Wolverine Earnings Analysis - Volatility Around Earnings

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Volatility and Earnings

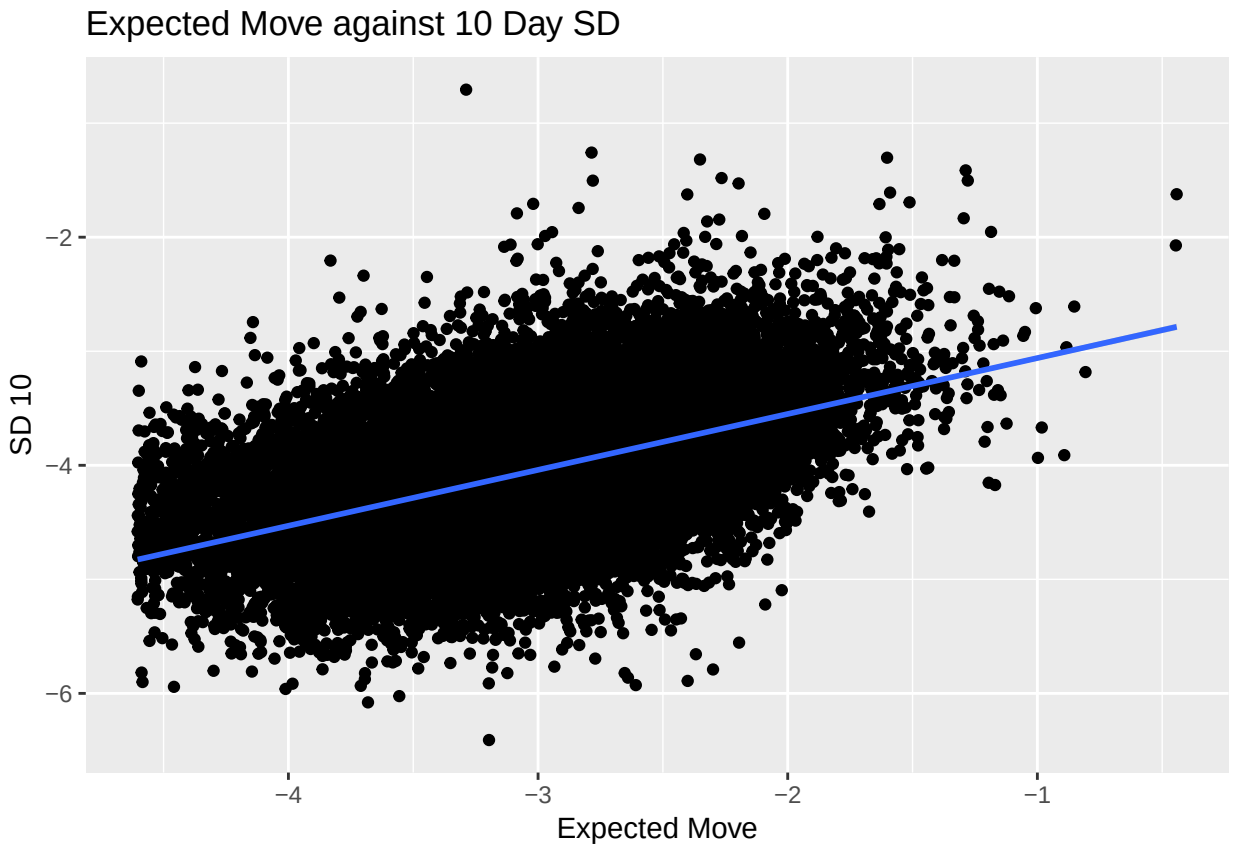
This is an analysis of equity volatility around earnings reports. In particular, we will address the following questions:

1. If the actual move after an earnings report is greater than or less than the market-implied expected move, what does this predict for realized volatility after the earnings report.
2. Is relationship #1 different when the actual move is a gain vs. loss.
3. Is the relationship in #1 different when stock price performance has been positive or negative in the run-up to the earnings report.
4. Is the relationship in #1 different when realized volatility has been high or low (relative to implied volatility) in the run-up to the earnings report?

Data & Methodology

Move-Ratio vs Subsequent Realized Volatility

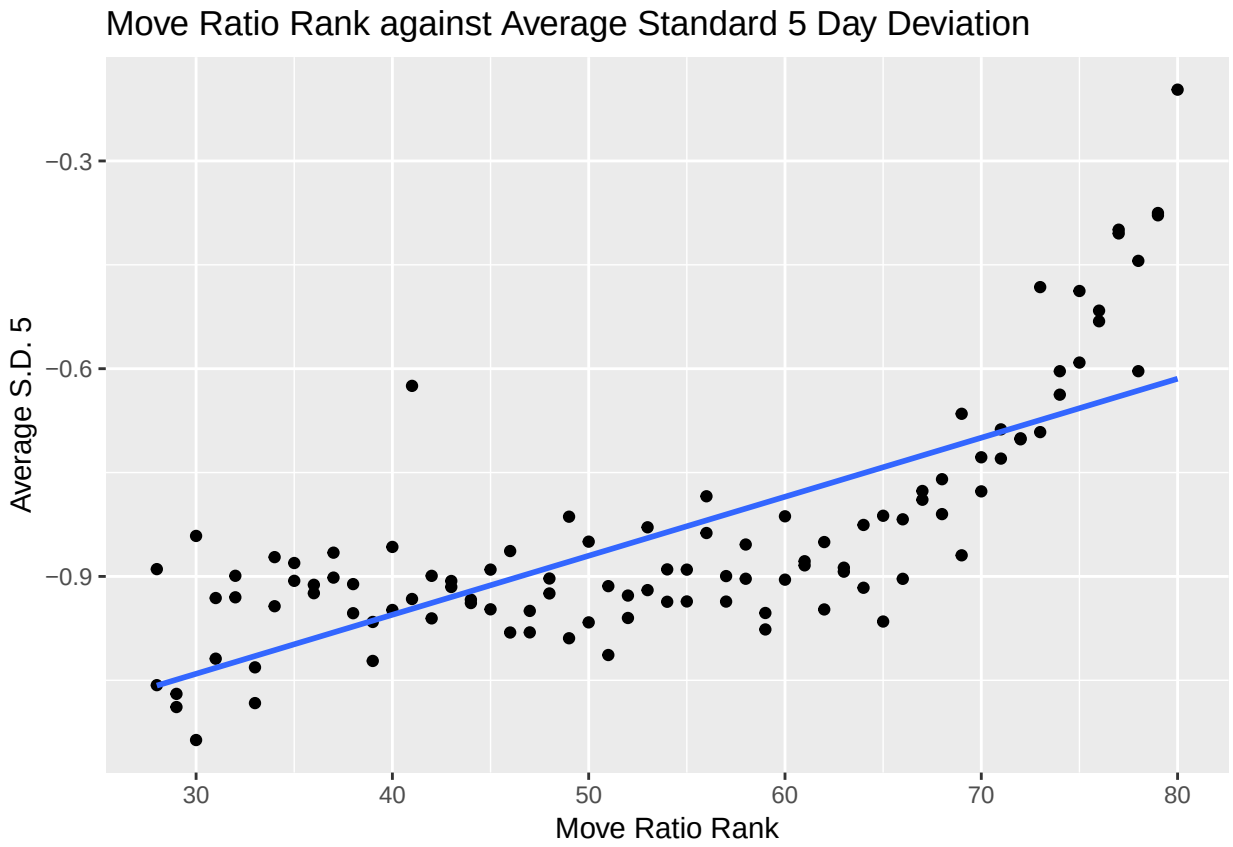
The following graph represents the "raw" data graphed at face value. Specifically, it is the expected move graphed against the 10 day standard deviations (SD 10). In order to make the graph more readable, however, each axis is scaled with a logarithm. As you can see the data is widely distributed in the y direction, and to a lesser extent in the x. This is in part due to the differing underlying prices that naturally have a large effect on the calculated standard deviations. Expected move varies to a lesser degree given that this is already a measure of SD. Having such a wide distribution will make it difficult to discern any concrete meaning from a graph given the amount of noise; this example is no exception. At first glance it is easy to see that there is indeed a positive correlation between the two. However, we cannot draw any conlcusions on if it is truely a correlation or a result of the noise.



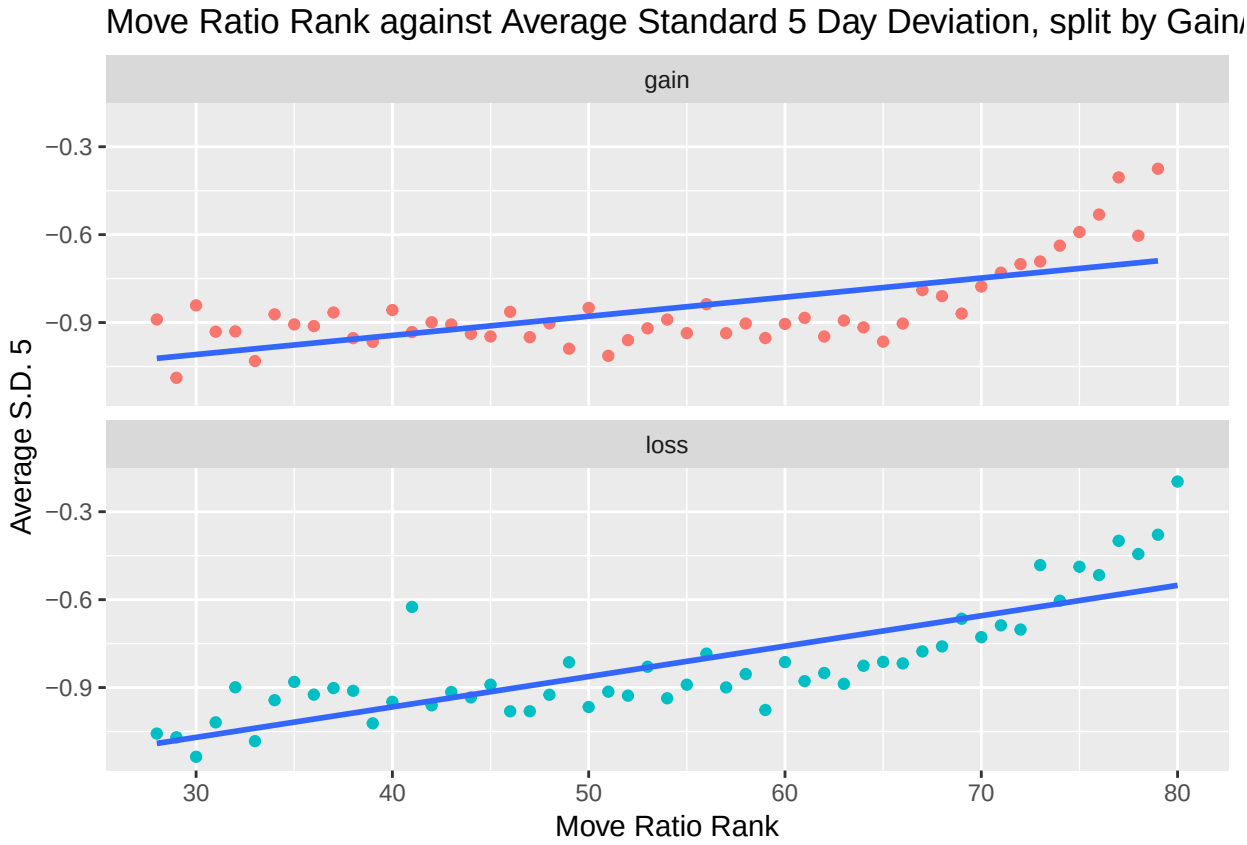
The next graph is the result of "cleaning up" the graphed data and the sacles of the plot. Here we are still listing standard deviation in the y direction, albeit modified, but now the x axis is move ratio instead of expected move. As described in the *Data & Methodology* section, move ratio is the actuale move scaled using the expected move. Here, however, we went one step further and cut the data into 100 equal width ranks. Given that there are more than 100 stocks present in the data, multiple stocks are represented by each rank. Separating the move ratios into discrete ranks allowed us to gather more readability out of a large amout of data. What this left us with was distinct veritcle lines of standard deviations corresponding to each rank.

On the y axis the standard deviation is also scaled using expected move, in order to create an equivalent scaled on both axes. We also applied a logarithm as stated before in addition to averaging on the "vertical lines" mentioned in the previous paragraph. By averaging these lines it allowed up to display only the center point of each line.

Finally, what we are left with is a graph with all of the noise removed and one that we can definitively say that there is a positive correlation between the move ratio and the standard deviation. The other three SD measures (3/7/10) are displayed in the appendix as each shows the same relationship.



Gains vs Loss



Positive and Negative Stock Performce Before Earnings

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Price Volatility Before Earnings

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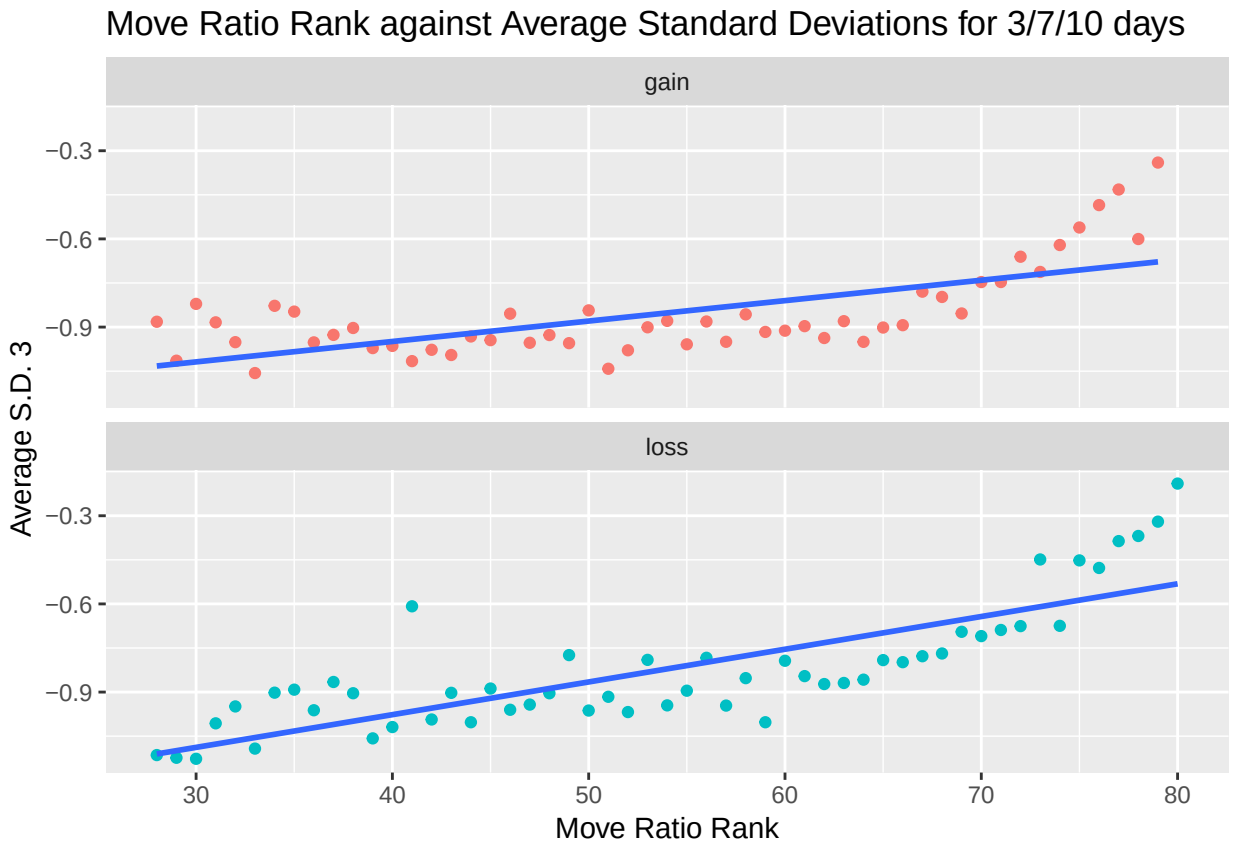
Next Steps

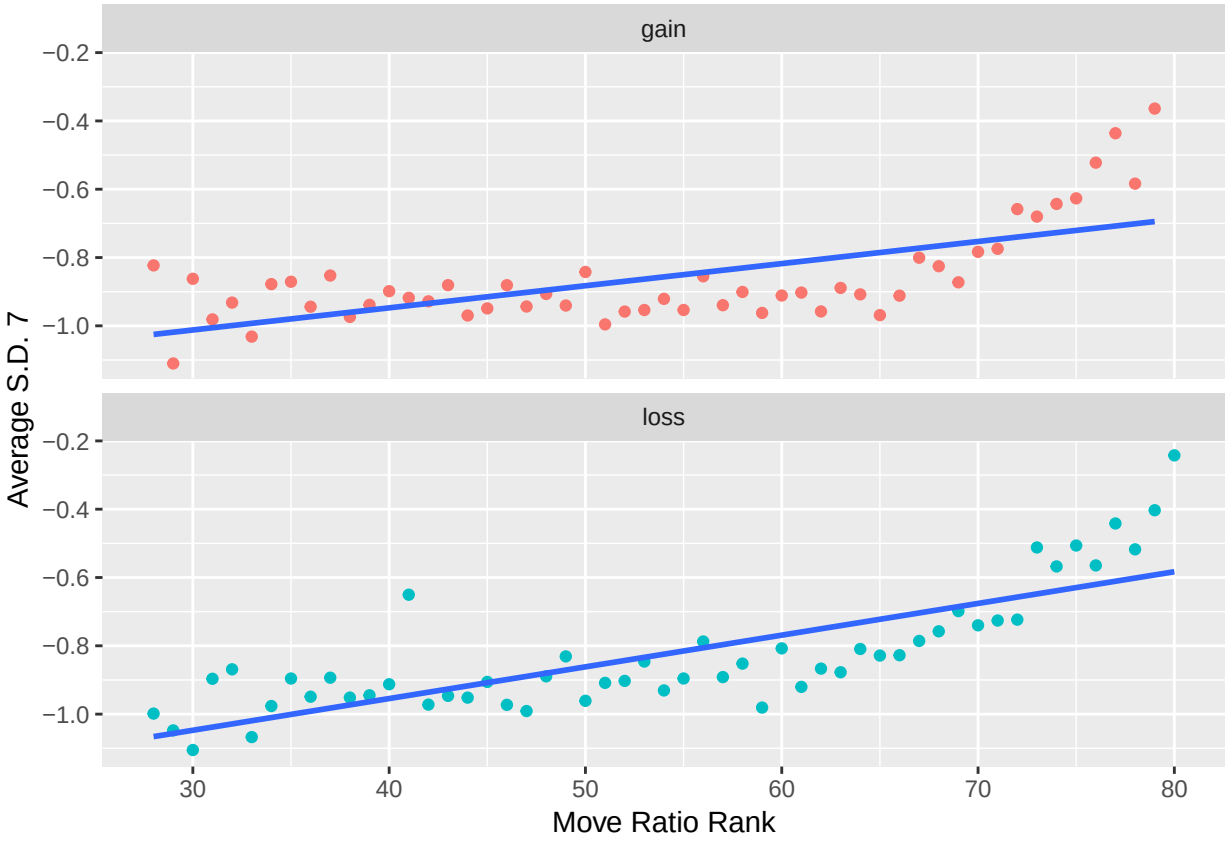
For the most part, this analysis simply reveals the well-known phenomenon of volatility clustering - high volatility begets high volatility. However, our analysis isolates this around earnings dates, and also normalizes the notion of high volatility by market implied volatility. It is also worth noting that the correlation more positive for loss vs. gain. Meaning large downward jumps are more strongly correlated with further losses.

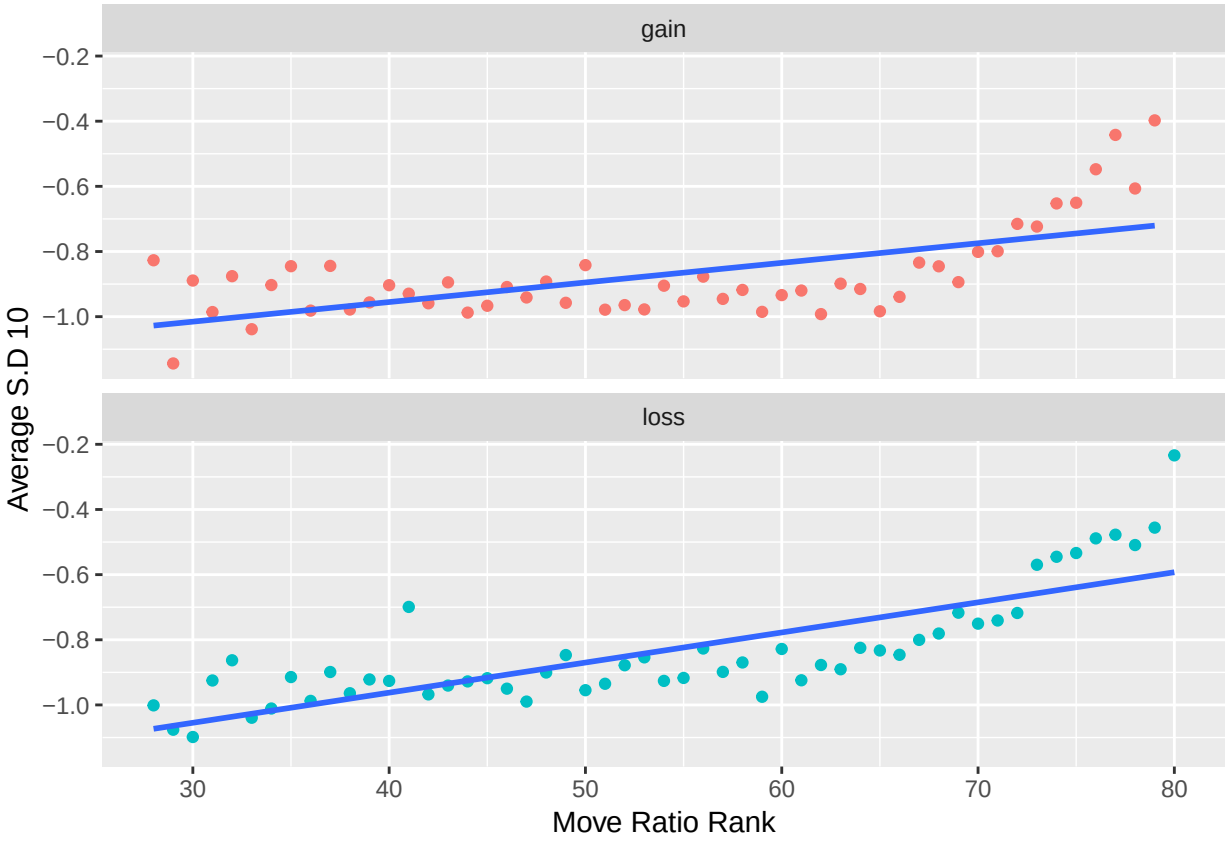
For further analysis, we would like to compare the current, and future, results against non-earnings data (a control group). Doing so will let us see that our findings do not hold outside of earnings and are indeed a result of the earnings release. Specifically, expected and actual move for non and earnings dates this will give us a baseline for what a pronounced or larger-than-normal jump is.

If possible, would you be able to send us non-earnings options data, so that we can analyze a control group and provide more thorough results?

Appendix


Move Ratio Rank against Average Standard Deviations for 3/7/10 days
gain
loss
−0.3
−0.6
−0.9
Average S.D. 3
30
40
50
60
70
80
Move Ratio Rank


gain
loss
−0.2
−0.4
−0.6
−0.8
−1.0
Average S.D. 7
30
40
50
60
70
80
Move Ratio Rank


gain
loss
−0.2
−0.4
−0.6
−0.8
−1.0
Average S.D 10
30
40
50
60
70
80
Move Ratio Rank