

$$\ell(B, S, t | \alpha, \mu, \omega, \delta) = (1 - \alpha) * e^{-\omega T} \left(\frac{(\omega T)^B}{B!} e^{-\omega T} \left(\frac{(\omega T)^s}{s!}\right) + \alpha \delta \right)$$

* $$e^{-\omega T} \left(\frac{(\omega T)^B}{B!} e^{-\omega T} \left(\frac{(\omega T)^s}{s!}\right) + \alpha (1 - \delta) \right)$$ (10)
\[ * e^{-(\mu + \omega T)} \left( \frac{(\mu + \omega T)^B}{B!} \right) e^{-\omega T} \left( \frac{(\omega T)^s}{s!} \right) \]

**EMPIRICAL FINDINGS**

Order generating and executing pattern are key function to differentiate activities of HFT. For only fraction of time interval, the price of the stock probably increase only if the imbalance is on buy side which only brilliant high frequency traders can capture and vice-versa as in [10]. Deep consideration of major activities and business condition of a particular company is compared with the market news and events and only the trade is executed accordingly. Event driven is basically theoretical as in [11]. An hourly holding period is considered by Aldridge, 2009.

<table>
<thead>
<tr>
<th>Level A: Event Trading Strategy</th>
<th>Stocks</th>
<th>Nordea</th>
<th>Metso</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holding periods &lt; 1 hrs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept((\hat{\alpha}))</td>
<td>-0.1693</td>
<td>-0.18</td>
<td>1.1731</td>
</tr>
<tr>
<td>((\hat{\epsilon}))</td>
<td>0.1638</td>
<td>0.1157</td>
<td>0.1452</td>
</tr>
<tr>
<td>(P-value)</td>
<td>(&lt; 1.96)</td>
<td>(&lt; 1.96)</td>
<td>8.08***</td>
</tr>
<tr>
<td>Non-HFT (Sharp ratio)</td>
<td>-1.0603</td>
<td>-1.1432</td>
<td>3.0376***</td>
</tr>
<tr>
<td>HFT (Sharp ratio)</td>
<td>1.2268**</td>
<td>1.5772**</td>
<td>3.0656***</td>
</tr>
<tr>
<td>VAR</td>
<td>-0.425***</td>
<td>-0.43**</td>
<td>na</td>
</tr>
<tr>
<td>C.VAR</td>
<td>-0.4447*</td>
<td>-0.4547*</td>
<td>na</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Level B: Market Inefficiency – Autoregressive Based Test.</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>R-Alpha</td>
<td>-0.1696</td>
<td>-0.18</td>
<td>1.1732*</td>
</tr>
<tr>
<td>((\hat{\epsilon}))</td>
<td>0.0027</td>
<td>0.0027</td>
<td>0.004</td>
</tr>
<tr>
<td>R² -(R)</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>R²(UR)</td>
<td>0.9767</td>
<td>0.9678</td>
<td>0.9547</td>
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<tr>
<td>AIC/(UR)</td>
<td>-15464.2*</td>
<td>-14487.3*</td>
<td>-19692.5*</td>
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<tr>
<td>AIC(R)</td>
<td>-2803.38</td>
<td>-2896.00</td>
<td>8547.60</td>
</tr>
<tr>
<td>M.I</td>
<td>1</td>
<td>1</td>
<td>1</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Level C: HFT Times of Non-HFT.</th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L.P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-HFT (Sharp ratio)</td>
<td>0.77</td>
<td></td>
<td>0.80</td>
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<tr>
<td>HFT (Sharp ratio)</td>
<td>1.93</td>
<td></td>
<td>2.02</td>
</tr>
<tr>
<td>HFT Times of Non-HFT</td>
<td>2.50**</td>
<td></td>
<td>2.52**</td>
</tr>
</tbody>
</table>

Note: * p < .05; *** p < .01 at 0% Risk, 0% threshold loss and 0% acceptable minimum return; L.P = long position S.P = short position; \((\hat{\epsilon})\) – standard error, AIC– Akaike information criterion, UR– Unrestricted, R-Restricted, M.I– market inefficiency.

**A. DRAW BACK OF EVENT TRADING STRATEGY**

Historically, the larger share of news of approximately (~64%) from companies around the world, published outside trading hours. Nonetheless, in recent years, this gravitation has repositioned and the majority of news is now published intraday in Figure 1.
News and events metadata floods in asynchronously during the day and market data is accessible at different frequencies (tick data, minute bar, end of day setting) as in [12]. In not normal day, in particular during global financial turmoil, in flash crash type phenomenon time, Figure 2 shows drawback of event based trading in HFT world. A negative relationship is clearly observable while molding logarithmic return against the logarithmic number of news; illustrating that, a company with a large amount of news might bring to an informed traders lower average annualized return than those with less news. It was best observed in the year 2008, which is the sample used for testing; this was a time interval of global financial meltdown and so often news regarding a company would be portraying negative sentiment which is reflected in low returns. The news variable is often included in the optimal trading rules thus validating our proposed Event trading strategy.

CONCLUSION

Incorporating news in real time trading using event trading strategies has probabilities to generate remarkable returns for Metso except Nordea for short and long both positions. Remarkably high P-value shows excess return via event trading. For
both short and long position, Metso has the significant high sharp ratio while negative sharp ratio to Nordea for non-HFT traders. The obtained negative VARs and CVARs interpret that there is a good possibility of earnings for general level event trading traders. VaR and conditional VaR (CVaR), is the expected loss (EL), benchmarks the average value of return within the cut-off tail. From table I, two and half times greater sharp ration of HFT traders compare to non-HFT traders proves the profitability of event trading strategies based on incorporating news and events in their trading strategies. In practice, well-designed and implemented strategies trading at the highest frequencies tend to produce the highest profitability with the double-digit Sharpe ratios.

There exists the auto correlation between current and past returns shown by high R-squared restricted value than ACI value of unrestricted model. News based trading strategies of HFT is efficient to engineer remarkable excess return on 66.67% of positions. This cannot be the case in case of non-HFT trading using event trading strategies. One reason is that HFT traders are well informed traders.

Additionally, this work may be extended to other HFT markets in Europe and Asia and it may be interesting to test the implementation of Event trading strategy based on the reported results.

REFERENCES