Literature Review

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Research Question:

What is the relationship between short interest and stock price movement?

After the dot-com bubble period, a surge of interest in short selling has been notice along with the tremendous rise and fall of stock price. Accordingly, many researchers had looked into the relationship between short interest and stock price. (Lamont et al. 2004) It is now commonly agreed that stocks with high short interest underperform the market (Asquith and Meulbroek, 1995; Desai et al, 2002; Asquith, et al, 2004) More specifically, many empirical literatures on short selling show that short interest ratios have increased over time and stocks with high short interest ratios have poorer performance (Desai *et al* (2002)), and that there is a large negative correlation between market performance and short interest (Lamont and Stein (2004)). Prior to these papers, the conventional view was that, due to the flow demand from short sellers covering their positions, large short positions foreshadow positive future returns. (Asquith et al, 2004)

Desai et al. (2002) investigated on the informational role of short interest in the Nasdaq market using a calendar-time portfolio approach to measure performance over long horizons. They took only equal-weighed portfolios of firms that had at least 2.5 percent short interest in the previous month and using OLS to estimate the regression of the monthly portfolio excess returns on four factors: market factor, size factor, book-to-market factor and a fourth momentum factor (Fama

and French (1993) and Carhart (1997)). The regression suggested a negative relationship between high level short interests and stock market performances. Desai et al. also applied such regression on portfolios of firms that had at least 5 percent, 7.5 percent and 10 percent short interest; the regression yield more negative interception coefficients that indicates that a higher level of short interest has a more negative correlation with stock market performance. The advantage of this method is that the cross-sectional correlation among individual securities that comprise the portfolio is automatically taken into account when calculation variance of the event portfolios. (Desai et al, 2002)

This view is later supported by Asquith, et al (2004) and Rapach, Ringgenberg, and Zhou (2016) that stocks with the greatest demand for shorting tend to have abnormally low future returns and thus large short positions are bearish signals.

Asquith et al used the same four-factor regression model (Fama and French (1993) and Carhart (1997)) to estimate the abnormal returns yet with different sampling approaches in a longer time period. They used two approaches to select sample of firms with large short interest positions to verify their results. The first approach identified firms based on their short interest relative to other firms. They rank all firms each month by the ratio of short interests to shares outstanding and sample the top percentile as the 99^{th} percentile sample and similarly, the top five percent as the 95th percentile sample. The second approach is to select firms by imposing absolute cutoff criteria of short interest greater than or equal to 2.5%, 5%, or 10% of shares outstanding. Asquith et al confirmed the negative correlation between short interest and trailing market performance in

a period from 1976 to 2002, however, their correlation is weak compared to the 1995-2002 period that Lamont and Stein examine. (Asquith, et al, 2004)

Later, Rapach et al. applied time series approach and unprecedentedly showed that aggregate short interest is the strongest known predictor of the equity risk premium. More than applying a newer method than the previous papers, Rapach et al differ from other literatures by examine the relation between short interest and stock returns at the aggregate level. They obtained short interest data from Compustat and firm's shares outstanding data from Center for Research in Security Prices (CRSP) spanning 1973 to 2014. This literature compared the predictability of aggregated normalized short interest (raw short interest divided by firm's shares outstanding) with 14 monthly predictor variables such as log dividend yield, log earnings-price ratio, excess stock return volatility, inflation, and others. Rapach et al. regress these data with vector autoregression (VAR) approach to estimate the significance of the explanatory variables where the S&P 500 log excess return for each month is the response variable then detrend the short interest series to capture the variation in short interest that is due to changes in the beliefs of short sellers. A one-sided alternative hypothesis is used for a more powerful test of predictability. (Rapach et al. 2016)

In contrast, my approach is different from all other previous works on assessing the relationship between short interest and stock price movement. In the sampling process, I am using the same dataset that Rapach et al. used with a longer time period from 1975 to 2017 but a different approach from other literatures. Instead of sampling only the top percentiles, I am putting sorted

stocks into deciles to generate 10 portfolios with short interest from the highest to the lowest to compare their results.

Moreover, instead of constructing time series regression of each variable to compare their predictive abilities, I am using random forest to rank the importance of 14 variables from Rapach et al. and stock interest as the 15th variable. The response variable - stock performances - are categorized into large rise (2), rise (1), no change (0), fall (-1) and large fall (-2) to transform linear regression into classification. The relationship between short interest and stock performances under different conditions can then be identified and a threshold that a short interest above this point will cause the stock underperformance with a very high probability can also be found.

Reference:

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