Academic Research Review

Alpha Strategy[1] for Overnight Returns

INTRODUCTION

Overnight returns are the returns generated by a stock based on its price change from the close of one trading day to the opening of the next. Developing a model of overnight returns can help investors have a good prediction of today's stock market price changes, from which they make decisions of buying or selling. In this paper, we first introduce the prediction model, followed by a short discussion of how the model simulates the behavior of overnight returns. Finally, we will present the back-testing results and show readers some possible trading strategies based on this model.

MODEL

We use the model proposed by Zura Kakushadze (2015), which decomposes the overnight returns ($R_{s,d}$) into 4 risk factors —- Size ($B_{s,d}^1$)[2], Momentum ($B_{s,d}^2$)[3], Intraday Volatility ($B_{s,d}^3$)[4] and Volume ($B_{s,d}^4$)[5]. $B_{s,d}^0$ which is the "market beta" is set to be always 1 to reflect that a portion of the returns of every stock is due to overall market movement. f_d^i is the specific return of risk factor $B_{s,d}^i$. $\varepsilon_{s,d}$ refers to the residuals and it is the intercept of the linear regression. *s* is the index for stock and *d* is the index for day.

$$R_{s,d} \sim \sum_{i=0}^{4} \beta_{s,d}^{(i)} f_d^{(i)} + \varepsilon_{s,d}$$

METHODOLOGY

Since the focus of this study is short horizon returns, it is irrational to use stocks that are rarely traded. To keep our discussion as simple as possible, we select the top 1000 liquid tickers in NYSE as the universe and rebalance this universe on a daily basis.

Multivariable linear regression is used to find the estimates of each f_d^i in the model. To train the model, the regression is first done using the 1000 tickers in the universe for 658 successive trading days (from 2013-2-1 to 2015-9-1). Then the average of each f_d^i is taken to get the final estimates. The model is again tested using 2766 tickers from the NYSE to see how well it actually behaved.

After getting the regression model, we conducted t-test for each regressor to evaluate its statistical significance at a level of 10%. The results are summaries in the table below.

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[1] Alpha strategy refers to highly statistically driven approach utilized to generate stock trading signals with the goal of achieving consistence above returns and a positive alpha.

[2] $\beta_{s,d}^1 = \ln(Close_{s,d-1})$

[3] $\beta_{s,d}^2 = \ln(\frac{Close_{s,d-1}}{Open_{s,d-1}})$

[4] $\beta_{s,d}^3 = \ln(\sqrt{\frac{1}{21}\sum_{k=1}^{21}(\frac{High_{s,d-k}-Low_{s,d-k}}{Close_{s,d-k}})^2})$

[5] $\beta_{s,d}^4 = \ln(\frac{1}{21}(\sum_{k=1}^{21} Volume_{s,d-k}))$

	Market (β^0)	Size (β^1)	Momentum(β^2)	Volatility (β^3)	Volume (β^4)
Average t-stats	*8.9656*	*32.114*	***1.1550***	*34.569*	*41.276*
Average p-value	*1.486e-18*	*4.577e-156*	***0.2484***	*6.526e-173*	*3.326e-218*

Table 1: Average t-stats and p-value for each regressor

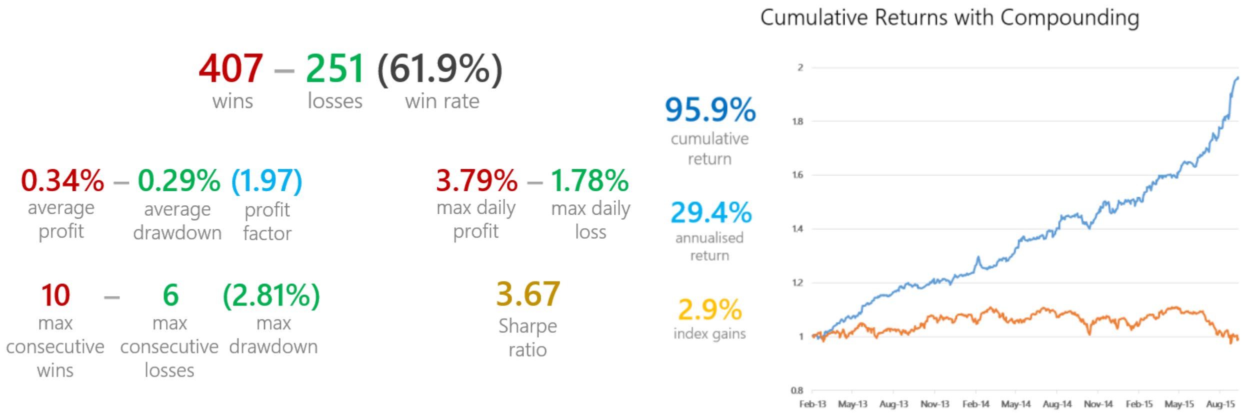
From the table, we can see that all regressors other than the third one (Momentum) have extremely low p-values. The direct implication is that momentum may not necessarily be a good predictor of the overnight returns of stocks. However, other mathematical definitions of momentum such as moving average of close-to-close returns should be tried before making such a conclusion.

TRADING STRATEGY

At the opening of every trading day, we have previous day's prices and today's opening price, from which we can calculate the forecasted overnight returns using the aforementioned 4-factor model. Meanwhile, we can calculate the true overnight returns and if the true value is higher than the predicted value, we expect the stock price to mean-revert. i.e. Stock price will go down. Therefore, we sell the stock during day time. The net investment amount on each stock is determined using the desired dollar holdings formula[6].

BACK-TESTING RESULTS

Using the above strategy and our model, we ran a back-test from 1/2/2013 to 1/9/2015 and the results are as follow:



CONCLUSION

Generally speaking, our model vastly out performs the general market index. However, as the multiple linear regression method requires that the predictors are independent of each other, some caution like the correlation of stocks should be carefully treated before applying the model.

[6] $H_{s,d} = -\widetilde{\varepsilon_{s,d}} \left(\frac{I}{\sum_{j=1}^{N}|\widetilde{\varepsilon_{j,d}}|}\right)$ *where I is our capital,* $\widetilde{\varepsilon_{s,d}} = \varepsilon_{s,d} - \overline{\varepsilon_{s,d}}$ *and* $\overline{\varepsilon_{s,d}}$ *is the cross − sectional mean of* $\varepsilon_{s,d}$

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REFERENCE

Kakushadze, Z. (2014, June 5). 4-Factor Model for Overnight Returns. *Wilmott Magazine, 79,* 56-63.

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