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HONORS THESIS



Anatomy of the Short Squeeze: Using Technical and Statistical Analysis to Forecast Price Volatility

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ABSTRACT

A short squeeze is a phenomenon in the stock market that occurs when the price of a security surges drastically higher over a short period of time. The main known cause of a short squeeze is due to short sellers aggressively covering their positions creating a short-term artificial increase in the demand for a given stock. The purpose of the present study is to determine whether the stock return volatility of a short squeeze can be forecasted using variables such as trade volume, price patterns, short interest, market capitalization, and a stock's outstanding shares. The study attempts to determine which of these variables has the strongest association to the largest price fluctuations in historical examples of short squeezes. Finally, this study seeks to analyze how these variables can be used to generate a short-term model to assist in forecasting the size of a potential short squeeze.

INTRODUCTION

Day trading and short-term investing have become very popular occupations over recent years, as trading costs have been almost, if not completely, eliminated at several brokerages and stock trading platforms as of 2021 (Davis, 2021). Social media has painted a deceiving picture of day trading as an easy career path that anyone can learn to do very simply in an attempt to make huge amounts of money in a short amount of time (Jordan & Diltz, 2003). In choosing what stocks to trade on a day-to-day basis, day traders tend to focus on volatile securities that make massive, short-term gains accessible but also pose higher levels of risk (Kuepper, 2021). One of these major niches is known as small cap stocks. On top of this, one of the tools day traders tend to depend on to help forecast volatile price movements is technical analysis (Kuepper, 2021). The goal of this study is to explore the past research on the profitability of day trading and technical analysis, as well as the association between trade volume, short interest, and float to intraday price movements. Considering the existing literature, this study intends to analyze the predictability and profitability of a very specific stock market phenomenon, known as a short squeeze.

LITERATURE REVIEW

Day Trading

A day trade occurs when an individual purchases or sells a security and then chooses to partially or completely close this position within the same trading day (Kuepper, 2021). Most of the scholarly research and analysis regarding day trading has been conducted during times where trading costs proved to be detrimental to the profitability of making intraday trades (Park & Irwin, 2004). In recent years, several brokerages, for example, Robinhood, TD Ameritrade, Fidelity, Interactive Brokers, E*Trade, and Charles Schwab have converted to a commission free trading platform (Davis, 2021).

Retail traders are individuals who purchase and sell securities for their own personal accounts (Zucchi, 2020). Typically, a retail trader has little to no knowledge or experience when it comes to trading securities which normally hinders their ability to be successful as a day

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trader (Zucchi, 2020). By looking at intraday trade data, research has determined historically that the majority of day traders are not profitable (Lee & Park, 2007). On the other hand, existing research indicates that a small portion of these traders have experienced more than marginal returns (Jordan & Diltz, 2003). Additionally, researchers have struggled to determine whether these marginally profitable traders were consistent from year to year (Lee & Park, 2007). The research also supports how trading costs have proven to restrict day trading profitability (Park & Irwin, 2004). As the present study seeks to investigate the profitability of making short term trades (holding a position for no longer than ten days), I will not be including transaction costs in my study because of the easy access to a commission free brokerage. In the next section, the study analyses research comparing the trading behavior and psychology behind professional and retail traders.

Trading Behavior

As previously discussed, the vast majority of day traders are retail traders. They do not professionally manage nor invest money for others or institutions (Zucchi 2020). Traders that do invest and trade money for a group or institution are known as institutional traders (Zucchi 2020). These traders are typically professionally trained and have significant experience with the market as well as with managing money over a long period of time (Zucchi 2020). Knowing that the majority of day traders, who happen to be mostly retail traders, are unsuccessful in generating marginal profits, this study explores the literature and research behind the differences in trading behavior between retail traders and stock trading professionals. As institutional traders typically perform better than retail traders, evidence shows that institutional traders value disciplined trading techniques and consistency in their trading decisions while most retail traders do not value these qualities (Locke & Mann, 2005). Being a disciplined trader entails creating a plan before executing a trade, knowing when you are going to enter or exit a trade, and not letting emotions control the decision-making process (Keim & Madhavan, 1995). Institutional traders typically use theoretical models to help them make investing decisions (Keim & Madhavan, 1995). On the other hand, retail traders show trends of trading emotionally and having a lack of discipline when it comes to realizing both

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gains and losses (Locke & Mann, 2005). Overall, unsuccessful traders usually exercise poor trading skills, plans, and rules which lessens their chance for success (Locke & Mann, 2005).

With the research and analysis of the present study, future studies can try to formulate a profitable trading strategy based on the predictability of a short squeeze. As previously discussed, having a disciplined trading technique with fixed rules and guidelines seems to increase the odds of success (Locke & Mann, 2005). When creating a strategy, fixed buy and sell indicators can be utilized to eliminate the negative impacts of emotional trading.

Technical Analysis

Another integral component utilized in the present study's analysis of the short squeeze is technical analysis. Technical analysis refers to the use of patterns in financial data to determine trends and make predictions on when to buy or sell securities in order to generate a profit (Seth, 2021). This form of analysis tends to be much more popular amongst the day trading community than that of fundamental analysis (Kuepper 2021). Fundamental analysis is the process of determining a security's intrinsic value based on its financials, competitors, markets, and the economy (Seth, 2021).

One of the most debated topics in financial markets is whether or not the market is efficient. The efficient market hypothesis states that all stocks are perfectly priced based on all known information to which the public has access (Downey, 2021). This theory opposes the idea that an individual can gain a consistent edge in the market using technical analysis. Research shows evidence both for and against the efficient market hypothesis. Analysts have conducted statistical studies on whether simple technical trading rules could yield positive returns in the stock market. For example, Bessembinder and Chan (1995) tested three different technical trading rules: variable-length-moving-average rules (VMA), fixed-length-moving-average rules (FMA), and trading-range-break rules (TRB). As defined by Bessembinder and Chan (1995), a VMA rule signals a buy indicator when a short-term price moving average crosses above a long-term price moving average and a sell indicator when a short term price moving average crosses below a long term price moving average. The FMA rules are very similar to that of the VMA, however both buy and sell signals are set for a fixed number of days rather

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than closing the position when the moving averages cross again. In contrast, TRB rules have buy signals when the price passes above a historical maximum and sell signals when the price passes below a historical minimum. Bessembinder and Chan (1995) concluded that technical trading rules such as these can generate profits, although some rules, like the VMA in this study, may clearly outperform others, such as FMA and TRB. Factors related to trading costs as well as economic and market conditions affected the profitability of some of the rules (Bessembinder & Chan, 1995). Further research on more detailed and selective technical trading rules in specific market segments may yield different results than very simple trading rules on the market as a whole.

In terms of the present study, I plan on utilizing a statistical analysis approach of technical indicators to determine whether a short squeeze is predictable or not. This will incorporate data on trade volume and chart patterns alongside a few fundamental statistics about a company's float and short interest, which will be explored later in this study.

The Short Squeeze

Although most may agree that the ability for an investor to place a bet for or against a stock based on their own thoughts and predictions of the future is important to sustaining a liquid and efficient market, “some critics argue that short selling is unethical because it is a bet against economic improvement and company growth” (Beers, 2021). Short selling is the act of borrowing shares and selling them on the open market because you believe the price will fall in the future, allowing you to generate a profit by purchasing the shares back at a lower price and returning them to their original owner (Mitchell, 2021). With an obligation to purchase back shares at a future date, the very existence of short selling can encourage asset bubbles by increasing a stock’s future demand and as emphasized in the case of a short squeeze, lead to ever increasing prices (Guimaraes & Pannella, 2021). Short interest is the number of shares sold short divided by the total number of shares a company has in its float (Mitchell, 2021). A high short interest indicates that a larger percentage of the total float shares are being sold short by investors. Looking at a company’s short interest can give a hint about the market’s overall sentiment of that company (Mitchell, 2021). Although this may be

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true, having an unusually high short interest could be an indication of a short squeeze in the near future (Mitchell, 2021).

A short squeeze is the result of a significant increase in the demand for a stock in a very short period of time (Mitchell, 2021). This causes the stock price to jump sharply higher, forcing traders who had bet that its price would fall (short sellers), to buy it in order to forestall even greater losses (Mitchell, 2021). Their panic to buy (the squeeze) only adds to the upward pressure on the stock's price alongside the traders who are waiting on the sidelines to buy the stock and get in on the action (Mitchell, 2021). This massive swing in stock return volatility can cause devastating losses for some but massive potential profits for others.

The recent noteworthy example of a short squeeze occurred with GameStop in January 2021. Prior to its massive increase in stock price, over 100% of GameStop's available shares in the market were being sold short mostly by hedge funds (Greifeld & Wang, 2021). At one point the short interest amounted to an astronomical high of 140% of the available shares in the market in mid-January (Greifeld & Wang, 2021). A short interest over 100% is made possible because traders purchasing shares in the market may be purchasing them from someone who is actively short selling them. In this instance, the shares that have actively been used in a short sale are now in the hands of a new owner who can take the shares they have just purchased and relend them to another short seller who is actively looking for available shares to short sell. As traders began to realize the upside potential that this stock presented based on the massive, short interest, they slowly began to push the stock price higher by purchasing GameStop shares (Greifeld & Wang, 2021). Eventually, the stock price reached a point where the hedge funds were forced to start covering their short positions because of the massive losses they were accruing (Greifeld & Wang, 2021). In total, short sellers of GameStop suffered a loss of \$80 billion in a matter of weeks (Greifeld & Wang, 2021). For a visual example of the GameStop short squeeze in January of 2021, see Appendix A for a chart depicting the price action.

Considering the potential stock return volatility of a short squeeze, the purpose of the present study is to specifically analyze the likelihood that such a situation will occur. To accomplish

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this, the present study connects several variables, specifically volume, short interest, float, as well as technical trading patterns, to identify the early stages and potential return volatility of the price action during this phenomenon. The remainder of the study will analyze the existing literature to determine whether there is any evidence that supports these variables' ability to forecast price fluctuations in the stock market.

Small Cap Stocks and Float

To date, little research has been conducted on day trading and technical analysis of small cap stocks. On a long-term basis, historically small cap stocks outperform large caps at points after an economic trough while large caps outperform during points prior to an economic peak (Switzer, 2010). One of the major characteristics of small cap stocks is their high-risk high reward potential because of their higher levels of volatility (Zhang, 2011). The reason they experience higher levels of volatility versus large cap stocks is because they are typically illiquid, and they have smaller amounts of shares in their float (Greenwood, 2006). A stock's float is the total amount of shares available in the market that can be readily traded amongst investors (Mitchell, 2021). When the float is relatively low, this means the supply of shares in the market is low. When the demand for a low float stock increases compared to a high float stock, the low float stock experiences higher levels of volatility because of the limited supply of shares (Greenwood, 2006). Due to the typical illiquidity in small cap stocks, trying to purchase, or short sell a large number of shares can be difficult and can affect an investors profitability (Zhang, 2011).

As mentioned earlier, small cap stocks experience larger levels of volatility compared to large caps (Zhang, 2011). When looking at day to day price movements, the study hypothesizes that stocks with a low market cap and low float will have a better potential to experience a short squeeze. For this reason, the study focuses on stocks with smaller market caps for the proposed research.

Trade Volume

Finally, it is imperative to address the roles of indicators, signals, and other fundamental tools that will be integral to the present study. The first indicator, volume, refers to the direct

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measurement of the number of shares that are traded at any given point in time (Twin, 2021). When demand increases for a given stock, traders aggressively try to purchase shares. An increase in demand typically comes an increase in trading volume as more and more traders are piling into a security pushing the price upward. Research supports this claim showing that there is typically a positive association between volume and stock price increases (Jones & Kaul, 2015). Further, research indicates that traders who use volume as a factor in technical analysis have had greater success in determining price increases (Blume & Easley, 1994).

As previously mentioned, a short squeeze occurs when short sellers are forced to cover their positions, increasing the demand and buying pressure drastically and ultimately increasing the price very quickly (Mitchell, 2021). The present study analyzes whether an increase in trading volume has a strong association with the stock return volatility of a short squeeze as well as forecasting power in predicting its early stages.

Short Interest

As previously stated, short interest is the total number of shares short sold divided by the total number of shares a company has in its current float (Mitchell, 2021). Increasing short interest tends to serve as an indicator of negative investor sentiment (Mitchell, 2021). However, since a short sell is an obligation, to at some point in the future repurchase shares, we can assume that it automatically increases the future demand for a specific stock (Guimaraes & Pannella, 2021). Based on the characteristics of small cap stocks, Mitchell (2021) argues that stocks with smaller floats and high short interest have the highest probability of a short squeeze as shortable shares reduce in number.

The present study analyzes whether a stock's short interest immediately preceding a short squeeze has any association with the volatility of the stock's returns. This is because it is hypothesized that all the traders shorting a stock with an unusually high short interest will begin to panic, covering their positions as quickly as possible if and when the price of that stock is making new highs.

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Price Patterns

Analyzing price patterns is one of the largest components of technical analysis (Seth, 2021). For example, Gao and Han (2018) analyze a consistent pattern that yields consistent marginal returns (Gao & Han, 2018). This pattern uses the first thirty minutes of the market open to predict the last thirty-minute returns. The authors' results demonstrate that patterns are most prominent near the open and close of the market where emotional trading and volatility appears to be the most prevalent factors impacting trading (Gao & Han, 2018). Thus, the authors provide evidence demonstrating that day traders seeking price patterns should focus on patterns that occur either just after the market opens and just before the market closes (Gao & Han, 2018).

As it pertains to the present study, a price pattern can have some forecasting power in terms of future price movements (Gao & Han, 2018). It attempts to identify, both visually as well as statistically, whether a short squeeze shows signs of repetitive price behavior and whether or not this behavior can be used to forecast the most optimal time to enter and exit a short squeeze. Additionally, the study will be coupling this analysis with a regression analysis focusing on the relationships between short interest, volume, shares float, and how volatile a short squeeze's price action may be.

RESEARCH QUESTION AND TOPIC ORIGINALITY

After analyzing the existing literature pertaining to intraday price movements, day trading, small cap stocks, short squeezes, and technical analysis, there appears to be a limited amount of research conducted that considers all of these specific variables at once. The existing literature indicates that it is exceptionally difficult for inexperienced day traders to generate consistent marginal profits (Lee & Park, 2007). Further, research regarding technical analysis leaves its viability still questionable, as the research claimed it does, but not necessarily in the context of a short squeeze (Bessembinder & Chan, 1995). Researchers such as Gao and Han (2018), Guimaraes and Pannella (2021), and Blume and Easley (1994), agree that price patterns, volume analysis, and short interest all have predictive power in short term price

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movements. But how can all these factors be tied into the anatomy of one of the most infamous stock market phenomena, the short squeeze?

The purpose of the present study is to determine whether a short squeeze can be forecasted using the variables of trade volume, price patterns, short interest, and a stock's float.

Considering this overarching research goal, the study identifies which of these variables has the strongest association with the largest price fluctuations in historical examples of short squeezes. Thus, the present study aims to answer the question of whether technical analysis, operationalized through price patterns, and statistical stock data - operationalized through intraday trading volume, short interest, shares float, and stock return volatility - can be used as valuable tools to predict a short squeeze and its magnitude.

Finally, if the results of these analyses indicate that these variables are strongly correlated to one another and can thus forecast a short squeeze, future studies will be conducted to generate a trading system and mathematical formula to assist in forecasting the size of a potential short squeeze and financially capture the opportunity. My hypothesis is that an increase in trading volume, the smaller the stock's float, and the higher the short interest will all have a strong positive association with an increase in the stock return volatility of a short squeeze. Overall, I believe conducting this study will bring valuable information and research to the field of finance as well as the stock trading community in general.

METHODOLOGY

Data Collection

Data for the present study will be gathered utilizing the Wharton Research Data Services which includes Compustat and Capital IQ as well as the Thinkorswim trading platform by TD Ameritrade. The information that will be collected includes intraday price data, the short interest for a given company at a specific time, intraday trade volume data, as well as a given company's shares outstanding at a specific time. Initially, the study called for the collection of a company's shares float. Through further research and efforts, it was noticed that share float data was inconsistent between several data services therefore this data entry was substituted

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for shares outstanding. Shares outstanding is a very similar metric to shares float except it “includes share blocks held by institutional investors and restricted shares owned by the company’s officers and insiders” (Chen 2022). In short, shares outstanding is another metric for determining the total supply of shares available in the market for a given stock. Another variable that will be calculated is supply rotation. Supply rotation will be the total number of trade volume that occurred throughout the short squeeze divided by the number of shares a given stock has outstanding. This will provide a ratio that determines how many times the supply of available shares in the market was rotated through relative to how volatile the short squeeze was. This factor will take into account the supply of shares in the market as well as the number of shares that was traded throughout the time frame of the short squeeze. The higher the ratio, the greater the trading activity relative to the number of shares available in the market. To collect this data, I will screen the databases using several constraints based on the variables just mentioned.

A fixed set of criteria and guidelines were used in order to dictate whether a specific scenario should be considered a short squeeze for the study. Following is the set criteria:

1. A relatively new high price is reached on the daily stock chart. See Appendix B for an example.
2. During the time period where this new high price is forming (1), the short interest must have increased to at least 10% of the shares outstanding as an indication that short sellers have taken relatively large positions. See Appendix C for example.
3. After a large short position has been identified, the daily stock price needs to exceed the high price from stage (1) as a technical indicator, known as a breakout, that in theory could spark the initial stages of a short squeeze. See Appendix D for example.
4. Finally, if all the other criteria have been met, the stock price must exceed at least 20% of the high price indicated in stage (1) to be considered a short squeeze up until a new daily high price is formed. See Appendix E for example.
5. As soon as the stock price drops 10% from the new high in stage (4), the study considers that short squeeze completed. See Appendix F for example.

Once stages (1) through (5) have been completed, the data is collected from the date range at which this scenario occurred. The data was manually gathered one scenario at a time from the Wharton Research Data Services as well as Thinkorswim. On top of this, the data was

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extracted from the date range between December of 2019 and December of 2021 in an attempt to best reflect the current structure and behavior of the market today.

Data Analysis

After manually sourcing the data from the databases, it will need to be further consolidated and organized. Utilizing Excel as a data analysis tool, each row on the spreadsheet represents a new data sample. Each column represented a different data value for each sample. From left to right the data columns were Sample #, Date of Short Squeeze, Ticker Symbol, # of Shares Short, Short Squeeze Trade Volume, # of Shares Outstanding, Market Capitalization, Short Interest, Supply Rotation, Short Squeeze Breakout Price, Short Squeeze High Price, and Short Squeeze Volatility %. See Appendix G for details.

To determine whether these variables can reliably be used to model the stock return volatility of a short squeeze as well as to determine which variables have the strongest association with volatility, a multiple variable regression analysis was conducted with a 0.05 alpha level. The independent variables included in the regression were # of Shares Outstanding, Market Capitalization, Short Interest, and Supply Rotation. The dependent variable in the study was the stock return volatility of the short squeeze measured as the percentage change in price from where the short squeeze begins to the highest intraday price that is reached as the short squeeze plays out.

ETHICAL CONSIDERATIONS

An Institutional Review Board (IRB) review was conducted prior to the start of the present study to ensure that IRB approval was not necessary. As no human subjects are being used in the present study and existing quantitative data is being used, no ethical issues arose.

Although this may be true, the results of this study should be viewed as educational to the field and topic of finance and should not serve as financial advice.

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RESULTS

The following graphic is an image of the results of the multiple regression analysis conducted on the four independent variables, # of Shares Outstanding, Market Capitalization, Short Interest, and Supply Rotation in relation to the dependent variable Short Squeeze Volatility %.

4 Factor Regression Analysis

SUMMARY OUTPUT

Regression Statistics

| | |
|-------------------|-------------|
| Multiple R | 0.545314309 |
| R Square | 0.297367695 |
| Adjusted R Square | 0.283315049 |
| Standard Error | 0.489129392 |
| Observations | 205 |

ANOVA

| | df | SS | MS | F | Significance F |
|------------|-----|-------------|-------------|-------------|----------------|
| Regression | 4 | 20.25084693 | 5.062711732 | 21.16097521 | 1.447E-14 |
| Residual | 200 | 47.84951245 | 0.239247562 | | |
| Total | 204 | 68.10035937 | | | |

| | Coefficients | Standard Error | t Stat | P-value | Lower 95% | Upper 95% | Lower 95.0% | Upper 95.0% |
|-------------------------|--------------|----------------|--------------|-------------|--------------|-------------|--------------|-------------|
| Intercept | 0.321834793 | 0.077172784 | 4.170314653 | 4.5303E-05 | 0.169658071 | 0.474011515 | 0.169658071 | 0.474011515 |
| # of Shares Outstanding | 2.47347E-10 | 3.01941E-10 | 0.819190088 | 0.413653052 | -3.4805E-10 | 8.42744E-10 | -3.4805E-10 | 8.42744E-10 |
| Market Capitalization | -1.20822E-11 | 1.28602E-11 | -0.939499514 | 0.348607606 | -3.74412E-11 | 1.32769E-11 | -3.74412E-11 | 1.32769E-11 |
| Short Interest | 0.742012571 | 0.303728627 | 2.443011638 | 0.015433114 | 0.143091238 | 1.340933903 | 0.143091238 | 1.340933903 |
| Supply Rotation | 0.048000099 | 0.005520478 | 8.69491748 | 1.26203E-15 | 0.037114289 | 0.058885908 | 0.037114289 | 0.058885908 |

In determining the strength of the four-factor model's ability to predict the stock return volatility of a short squeeze, the Adjusted R Squared value and F-statistic are most commonly used. Simply put, the Adjusted R Squared value from this regression of 0.2833 means that approximately 28.33% of the stock return volatility of a short squeeze can be explained by the four-factor model. The F-statistic had a statistically significant p-value of 0.00 which is less than the 0.05 alpha level. This is an indication that the independent variables used had a positive impact on the predictive power of the model as a whole. Since a regression attempts to show a correlation between the independent and dependent variables, an R-Squared value of 1 or 100% would represent that there is a perfect correlation between the model and its ability to predict the stock return volatility of a short squeeze. An R-Squared value of 0 or 0%

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would represent that there is absolutely no correlation between the model and its ability to predict the stock return volatility of a short squeeze.

Next, the regression model attempts to determine whether the independent variables individually are statistically relevant in predicting the stock return volatility of a short squeeze. To do this, the model calculates a p-value for each independent variable. The first variable, the Number of Shares Outstanding, has a p-value of 0.41. Since this is significantly greater than the 0.05 alpha level, the regression determined that using a stock's outstanding shares on its own is not a strong predictor of the stock return volatility of a short squeeze because it was not statistically significant. The second variable, Market Capitalization, also had a p-value significantly greater than the 0.05 alpha level with a p-value of 0.35. The regression determined that using the market capitalization of a company on its own is not a strong predictor of the stock return volatility of a short squeeze because it was not statistically significant. The third variable, Short Interest, has a p-value of 0.02. With a p-value lower than the alpha level of 0.05, the regression determined that a stock's short interest is a strong predictor of the stock return volatility of a short squeeze because it was statistically significant. Lastly, the fourth variable, Supply Rotation, has a p-value of 0.00. With a p-value significantly lower than the alpha level of 0.05, the ratio of volume traded divided by shares outstanding proved to be the strongest variable at predicting the stock return volatility of a short squeeze because it was the most statistically significant.

Lastly, the regression assigns coefficient values for each independent variable ultimately determining how a change in each would impact the stock return volatility of a short squeeze. As the two variables, the Number of Shares Outstanding and Market Capitalization, were not determined to be statistically significant, their coefficients are unimportant. On the other hand, the Short Interest and Supply Turnover variables were both statistically significant therefore it is important to analyze their impact on the stock return volatility of a short squeeze by interpreting their assigned coefficients. The estimated coefficient value of the Short Interest variable was 0.74. Based on the model, this means that for every 1% or 0.01 increase in short interest the stock return volatility of a short squeeze is predicted to increase by 0.74%. Because the coefficient is a positive number the short interest variable has a positive

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relationship with the volatility of a short squeeze. This means that when short interest increases, volatility is expected to increase as well. The coefficient value assigned to the Supply Rotation variable was 0.05. Based on the model, this means for every additional supply turnover the stock return volatility of a short squeeze is expected to increase by 5%. Similarly, Supply Rotation has a positive relationship with the volatility of a short squeeze. This means that when supply rotation increases, volatility is expected to increase as well.

CONCLUSION

Takeaways

In an attempt to construct an honors thesis capstone in the field of contemporary finance, this detailed methodology and regression analysis proved to deliver several key insights about the stock return volatility of short squeezes. The first major takeaway from the study was the insignificant impact that a change in the number of a stock's shares outstanding had on volatility. After conducting a literature review, it was hypothesized that a decrease in a stock's available shares in the market would solely have a strong increase in the stock return volatility of a short squeeze. The model determined this hypothesis to be false as the p-value for the Number of Shares Outstanding variable was drastically higher than the 0.05 alpha level at 0.41.

The second major takeaway was very similar to that of the first. Based on the literature review, it was hypothesized that the smaller the market capitalization of a stock experiencing a squeeze, the greater its stock return volatility would be. Interestingly enough, market capitalization as a sole variable proved to not have a strong impact on the stock return volatility of short squeeze. The regression model determined that this initial hypothesis was false by producing a p-value of 0.35 for the Market Capitalization variable which is drastically greater than the 0.05 alpha level granting it not statistically significant.

The third major takeaway from the study was of no surprise as an unusually high level of this variable is a requirement for a short squeeze to occur. Short interest, the calculation that provides investors with information about what percentage of a stock's supply of shares in the

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market are being actively sold short, based on the literature review, was theoretically the most important variable to track. As it was hypothesized, the regression model did confirm that an increase in a stock's short interest would result in an increase in the stock return volatility of a short squeeze. The regression calculated a p-value of 0.02 for the Short Interest variable which was statistically significant on the 0.05 alpha level. This may appear obvious because the larger the number of short sellers or short positions that are trapped in a squeeze, the greater the short-term demand will be inflated for a stock. It can be concluded that this will significantly increase the stock return volatility of a short squeeze when the short sellers either begin to cut their losses short or are forced to cover their positions, especially when there is a larger and larger number of them. Based on the regression model, an increase in short interest of 0.01 or 1% would result in an increase in the stock return volatility of a short squeeze by 0.74%. This may not appear to be that much of a drastic change but in cases where the short interest alone is astronomically high, the effect on the short squeeze's stock return volatility is enormous. For example, in a short squeeze where the short interest is 50%, stock return volatility is expected to increase by 37%.

The fourth and most fascinating takeaway from the regression analysis comes from the fourth variable, Supply Rotation. As noted earlier, using shares outstanding on its own as a variable to predict return volatility proved to be insufficient. But, interestingly enough, linking the shares outstanding variable together with trade volume proved to be the best predictor of stock return volatility in the regression analysis. By creating a variable that accounts for both trade volume and the number of shares available in the market, the Supply Rotation variable represents the amount of turnover that occurs from active trading relative to how many shares a company has outstanding. In a sense, it would be much easier for a company with one million shares outstanding to turnover its supply ten times through trading activity than a company with 100 million shares outstanding. This is because for the company with less shares outstanding it would only require trading volume of ten million shares throughout the time period of the short squeeze while the company with 100 million shares outstanding would require one billion shares to be traded in order to have a supply rotation of 10. The analysis allows us to conclude that in scenarios where stock's experienced extraordinary

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levels of turnover or supply rotation there was a strong association with an increase in stock return volatility. This means although shares outstanding does not have a direct impact on the stock return volatility of a short squeeze, it does have an indirect impact through its relationship with trade volume on stock return volatility. From a mathematical perspective, when shares outstanding decreases, the denominator of the supply rotation calculation also decreases, therefore ultimately having a net positive impact on the supply rotation variable in this scenario. On the other hand, when shares outstanding increases it has the opposite impact on the supply rotation. In terms of trade volume in general, it appears to have a direct relationship with the stock return volatility of a short squeeze. Thinking about it conceptually, trade volume could be thought of as the demand for a given stock or the amount of attention that stock is receiving. In a given scenario where trade volume is extremely high, one may conclude that there is an extraordinary amount of demand associated with that stock especially if the price is pushing higher. When trade volume increases, the numerator of the supply rotation calculation also increases, therefore ultimately having a net positive impact on the supply rotation. The opposite is true when trade volume is decreasing potentially as an indication that demand is decreasing. With this being said, based on the regression model, supply rotation was the best predictor of a short squeeze's stock return volatility with a p-value of 0.00 which is lower than the alpha level of 0.05, so this finding is statistically significant. Tracking trade volume as well as shares outstanding proved to be important through the Supply Rotation variable.

The final major takeaway from the regression analysis was the Adjusted R-Squared calculation of 28.33%. An Adjusted R-Squared value this low suggests that there was typically a large variance between the model's predictions of stock return volatility and the actual stock return volatility that was experienced. Although the model determined that two of the independent variables had strong predictive power when it came to the stock return volatility of short squeezes, this Adjusted R-Squared value suggests that there is certainly still room for improvement. In other words, this analysis implies that there are several other independent variables that are not accounted for in the regression that could help strengthen the model's overall fit to the actual stock return volatility of a short squeeze.

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Complications

As the research was being conducted, it was noted that the possibility of human error could lead to major complications in the dataset. Errors could lead to inaccurate results through skewness and bias. This is because the data was manually extracted from online databases rather than through the use of a computer program that would make no errors in data extraction. The research process was very tedious and time consuming. It involved much back and forth between different databases to ensure the set of criteria was being met as well as to confirm data was being extracted correctly. The use of computer programming would certainly have improved the research methodology and ensured that different human errors would take place.

As there was no widely accepted way to identify a short squeeze, a set of criteria was constructed in the methodology in order to identify such a scenario. For this reason, the set of criteria used in this analysis may be disputed by other academics and professionals. If major changes were made to the criteria of short squeeze this could ultimately have an impact on the sample size used in the regression analysis and include scenarios that were not accounted for in the initial criteria. This would likely have an impact on the results found from this analysis.

During the research process it was noted that both short interest data and trade volume are delayed data. Short interest for a given stock is reported and released on a rolling 15-day time frame, but trade volume can be collected at the end of each trading day. Although these two variables showed strong predictive power, implementing the knowledge learned from this regression may not be as simple as looking up the data. For example, in a scenario where someone was trying to predict the stock return volatility of a potential short squeeze, they would likely need to also predict the trade volume and potentially even the short interest if they did not have the most up to date information prior to the squeeze.

Further Research

Based on the results of this thesis capstone, several key takeaways about the stock return volatility of short squeezes were found. Although great progress was made in terms of creating a model to predict their stock return volatility, the Adjusted R Square value suggests

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that there is certainly room for improvement. Through further research some suggestions to pursue would be variables that were not accounted for in this model. For example, some variable accounting for time may be necessary as it was noticed during the research that some short squeeze scenarios took more time to play out than others. In addition, success was found by combining two variables together to form one. In this project, little success was found with the shares outstanding variable, but by combining it with the trade volume variable it proved to be useful. Some variables that may be of interest are a market capitalization divided by trade volume ratio, a number of trading days for short squeeze to pan out variable, a trade volume divided by trading days ratio, a news related variable, and potentially tracking a stock's social media mentions before and during a short squeeze variable. Tracking and testing additional variables may lead to further conclusions and results that support the idea that a short squeeze's stock return volatility can be predicted utilizing several independent variables.

Through further research and the testing of additional independent variables, it may be possible to identify a model that has a stronger ability to predict stock return volatility. In this case, one may want to attempt to implement the model into a trading strategy. A study done producing a trading algorithm or system based upon the criteria set to identify a short squeeze and applying the model to place and exit trades may show high levels of profitability. But, as previously stated, one would need to do additional research and other models may be required in order to predict the values for the independent variables to input into the short squeeze volatility model. For example, in this model one would need to know the short interest prior to executing a trade as well as a general prediction on what the supply rotation will be in the near-term future in order to accurately predict stock return volatility. Additional research would be required the other studies in order to predict the near-term future of supply rotation and possibly even predict a change in short interest prior to the information being released. Ultimately, without further study and testing, these complications may make implementation of the model impractical.

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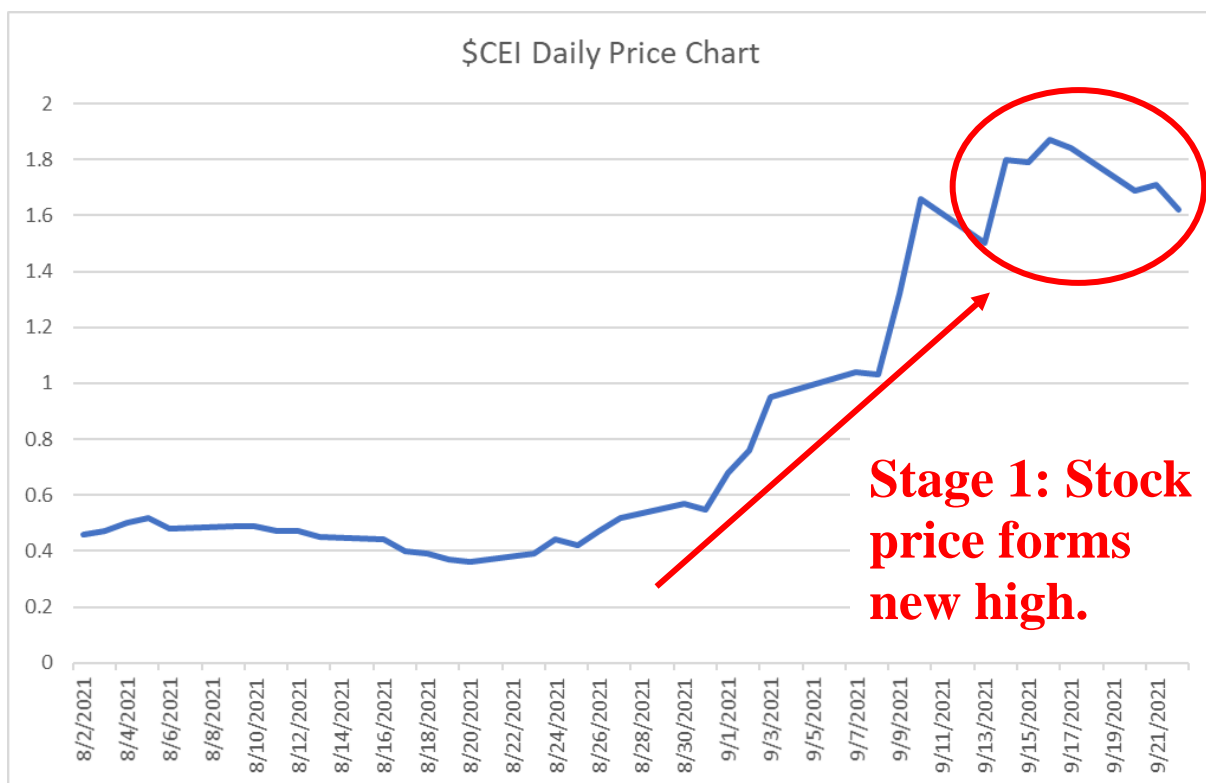
APPENDICES

Appendix A – Image of GameStop Price Action During Short Squeeze



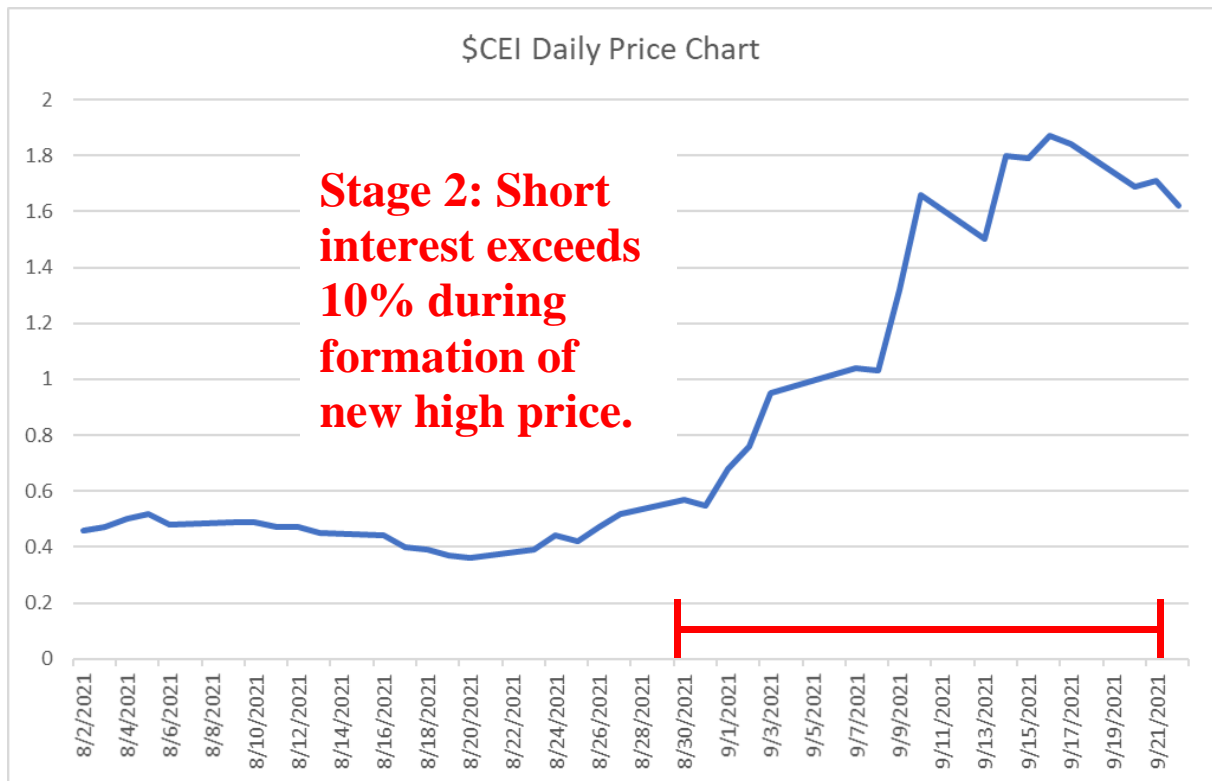
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Appendix B – Stage 1 of Short Squeeze



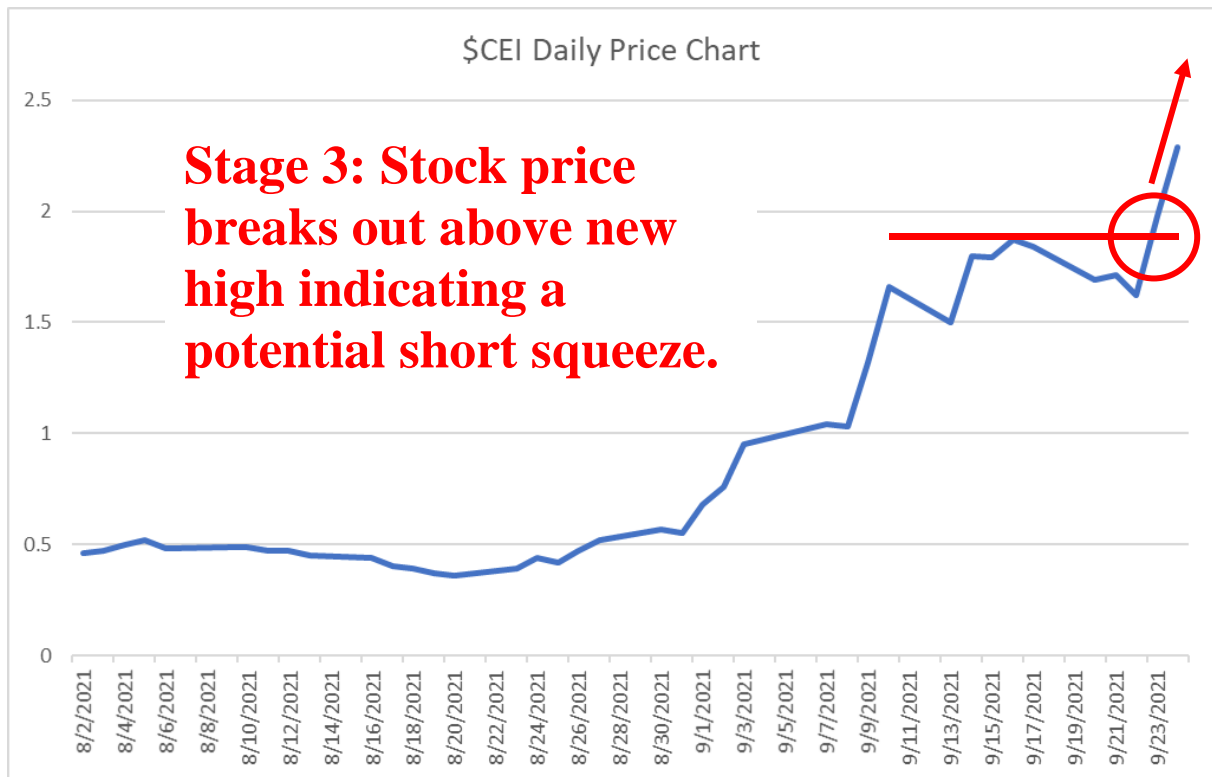
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Appendix C – Stage 2 of Short Squeeze



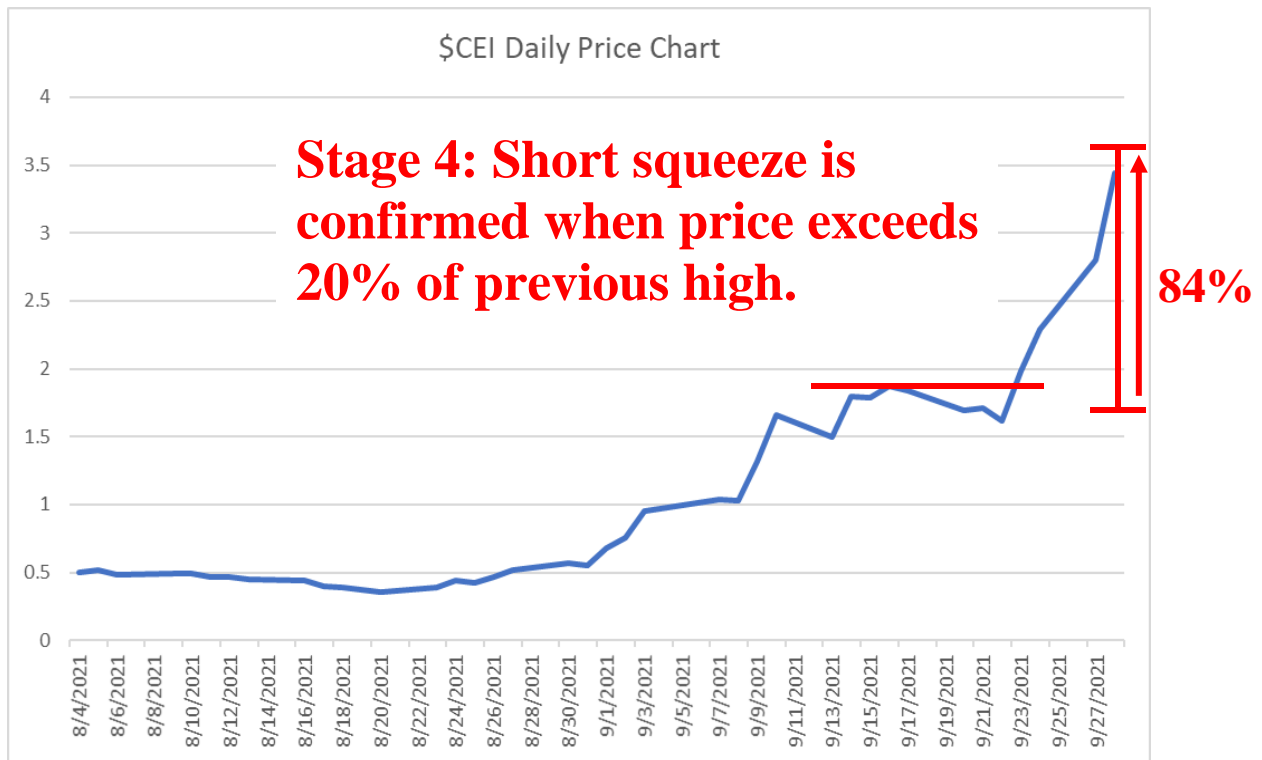
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Appendix D – Stage 3 of Short Squeeze



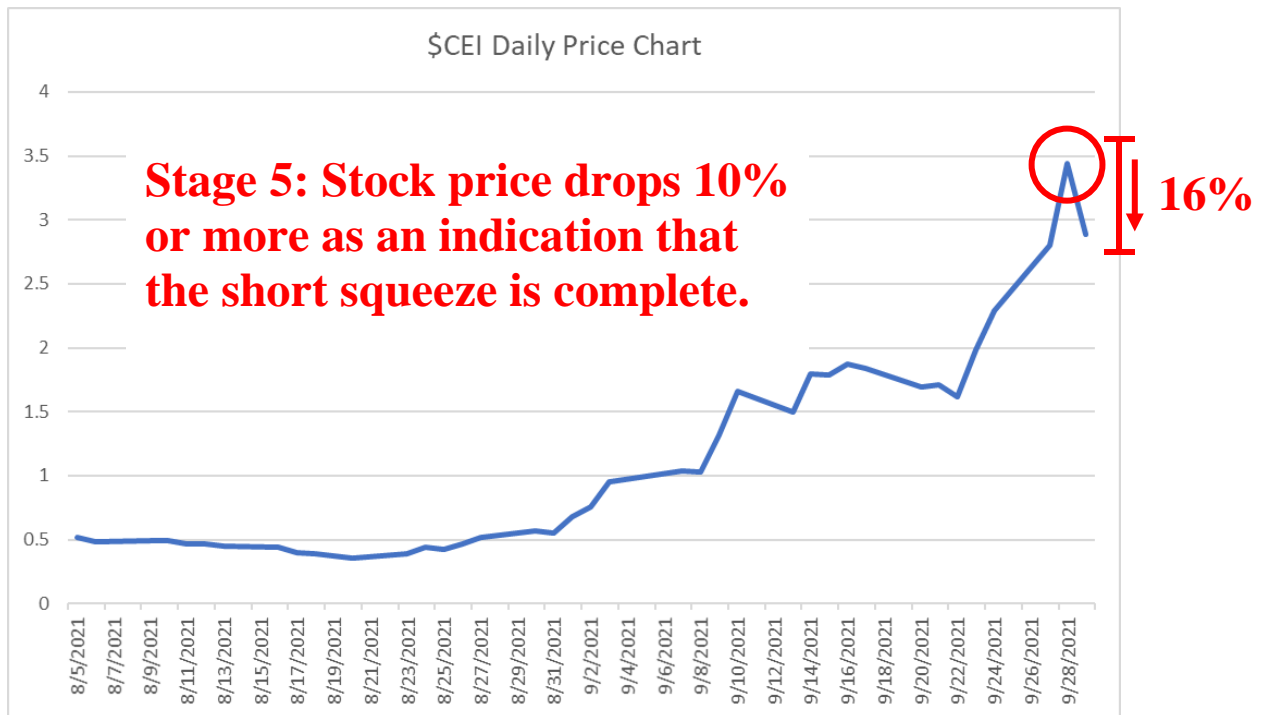
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Appendix E – Stage 4 of Short Squeeze



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Appendix F – Stage 5 of Short Squeeze



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Appendix G – Dataset

| # | A | B | C | D | E | F | G | H | I | J | K | L |
|----|----------|-----------------------|---------------|-------------------|----------------------------|-------------------------|-----------------------|----------------|-----------------|------------------------------|--------------------------|----------------------------|
| 1 | Sample # | Date of Short Squeeze | Ticker Symbol | # of Shares Short | Short Squeeze Trade Volume | # of Shares Outstanding | Market Capitalization | Short Interest | Supply Rotation | Short Squeeze Breakout Price | Short Squeeze High Price | Short Squeeze Volatility % |
| 2 | 1 | 12/19/2019 | RAD | 14,244,000 | 178,409,000 | 54,875,000 | 635,452,500 | 25.96% | 3.25 | \$ | 11.58 | 23.88 |
| 3 | 2 | 2/27/2020 | IBIO | 8,001,000 | 461,427,000 | 76,195,000 | 39,621,400 | 10.50% | 6.06 | \$ | 0.52 | 2.52 |
| 4 | 3 | 2/27/2020 | AIN | 1,007,000 | 59,465,000 | 8,264,000 | 14,379,300 | 12.15% | 7.19 | \$ | 1.74 | 3.47 |
| 5 | 4 | 4/8/2020 | WTI | 17,668,000 | 27,933,000 | 141,689,000 | 283,338,000 | 12.47% | 0.20 | \$ | 2.00 | 2.50 |
| 6 | 5 | 4/9/2020 | CHWY | 8,146,000 | 23,155,000 | 96,479,000 | 2,634,562,770 | 12.25% | 0.35 | \$ | 39.63 | 47.50 |
| 7 | 6 | 4/9/2020 | TTD | 7,881,000 | 318,385,000 | 40,412,000 | 868,858,000 | 18.26% | 7.88 | \$ | 21.50 | 30.60 |
| 8 | 7 | 4/13/2020 | INSG | 15,085,000 | 18,430,000 | 96,123,000 | 926,606,440 | 15.89% | 0.19 | \$ | 9.64 | 12.25 |
| 9 | 8 | 4/13/2020 | ROKU | 11,011,000 | 127,648,000 | 94,760,000 | 9,644,672,800 | 11.82% | 1.35 | \$ | 101.78 | 135.47 |
| 10 | 9 | 4/14/2020 | HALO | 13,985,000 | 15,695,000 | 138,069,000 | 2,544,611,670 | 10.13% | 0.11 | \$ | 18.43 | 24.99 |
| 11 | 10 | 4/14/2020 | BYND | 8,516,000 | 88,696,000 | 61,845,000 | 4,861,017,000 | 13.77% | 1.43 | \$ | 78.60 | 117.00 |
| 12 | 11 | 4/17/2020 | PS | 11,933,000 | 15,801,000 | 105,406,000 | 1,474,629,940 | 11.32% | 0.15 | \$ | 13.99 | 17.89 |
| 13 | 12 | 4/21/2020 | VITI | 14,239,000 | 31,756,000 | 142,689,000 | 361,225,550 | 10.05% | 0.22 | \$ | 2.55 | 3.00 |
| 14 | 13 | 4/21/2020 | APA | 49,386,000 | 198,666,000 | 377,418,000 | 3,800,599,240 | 13.09% | 0.53 | \$ | 10.07 | 14.79 |
| 15 | 14 | 4/21/2020 | PENN | 14,843,000 | 34,742,000 | 116,864,000 | 1,866,318,080 | 12.70% | 0.30 | \$ | 15.97 | 19.83 |
| 16 | 15 | 4/27/2020 | MIK | 25,966,000 | 13,799,000 | 146,847,000 | 439,072,530 | 17.68% | 0.09 | \$ | 2.99 | 3.80 |
| 17 | 16 | 4/21/2020 | SPIX | 20,076,000 | 54,518,000 | 56,522,000 | 956,917,460 | 35.52% | 0.96 | \$ | 16.93 | 24.10 |
| 18 | 17 | 4/21/2020 | X | 64,015,000 | 122,933,000 | 170,247,000 | 1,242,803,100 | 37.60% | 0.72 | \$ | 7.30 | 8.80 |
| 19 | 18 | 4/29/2020 | PEI | 13,040,000 | 13,036,000 | 78,840,000 | 100,126,800 | 41.91% | 0.17 | \$ | 1.27 | 1.52 |
| 20 | 19 | 4/29/2020 | SM | 23,043,000 | 43,350,000 | 112,989,000 | 275,693,160 | 20.40% | 0.38 | \$ | 2.44 | 3.76 |
| 21 | 20 | 4/30/2020 | PRTY | 15,982,000 | 55,347,000 | 94,491,000 | 66,143,700 | 16.91% | 0.56 | \$ | 0.70 | 0.89 |
| 22 | 21 | 5/6/2020 | BYND | 8,658,000 | 143,847,000 | 61,849,000 | 7,736,331,000 | 11.03% | 2.33 | \$ | 117.00 | 147.55 |
| 23 | 22 | 5/11/2020 | MARK | 6,578,000 | 448,354,000 | 55,066,000 | 63,325,900 | 11.95% | 8.14 | \$ | 1.15 | 2.68 |
| 24 | 23 | 5/13/2020 | GPPO | 20,375,000 | 57,143,000 | 138,686,000 | 470,990,760 | 15.83% | 0.44 | \$ | 3.66 | 4.94 |
| 25 | 24 | 5/15/2020 | PENN | 16,785,000 | 195,916,000 | 133,465,000 | 2,646,610,950 | 12.58% | 1.47 | \$ | 19.83 | 33.00 |
| 26 | 25 | 5/18/2020 | EXPE | 13,232,000 | 94,706,000 | 135,458,000 | 10,493,931,260 | 9.77% | 0.70 | \$ | 77.47 | 97.59 |
| 27 | 26 | 5/21/2020 | SBH | 19,478,000 | 20,832,000 | 112,871,000 | 1,265,283,910 | 17.26% | 0.18 | \$ | 11.21 | 13.91 |
| 28 | 27 | 5/26/2020 | PRTY | 22,360,000 | 70,682,000 | 94,491,000 | 84,096,990 | 23.66% | 0.75 | \$ | 0.89 | 2.11 |
| 29 | 28 | 5/26/2020 | MARK | 12,588,000 | 178,880,000 | 55,066,000 | 147,576,880 | 22.86% | 3.25 | \$ | 2.68 | 3.75 |
| 30 | 29 | 5/26/2020 | CLF | 113,049,000 | 134,311,000 | 398,610,000 | 1,953,189,000 | 28.34% | 0.34 | \$ | 4.90 | 7.09 |
| 31 | 30 | 5/26/2020 | SABR | 28,975,000 | 116,072,000 | 275,523,000 | 2,173,876,470 | 10.52% | 0.42 | \$ | 7.89 | 11.49 |
| 32 | 31 | 5/27/2020 | NIO | 139,537,000 | 1,021,907,000 | 831,928,000 | 3,410,904,800 | 16.77% | 1.23 | \$ | 4.10 | 6.83 |
| 33 | 32 | 5/27/2020 | MIK | 29,345,000 | 34,569,000 | 147,328,000 | 559,846,400 | 19.92% | 0.23 | \$ | 3.80 | 4.86 |
| 34 | 33 | 5/27/2020 | CPRI | 20,561,000 | 59,910,000 | 149,365,000 | 2,534,724,050 | 13.77% | 0.40 | \$ | 16.97 | 23.74 |
| 35 | 34 | 5/27/2020 | CNK | 12,647,000 | 44,878,000 | 117,527,000 | 1,970,927,790 | 10.78% | 0.38 | \$ | 16.77 | 20.89 |
| 36 | 35 | 5/27/2020 | M | 132,063,000 | 755,842,000 | 309,670,000 | 2,221,430,600 | 42.65% | 2.44 | \$ | 7.18 | 11.32 |
| 37 | 36 | 5/27/2020 | GPS | 41,194,000 | 172,036,000 | 372,639,000 | 3,491,627,430 | 11.05% | 0.46 | \$ | 9.37 | 13.37 |
| 38 | 37 | 5/27/2020 | RCL | 25,281,000 | 256,197,000 | 209,385,000 | 11,105,780,400 | 12.07% | 1.22 | \$ | 53.04 | 78.88 |
| 39 | 38 | 6/2/2020 | CHWY | 16,791,000 | 197,702,000 | 84,211,000 | 4,004,233,050 | 19.94% | 2.35 | \$ | 47.55 | 59.30 |
| 40 | 39 | 6/2/2020 | SM | 24,761,000 | 43,284,000 | 112,889,000 | 496,021,710 | 21.95% | 0.38 | \$ | 4.49 | 6.88 |
| 41 | 40 | 6/3/2020 | SAVE | 22,308,000 | 244,277,000 | 86,940,000 | 1,431,426,400 | 25.93% | 2.84 | \$ | 16.66 | 26.50 |
| 42 | 41 | 6/3/2020 | MAC | 51,530,000 | 65,362,000 | 141,535,000 | 1,120,957,200 | 36.41% | 0.46 | \$ | 7.92 | 13.90 |
| 43 | 42 | 6/3/2020 | TTD | 7,964,000 | 523,559,000 | 40,889,000 | 1,338,296,970 | 19.48% | 12.80 | \$ | 32.73 | 47.57 |
| 44 | 43 | 6/4/2020 | PEI | 30,986,000 | 14,277,000 | 78,876,000 | 108,848,880 | 39.28% | 0.18 | \$ | 1.38 | 2.35 |
| 45 | 44 | 6/4/2020 | TUP | 9,434,000 | 26,197,000 | 49,014,000 | 198,016,580 | 19.29% | 0.53 | \$ | 4.04 | 8.04 |
| 46 | 45 | 6/4/2020 | NCLH | 46,079,000 | 303,192,000 | 296,347,000 | 4,819,321,600 | 17.96% | 1.18 | \$ | 18.80 | 28.98 |
| 47 | 46 | 6/4/2020 | CCL | 113,074,000 | 306,833,000 | 599,693,000 | 10,608,569,170 | 18.86% | 0.51 | \$ | 17.69 | 26.90 |
| 48 | 47 | 6/4/2020 | X | 30,388,000 | 48,478,000 | 170,376,000 | 1,499,308,800 | 29.57% | 0.28 | \$ | 8.80 | 11.15 |
| 49 | 48 | 6/5/2020 | WTI | 22,617,000 | 23,692,000 | 142,689,000 | 425,007,000 | 15.96% | 0.17 | \$ | 3.00 | 3.97 |
| 50 | 49 | 6/5/2020 | REI | 13,898,000 | 5,220,000 | 67,977,000 | 90,409,410 | 20.43% | 0.14 | \$ | 1.33 | 2.05 |
| 51 | 50 | 6/5/2020 | RIG | 78,688,000 | 213,081,000 | 614,777,000 | 1,130,821,680 | 12.90% | 0.35 | \$ | 1.84 | 4.10 |
| 52 | 51 | 6/8/2020 | PRTY | 20,800,000 | 25,516,000 | 94,491,000 | 196,431,100 | 22.01% | 0.27 | \$ | 2.10 | 2.74 |
| 53 | 52 | 6/22/2020 | UPCN | 6,632,000 | 34,359,000 | 47,879,000 | 56,038,430 | 13.85% | 0.72 | \$ | 1.17 | 1.50 |
| 54 | 53 | 7/2/2020 | NIO | 138,450,000 | 615,401,000 | 903,928,000 | 7,276,620,400 | 15.32% | 0.68 | \$ | 8.05 | 12.30 |
| 55 | 54 | 7/7/2020 | GNMK | 7,118,000 | 14,349,000 | 70,232,000 | 1,121,600,040 | 10.13% | 0.20 | \$ | 15.97 | 19.83 |
| 56 | 55 | 7/8/2020 | VUZI | 4,135,000 | 19,097,000 | 39,307,000 | 129,713,100 | 10.52% | 0.49 | \$ | 3.30 | 4.32 |
| 57 | 56 | 7/15/2020 | NVIS | 12,865,000 | 137,138,000 | 142,553,000 | 270,856,700 | 9.62% | 0.96 | \$ | 1.90 | 3.45 |

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| | | | | | | | | | | | | | | |
|-----|-----|------------|------|-------------|-------------|-------------|----------------|--------|-------|----|--------|----|--------|---------|
| 58 | 57 | 7/22/2020 | TUP | 8,374,000 | 56,560,000 | 49,014,000 | 394,072,560 | 17.08% | 1.15 | \$ | 8.04 | \$ | 16.60 | 106.47% |
| 59 | 58 | 7/23/2020 | AMAG | 11,960,000 | 6,550,000 | 34,273,000 | 333,813,020 | 34.90% | 0.19 | \$ | 9.74 | \$ | 12.00 | 23.20% |
| 60 | 59 | 7/29/2020 | BLNK | 2,991,000 | 71,405,000 | 28,100,000 | 242,784,000 | 10.64% | 2.54 | \$ | 8.64 | \$ | 14.58 | 68.75% |
| 61 | 60 | 7/29/2020 | KNDI | 4,791,000 | 79,339,000 | 52,849,000 | 295,954,400 | 9.07% | 1.50 | \$ | 5.60 | \$ | 14.90 | 166.07% |
| 62 | 61 | 7/31/2020 | MARA | 2,889,000 | 264,982,000 | 28,447,000 | 57,747,410 | 10.16% | 9.31 | \$ | 2.03 | \$ | 4.79 | 135.96% |
| 63 | 62 | 8/1/2020 | RIOT | 8,383,000 | 140,048,000 | 34,541,000 | 114,330,710 | 18.42% | 4.05 | \$ | 3.11 | \$ | 4.58 | 38.37% |
| 64 | 63 | 8/4/2020 | SRNE | 52,303,000 | 320,372,000 | 202,122,000 | 1,988,880,480 | 25.88% | 1.59 | \$ | 9.84 | \$ | 14.99 | 52.34% |
| 65 | 64 | 8/6/2020 | PENN | 17,078,000 | 48,273,000 | 135,965,000 | 5,501,143,900 | 12.56% | 0.36 | \$ | 40.46 | \$ | 51.00 | 26.05% |
| 66 | 65 | 8/23/2020 | NIO | 110,480,000 | 663,151,000 | 903,928,000 | 14,860,576,320 | 12.22% | 0.73 | \$ | 16.44 | \$ | 20.97 | 27.55% |
| 67 | 66 | 8/28/2020 | CHWY | 15,877,000 | 25,183,000 | 84,225,000 | 4,994,542,500 | 18.85% | 0.30 | \$ | 59.30 | \$ | 74.84 | 26.21% |
| 68 | 67 | 9/8/2020 | VKHS | 20,892,000 | 226,165,000 | 105,135,000 | 2,407,591,500 | 19.87% | 2.15 | \$ | 22.90 | \$ | 23.14 | 23.14% |
| 69 | 68 | 10/2/2020 | WWR | 1,507,000 | 430,409,000 | 9,732,000 | 47,978,760 | 15.48% | 44.23 | \$ | 4.93 | \$ | 18.50 | 278.25% |
| 70 | 69 | 10/3/2020 | SPWR | 37,526,000 | 60,489,000 | 170,686,000 | 2,457,742,700 | 22.06% | 0.36 | \$ | 14.45 | \$ | 18.76 | 29.41% |
| 71 | 70 | 10/5/2020 | PLUG | 61,908,000 | 192,754,000 | 401,740,000 | 5,764,960,000 | 15.41% | 0.48 | \$ | 14.15 | \$ | 19.59 | 36.52% |
| 72 | 71 | 10/6/2020 | PSI | 644,000 | 321,675,000 | 8,726,000 | 25,218,140 | 7.38% | 36.86 | \$ | 2.89 | \$ | 9.31 | 222.15% |
| 73 | 72 | 10/10/2020 | HALO | 14,983,000 | 92,123,000 | 137,027,000 | 4,092,996,490 | 10.93% | 0.67 | \$ | 29.87 | \$ | 44.53 | 49.08% |
| 74 | 73 | 10/13/2020 | HOG | 20,678,000 | 48,307,000 | 153,241,000 | 4,583,438,310 | 13.49% | 0.32 | \$ | 29.91 | \$ | 37.20 | 24.37% |
| 75 | 74 | 11/4/2020 | EXPE | 14,707,000 | 29,515,000 | 135,703,000 | 14,119,897,150 | 10.84% | 0.22 | \$ | 104.05 | \$ | 130.57 | 25.49% |
| 76 | 75 | 11/5/2020 | GPRO | 14,002,000 | 22,377,000 | 128,941,000 | 951,584,580 | 10.86% | 0.17 | \$ | 7.38 | \$ | 8.82 | 19.51% |
| 77 | 76 | 11/5/2020 | SPWR | 38,241,000 | 109,030,000 | 170,159,000 | 3,297,681,420 | 22.47% | 0.64 | \$ | 19.38 | \$ | 24.40 | 25.90% |
| 78 | 77 | 11/9/2020 | PLUG | 65,833,000 | 585,669,000 | 401,740,000 | 7,769,651,600 | 16.39% | 1.45 | \$ | 19.34 | \$ | 28.70 | 48.40% |
| 79 | 78 | 11/9/2020 | NCLH | 54,066,000 | 75,000,000 | 275,419,000 | 5,291,894,800 | 19.59% | 0.27 | \$ | 19.20 | \$ | 23.05 | 20.05% |
| 80 | 79 | 11/16/2020 | FUV | 2,977,000 | 33,100,000 | 31,515,000 | 247,392,750 | 9.45% | 1.05 | \$ | 7.85 | \$ | 16.25 | 107.01% |
| 81 | 80 | 11/16/2020 | X | 38,510,000 | 281,484,000 | 220,404,000 | 2,457,504,800 | 17.47% | 1.20 | \$ | 11.15 | \$ | 20.00 | 79.37% |
| 82 | 81 | 11/17/2020 | RIOT | 9,790,000 | 130,842,000 | 50,827,000 | 231,243,860 | 19.22% | 2.57 | \$ | 4.58 | \$ | 7.50 | 63.76% |
| 83 | 82 | 11/17/2020 | KNDI | 7,861,000 | 128,277,000 | 72,932,000 | 738,801,160 | 10.78% | 1.76 | \$ | 10.13 | \$ | 14.92 | 47.25% |
| 84 | 83 | 11/18/2020 | BLNK | 4,629,000 | 161,212,000 | 32,291,000 | 470,802,780 | 14.34% | 4.99 | \$ | 14.58 | \$ | 38.31 | 162.76% |
| 85 | 84 | 11/19/2020 | MGNI | 14,006,000 | 38,826,000 | 111,959,000 | 1,464,423,720 | 12.51% | 0.35 | \$ | 13.08 | \$ | 20.44 | 56.27% |
| 86 | 85 | 11/19/2020 | NKLA | 48,223,000 | 144,652,000 | 384,688,000 | 10,485,602,400 | 12.56% | 0.38 | \$ | 27.30 | \$ | 37.95 | 39.01% |
| 87 | 86 | 11/23/2020 | OPAY | 1,829,000 | 377,129,000 | 16,517,000 | 60,387,050 | 11.07% | 22.84 | \$ | 3.45 | \$ | 9.02 | 147.12% |
| 88 | 87 | 11/23/2020 | FTK | 2,069,000 | 184,006,000 | 24,701,000 | 50,637,050 | 8.38% | 7.45 | \$ | 2.05 | \$ | 5.40 | 163.41% |
| 89 | 88 | 11/24/2020 | SAVE | 16,066,000 | 123,588,000 | 97,678,000 | 2,244,640,440 | 16.45% | 1.27 | \$ | 22.98 | \$ | 27.99 | 21.80% |
| 90 | 89 | 11/25/2020 | NCLH | 51,589,000 | 326,021,000 | 275,636,000 | 6,353,409,800 | 18.72% | 1.18 | \$ | 23.05 | \$ | 29.11 | 26.29% |
| 91 | 90 | 11/25/2020 | DDO | 38,503,000 | 33,280,000 | 124,142,000 | 1,065,138,360 | 31.02% | 0.27 | \$ | 8.58 | \$ | 10.68 | 24.48% |
| 92 | 91 | 11/25/2020 | SNOW | 6,936,000 | 65,347,000 | 40,409,000 | 12,161,109,000 | 17.16% | 1.62 | \$ | 301.00 | \$ | 429.00 | 42.52% |
| 93 | 92 | 11/30/2020 | CENI | 4,139,000 | 20,065,000 | 20,176,000 | 115,003,200 | 20.51% | 0.99 | \$ | 5.70 | \$ | 7.84 | 37.54% |
| 94 | 93 | 11/30/2020 | CHWY | 13,771,000 | 106,565,000 | 94,327,000 | 7,059,432,680 | 34.60% | 1.13 | \$ | 74.84 | \$ | 109.73 | 46.62% |
| 95 | 94 | 12/3/2020 | INSJ | 26,727,000 | 34,242,000 | 98,880,000 | 3,096,579,200 | 27.03% | 0.35 | \$ | 11.09 | \$ | 15.05 | 35.71% |
| 96 | 95 | 12/7/2020 | SFIK | 21,252,000 | 85,919,000 | 60,690,000 | 2,572,042,200 | 35.02% | 1.42 | \$ | 42.38 | \$ | 72.34 | 70.46% |
| 97 | 96 | 12/8/2020 | PLUG | 66,525,000 | 514,130,000 | 453,598,000 | 13,018,262,600 | 14.67% | 1.13 | \$ | 28.70 | \$ | 37.91 | 32.09% |
| 98 | 97 | 12/15/2020 | MARA | 7,827,000 | 217,107,000 | 63,634,000 | 445,438,000 | 12.30% | 3.41 | \$ | 7.00 | \$ | 10.77 | 53.86% |
| 99 | 98 | 12/15/2020 | VUZI | 6,080,000 | 55,597,000 | 42,719,000 | 228,837,890 | 14.23% | 1.30 | \$ | 5.31 | \$ | 9.25 | 74.20% |
| 100 | 99 | 12/15/2020 | SPWR | 41,834,000 | 113,666,000 | 170,159,000 | 4,151,879,600 | 24.59% | 0.67 | \$ | 24.40 | \$ | 33.19 | 38.02% |
| 101 | 100 | 12/15/2020 | MVIS | 18,149,000 | 316,551,000 | 148,406,000 | 505,100,700 | 12.40% | 2.16 | \$ | 3.45 | \$ | 9.74 | 182.32% |
| 102 | 101 | 12/16/2020 | RIOT | 10,738,000 | 253,810,000 | 67,530,000 | 762,413,700 | 15.90% | 3.76 | \$ | 11.29 | \$ | 15.99 | 41.63% |
| 103 | 102 | 12/17/2020 | FUBO | 21,747,000 | 108,247,000 | 67,563,000 | 2,211,338,990 | 12.12% | 1.60 | \$ | 32.73 | \$ | 60.33 | 93.49% |
| 104 | 103 | 12/18/2020 | BLNK | 6,181,000 | 128,834,000 | 32,291,000 | 1,237,066,210 | 19.34% | 3.99 | \$ | 38.11 | \$ | 56.12 | 46.49% |
| 105 | 104 | 12/18/2020 | CRBP | 31,658,000 | 61,739,000 | 84,637,000 | 132,779,440 | 37.67% | 0.76 | \$ | 1.58 | \$ | 1.98 | 25.32% |
| 106 | 105 | 12/18/2020 | MGNI | 12,902,000 | 57,365,000 | 111,959,000 | 2,474,293,900 | 11.52% | 0.51 | \$ | 22.10 | \$ | 33.50 | 51.58% |
| 107 | 106 | 12/21/2020 | RMO | 2,814,000 | 25,984,000 | 23,000,000 | 556,370,000 | 12.23% | 1.13 | \$ | 24.19 | \$ | 37.75 | 56.06% |
| 108 | 107 | 12/30/2020 | NETE | 814,000 | 49,894,000 | 4,845,000 | 74,273,850 | 16.80% | 10.30 | \$ | 15.33 | \$ | 19.15 | 24.92% |
| 109 | 108 | 1/4/2021 | JAGX | 8,536,000 | 681,713,000 | 81,906,000 | 105,658,740 | 10.42% | 8.32 | \$ | 1.29 | \$ | 2.99 | 131.78% |
| 110 | 109 | 1/5/2021 | MAK | 24,648,000 | 36,780,000 | 147,650,000 | 1,971,127,500 | 16.69% | 0.25 | \$ | 13.35 | \$ | 17.90 | 34.08% |
| 111 | 110 | 1/5/2021 | SM | 12,385,000 | 54,987,000 | 114,573,000 | 812,322,170 | 10.81% | 0.48 | \$ | 7.09 | \$ | 10.50 | 48.10% |
| 112 | 111 | 1/6/2021 | MARA | 9,709,000 | 202,082,000 | 63,634,000 | 986,327,000 | 15.26% | 3.18 | \$ | 15.50 | \$ | 24.35 | 57.10% |
| 113 | 112 | 1/6/2021 | VISL | 3,206,000 | 15,755,000 | 20,879,000 | 40,087,680 | 15.36% | 0.75 | \$ | 1.92 | \$ | 2.30 | 19.79% |
| 114 | 113 | 1/6/2021 | REI | 10,743,000 | 34,831,000 | 81,669,000 | 69,418,650 | 13.15% | 0.43 | \$ | 0.85 | \$ | 1.18 | 38.82% |
| 115 | 114 | 1/6/2021 | JWN | 31,646,000 | 72,004,000 | 157,684,000 | 5,119,999,480 | 20.07% | 0.46 | \$ | 32.47 | \$ | 42.14 | 29.76% |

Anatomy of the Short Squeeze: Using Technical and Statistical Analysis to Forecast Price Volatility

Honors Thesis for Gianni Demerski

| | | | | | | | | | | | | | | |
|-----|-----|-----------|-------|-------------|---------------|-------------|----------------|--------|-------|----|--------|----|--------|---------|
| 116 | 115 | 1/6/2021 | PLUG | 63,501,000 | 354,470,000 | 453,598,000 | 17,195,900,180 | 14.00% | 1.22 | \$ | 37.91 | \$ | 73.90 | 94.94% |
| 117 | 116 | 1/6/2021 | M | 108,646,000 | 465,932,000 | 310,478,000 | 3,800,250,720 | 34.99% | 1.50 | \$ | 12.24 | \$ | 22.30 | 82.19% |
| 118 | 117 | 1/6/2021 | X | 32,896,000 | 129,676,000 | 220,404,000 | 4,408,080,000 | 14.93% | 0.59 | \$ | 20.00 | \$ | 24.71 | 23.55% |
| 119 | 118 | 1/7/2021 | ITRM | 5,872,000 | 128,566,000 | 49,081,000 | 57,424,770 | 11.96% | 2.62 | \$ | 1.17 | \$ | 2.12 | 81.20% |
| 120 | 119 | 1/7/2021 | DDO | 33,448,000 | 327,297,000 | 124,142,000 | 1,585,293,340 | 26.94% | 2.64 | \$ | 12.77 | \$ | 31.45 | 146.28% |
| 121 | 120 | 1/8/2021 | SKT | 44,801,000 | 26,948,000 | 93,453,000 | 1,083,495,140 | 47.94% | 0.29 | \$ | 11.38 | \$ | 19.88% | 19.88% |
| 122 | 121 | 1/12/2021 | GEVO | 17,039,000 | 112,915,000 | 122,963,000 | 895,981,900 | 13.84% | 0.92 | \$ | 5.86 | \$ | 7.82 | 34.83% |
| 123 | 122 | 1/13/2021 | MAC | 80,840,000 | 20,327,000 | 149,472,000 | 1,861,915,840 | 53.55% | 0.14 | \$ | 12.47 | \$ | 15.10 | 21.09% |
| 124 | 123 | 1/14/2021 | BBBY | 76,181,000 | 203,543,000 | 121,215,000 | 3,170,984,400 | 62.83% | 1.88 | \$ | 26.16 | \$ | 47.73 | 82.45% |
| 125 | 124 | 1/14/2021 | SPWR | 43,347,000 | 101,462,000 | 170,159,000 | 5,647,577,210 | 23.47% | 0.80 | \$ | 33.19 | \$ | 54.99 | 65.68% |
| 126 | 125 | 1/14/2021 | CNK | 31,631,000 | 45,011,000 | 118,158,000 | 2,152,838,760 | 26.77% | 0.38 | \$ | 18.22 | \$ | 23.58 | 29.42% |
| 127 | 126 | 1/14/2021 | SFIX | 19,815,000 | 44,205,000 | 62,902,000 | 4,544,040,480 | 31.50% | 0.70 | \$ | 72.24 | \$ | 113.76 | 57.48% |
| 128 | 127 | 1/19/2021 | GEVO | 13,489,000 | 149,739,000 | 122,965,000 | 936,993,300 | 16.97% | 1.22 | \$ | 7.62 | \$ | 11.68 | 53.28% |
| 129 | 128 | 1/19/2021 | HSIC | 24,104,000 | 35,466,000 | 69,747,000 | 1,775,888,800 | 24.38% | 0.36 | \$ | 17.96 | \$ | 21.93 | 22.10% |
| 130 | 129 | 1/19/2021 | VISL | 3,645,000 | 59,228,000 | 20,879,000 | 48,021,700 | 17.46% | 2.84 | \$ | 2.30 | \$ | 3.02 | 31.30% |
| 131 | 130 | 1/19/2021 | SAVA | 5,457,000 | 24,090,000 | 34,954,000 | 454,052,460 | 15.61% | 0.69 | \$ | 12.99 | \$ | 26.58 | 58.43% |
| 132 | 131 | 1/19/2021 | MGNI | 14,308,000 | 22,956,000 | 111,959,000 | 3,750,626,500 | 12.78% | 0.21 | \$ | 33.50 | \$ | 40.20 | 20.05% |
| 133 | 132 | 1/19/2021 | PEI | 10,946,000 | 32,955,000 | 79,537,000 | 131,236,050 | 13.76% | 0.41 | \$ | 1.65 | \$ | 2.93 | 77.58% |
| 134 | 133 | 1/20/2021 | VUZI | 7,358,000 | 36,586,000 | 42,719,000 | 474,608,090 | 17.22% | 0.86 | \$ | 11.11 | \$ | 16.34 | 47.07% |
| 135 | 134 | 1/21/2021 | SHIP | 9,974,000 | 81,849,000 | 75,346,000 | 79,113,300 | 13.24% | 1.09 | \$ | 1.05 | \$ | 1.52 | 44.76% |
| 136 | 135 | 1/21/2021 | CRBP | 16,246,000 | 41,493,000 | 84,037,000 | 166,393,260 | 15.33% | 0.49 | \$ | 1.98 | \$ | 2.48 | 25.76% |
| 137 | 136 | 1/22/2021 | GME | 61,782,000 | 97,015,000 | 149,472,000 | 2,257,027,200 | 92.54% | 0.65 | \$ | 15.10 | \$ | 25.99 | 72.12% |
| 138 | 137 | 1/22/2021 | EXPR | 7,220,000 | 435,902,000 | 64,948,000 | 128,597,040 | 11.12% | 6.71 | \$ | 1.98 | \$ | 4.72 | 138.36% |
| 139 | 138 | 1/22/2021 | COLS | 4,888,000 | 4,134,000 | 33,749,000 | 210,591,780 | 12.25% | 0.14 | \$ | 6.24 | \$ | 9.20 | 47.44% |
| 140 | 139 | 1/23/2021 | VYRT | 33,243,000 | 257,045,000 | 109,489,000 | 1,032,292,670 | 30.37% | 2.35 | \$ | 9.43 | \$ | 24.90 | 164.05% |
| 141 | 140 | 1/25/2021 | SPCE | 38,600,000 | 164,560,000 | 234,342,000 | 6,494,897,500 | 16.47% | 0.70 | \$ | 36.25 | \$ | 59.43 | 63.45% |
| 142 | 141 | 1/25/2021 | ROAD | 10,311,000 | 28,457,000 | 55,224,000 | 1,239,778,800 | 18.67% | 0.52 | \$ | 22.45 | \$ | 32.48 | 44.68% |
| 143 | 142 | 1/25/2021 | GRPX | 12,811,000 | 29,199,000 | 43,925,000 | 2,173,848,250 | 29.17% | 0.88 | \$ | 49.49 | \$ | 59.67 | 20.67% |
| 144 | 143 | 1/25/2021 | BYND | 15,436,000 | 46,430,000 | 62,656,000 | 9,226,096,000 | 24.64% | 0.74 | \$ | 147.25 | \$ | 227.50 | 54.50% |
| 145 | 144 | 1/25/2021 | MAC | 79,540,000 | 97,015,000 | 149,472,000 | 2,257,027,200 | 92.54% | 0.65 | \$ | 15.10 | \$ | 25.99 | 72.12% |
| 146 | 145 | 1/25/2021 | AKBA | 28,817,000 | 105,619,000 | 144,539,000 | 498,659,550 | 19.94% | 0.73 | \$ | 3.45 | \$ | 5.19 | 50.43% |
| 147 | 146 | 1/26/2021 | GME | 61,782,000 | 271,983,000 | 69,747,000 | 11,099,537,580 | 88.58% | 3.90 | \$ | 159.14 | \$ | 385.00 | 141.93% |
| 148 | 147 | 1/26/2021 | WKHS | 33,677,000 | 126,708,000 | 120,529,000 | 3,790,637,050 | 27.94% | 1.05 | \$ | 31.45 | \$ | 40.45 | 28.62% |
| 149 | 148 | 1/26/2021 | WWR | 3,414,000 | 42,543,000 | 19,022,000 | 144,567,200 | 17.95% | 2.24 | \$ | 7.60 | \$ | 9.15 | 20.39% |
| 150 | 149 | 1/27/2021 | NAKD | 31,256,000 | 3,466,365,000 | 96,310,000 | 57,786,000 | 32.43% | 35.99 | \$ | 0.60 | \$ | 3.63 | 505.00% |
| 151 | 150 | 1/28/2021 | REI | 9,065,000 | 54,926,000 | 81,669,000 | 102,068,250 | 11.10% | 0.67 | \$ | 1.25 | \$ | 1.75 | 40.00% |
| 152 | 151 | 2/1/2021 | CRBP | 14,688,000 | 36,956,000 | 84,037,000 | 209,252,110 | 17.48% | 0.44 | \$ | 2.49 | \$ | 3.09 | 24.10% |
| 153 | 152 | 2/1/2021 | SAVA | 5,983,000 | 78,696,000 | 34,954,000 | 828,409,800 | 17.11% | 2.25 | \$ | 23.70 | \$ | 74.50 | 214.33% |
| 154 | 153 | 2/3/2021 | ARTL | 1,903,000 | 66,883,000 | 15,712,000 | 19,482,880 | 12.11% | 4.26 | \$ | 1.24 | \$ | 2.84 | 129.05% |
| 155 | 154 | 2/3/2021 | AZES | 5,087,000 | 426,784,000 | 62,679,000 | 64,559,370 | 8.12% | 6.81 | \$ | 1.03 | \$ | 2.19 | 112.62% |
| 156 | 155 | 2/2/2021 | MGNI | 12,695,000 | 23,576,000 | 111,959,000 | 4,500,751,800 | 11.34% | 0.21 | \$ | 40.20 | \$ | 58.50 | 45.52% |
| 157 | 156 | 2/3/2021 | SAVE | 12,755,000 | 101,498,000 | 97,678,000 | 2,734,007,220 | 13.06% | 1.04 | \$ | 27.99 | \$ | 39.54 | 41.26% |
| 158 | 157 | 2/3/2021 | KERN | 1,849,000 | 35,881,000 | 21,597,000 | 158,953,920 | 8.56% | 1.86 | \$ | 7.36 | \$ | 10.44 | 41.83% |
| 159 | 158 | 2/3/2021 | MVIS | 22,508,000 | 130,680,000 | 146,406,000 | 1,425,994,440 | 15.37% | 0.89 | \$ | 9.74 | \$ | 16.19 | 66.22% |
| 160 | 159 | 2/4/2021 | ATOS | 9,201,000 | 126,378,000 | 71,574,000 | 282,717,300 | 12.86% | 1.77 | \$ | 5.55 | \$ | 4.98 | 26.08% |
| 161 | 160 | 2/4/2021 | AMHS | 23,909,000 | 22,440,000 | 229,211,000 | 2,920,786,310 | 9.99% | 0.69 | \$ | 12.21 | \$ | 17.19 | 40.79% |
| 162 | 161 | 2/4/2021 | TDC | 165,780,000 | 51,034,000 | 109,300,000 | 3,694,340,000 | 15.17% | 0.47 | \$ | 33.80 | \$ | 59.58 | 76.72% |
| 163 | 162 | 2/5/2021 | VISL | 4,048,000 | 321,895,000 | 27,459,000 | 98,028,630 | 14.74% | 4.44 | \$ | 3.57 | \$ | 4.90 | 37.25% |
| 164 | 163 | 2/5/2021 | WWR | 4,488,000 | 49,278,000 | 19,022,000 | 174,051,300 | 23.59% | 2.59 | \$ | 9.15 | \$ | 11.45 | 25.14% |
| 165 | 164 | 2/6/2021 | MARIA | 10,467,000 | 161,047,000 | 63,634,000 | 1,853,022,080 | 16.45% | 2.53 | \$ | 29.12 | \$ | 41.20 | 41.48% |
| 166 | 165 | 2/6/2021 | RIOA | 11,814,000 | 105,328,000 | 67,530,000 | 1,977,278,400 | 17.49% | 1.56 | \$ | 29.28 | \$ | 41.88 | 43.03% |
| 167 | 166 | 2/6/2021 | ITP | 6,151,000 | 94,489,000 | 28,536,000 | 28,536,000 | 21.56% | 3.31 | \$ | 1.00 | \$ | 1.45 | 45.00% |
| 168 | 167 | 2/8/2021 | RKDA | 1,962,000 | 23,111,779 | 21,338,000 | 76,140,960 | 9.20% | 1.08 | \$ | 3.57 | \$ | 3.85 | 63.87% |
| 169 | 168 | 2/9/2021 | ACD | 23,886,000 | 254,656,000 | 184,191,000 | 2,983,894,200 | 14.05% | 1.38 | \$ | 16.20 | \$ | 22.35 | 37.96% |
| 170 | 169 | 2/9/2021 | CTRM | 35,672,000 | 116,751,000 | 364,462,000 | 4,009,082,000 | 9.79% | 0.32 | \$ | 11.00 | \$ | 16.70 | 51.82% |
| 171 | 170 | 2/10/2021 | TMBR | 1,536,000 | 71,432,000 | 12,032,000 | 25,628,160 | 12.77% | 5.94 | \$ | 2.13 | \$ | 3.15 | 47.89% |
| 172 | 171 | 2/11/2021 | SHIP | 9,080,000 | 172,154,000 | 75,346,000 | 114,525,920 | 12.05% | 2.29 | \$ | 1.52 | \$ | 2.09 | 37.50% |
| 173 | 172 | 2/12/2021 | VUZI | 6,036,000 | 55,984,000 | 54,073,000 | 883,552,820 | 11.16% | 1.04 | \$ | 16.34 | \$ | 24.44 | 49.57% |
| 174 | 173 | 2/18/2021 | COLS | 3,307,000 | 36,039,000 | 33,749,000 | 310,490,800 | 9.80% | 1.07 | \$ | 9.20 | \$ | 14.81 | 60.98% |
| 175 | 174 | 2/19/2021 | SABR | 61,361,000 | 204,628,000 | 317,297,000 | 4,226,394,040 | 19.34% | 0.64 | \$ | 13.12 | \$ | 17.00 | 27.63% |
| 176 | 175 | 3/1/2021 | SBH | 14,895,000 | 23,936,000 | 112,814,000 | 1,939,272,660 | 13.20% | 0.21 | \$ | 17.19 | \$ | 21.91 | 27.46% |
| 177 | 176 | 3/2/2021 | RKT | 39,658,000 | 411,906,000 | 113,373,000 | 2,819,718,120 | 34.37% | 3.57 | \$ | 24.44 | \$ | 44.39 | 81.83% |
| 178 | 177 | 3/3/2021 | TMST | 5,744,000 | 6,957,000 | 45,175,000 | 430,969,500 | 12.71% | 0.15 | \$ | 9.54 | \$ | 12.99 | 25.79% |
| 179 | 178 | 3/11/2021 | TMBR | 2,386,000 | 147,978,000 | 12,032,000 | 37,900,800 | 19.83% | 12.30 | \$ | 3.15 | \$ | 3.75 | 15.05% |
| 180 | 179 | 3/18/2021 | VUZI | 6,703,000 | 51,865,000 | 57,887,000 | 1,509,692,960 | 11.58% | 0.90 | \$ | 26.08 | \$ | 30.88 | 18.40% |
| 181 | 180 | 3/18/2021 | SLGG | 3,201,000 | 47,707,000 | 21,408,000 | 181,507,200 | 14.81% | 2.21 | \$ | 8.40 | \$ | 11.20 | 33.33% |
| 182 | 181 | 3/26/2021 | ATNF | 41,699,000 | 18,032,000 | 18,032,000 | 138,305,440 | 12.82% | 2.42 | \$ | 7.67 | \$ | 14.75 | 92.31% |
| 183 | 182 | 4/6/2021 | TMST | 6,241,000 | 24,043,000 | 45,802,000 | 570,025,000 | 13.69% | 0.53 | \$ | 12.50 | \$ | 15.50 | 24.00% |
| 184 | 183 | 4/26/2021 | MVIS | 31,423,000 | 372,116,000 | 157,592,000 | 3,151,840,000 | 19.94% | 2.36 | \$ | 20.00 | \$ | 31.14 | 55.70% |
| 185 | 184 | 5/12/2021 | CRIS | 11,159,000 | 60,062,000 | 91,519,000 | 1,201,644,470 | 12.19% | 0.66 | \$ | 13.13 | \$ | 17.40 | 32.52% |
| 186 | 185 | 5/18/2021 | SM | 11,857,000 | 47,662,000 | 117,789,000 | 2,296,885,500 | 10.07% | 0.40 | \$ | 19.50 | \$ | 24.79 | 27.13% |
| 187 | 186 | 5/27/2021 | AMC | 94,577,000 | 1,366,145,000 | 450,280,000 | 11,617,224,000 | 21.00% | 3.03 | \$ | 25.80 | \$ | 36.72 | 42.33% |
| 188 | 187 | 5/28/2021 | LEDS | 557,000 | 39,412,000 | 4,058,000 | 54,539,520 | 13.73% | 9.71 | \$ | 13.44 | \$ | 18.27 | 35.94% |
| 189 | 188 | 6/1/2021 | AMC | 101,303,000 | 1,275,156,000 | 450,280,000 | 16,534,281,600 | 22.50% | 2.83 | \$ | 36.72 | \$ | 72.62 | 97.77% |
| 190 | 189 | 6/15/2021 | REI | 13,566,000 | 41,354,000 | 99,276,000 | 289,182,780 | 13.66% | 0.41 | \$ | 2.51 | \$ | 3.11 | 23.90% |
| 191 | 190 | 6/17/2021 | PEI | 11,371,000 | 37,226,000 | 79,280,000 | 166,446,000 | 14.33% | 0.47 | \$ | 2.10 | \$ | 3.42 | 62.80% |
| 192 | 191 | 6/2/2021 | UONE | 872 | | | | | | | | | | |

REFERENCES

Beers, B. (2021, September 8). *Short Selling Basics*. Investopedia. Retrieved April 18, 2022, from <https://www.investopedia.com/articles/investing/100913/basics-short-selling.asp>

Bessembinder, H., & Chan, K. (1998). Market Efficiency and the Returns to Technical Analysis. *Financial Management*, 27(2), 5-17. Retrieved March 5, 2021, from <http://www.jstor.org/stable/3666289>

Blume, L., Easley, D., & O'Hara, M. (1994). Market Statistics and Technical Analysis: The Role of Volume. *The Journal of Finance*, 49(1), 153-181. doi:10.2307/2329139

Chen, J. (2022, March 1). *Shares Outstanding*. Investopedia. Retrieved March 1, 2022, from <https://www.investopedia.com/terms/o/outstandingshares.asp>

Davis, C. (2021, March 22). 14 Best Online Brokers for Free Stock Trading of April 2021. Retrieved from <https://www.nerdwallet.com/best/investing/free-stock-trading>

Douglas J. Jordan, & Diltz, J. (2003). The Profitability of Day Traders. *Financial Analysts Journal*, 59(6), 85-94. Retrieved April 5, 2021, from <http://www.jstor.org/stable/4480531>

Downey, L. (2021, April 02). Efficient Market Hypothesis (EMH). Retrieved from

Anatomy of the Short Squeeze: Using Technical and Statistical Analysis to Forecast Price Volatility
Honors Thesis for Gianni Demerski

<https://www.investopedia.com/terms/e/efficientmarkethypothesis.asp>

Gao, L., Han, Y., Li, S. Z., & Zhou, G. (2018). Market intraday momentum. *Journal of Financial Economics*, 129(2), 394-414. doi:10.1016/j.jfineco.2018.05.009

Greenwood, R. (2006, July 05). Float Manipulation and Stock Prices. Retrieved from <https://hbswk.hbs.edu/item/float-manipulation-and-stock-prices>

Greifeld, K., & Wang, L. (2021, February 1). GameStop Short Interest Plunges in Sign Traders Are Covering. Retrieved from <https://www.bloomberg.com/news/articles/2021-02-01/gamestop-short-interest-plummets-in-a-sign-traders-are-covering>

Guimaraes, B., & Pannella, P. (2021). Short-squeeze bubbles. *SSRN Electronic Journal*. doi:10.2139/ssrn.3797556

Jones, C., Kaul, G., & Lipson, M. (1994). Transactions, Volume, and Volatility. *The Review of Financial Studies*, 7(4), 631-651. Retrieved March 5, 2021, from <http://www.jstor.org/stable/2962246>

Keim, D. B., & Madhavan, A. (2000, March 07). Anatomy of the trading process: empirical evidence on the behavior of institutional traders. Retrieved from

Anatomy of the Short Squeeze: Using Technical and Statistical Analysis to Forecast Price Volatility
Honors Thesis for Gianni Demerski

<https://www.sciencedirect.com/science/article/pii/S0304405X94007997>

Kuepper, J. (2021, January 28). An Introduction to Day Trading. Retrieved from

<https://www.investopedia.com/articles/trading/05/011705.asp>

Lee, E., Park, K.S., & Jang, H. (2007). How Profitable is Day-trading?: A Study on

Day-trading in Korean Stock Market *. *Asia-pacific Journal of Financial Studies*,
36, 351-385.

Locke, P. R., & Mann, S. C. (2005). Professional trader discipline and trade disposition.

Journal of Financial Economics, 76(2), 401-444. doi:10.1016/j.jfineco.2004.01.004

Mitchell, C. (2021, March 04). Floating Stock Definition and Example. Retrieved from

<https://www.investopedia.com/terms/f/floating-stock.asp>

Mitchell, C. (2021, January 28). Short Interest Definition and Uses. Retrieved from

<https://www.investopedia.com/terms/s/shortinterest.asp>

Mitchell, C. (2021, March 08). Short Squeeze. Retrieved from

<https://www.investopedia.com/terms/s/shortsqueeze.asp>

Park, C., & Irwin, S. H. (2004). The Profitability of Technical Analysis: A Review. *SSRN*

Anatomy of the Short Squeeze: Using Technical and Statistical Analysis to Forecast Price Volatility
Honors Thesis for Gianni Demerski

Electronic Journal. doi:10.2139/ssrn.603481

Seth, S. (2021, February 12). Technical Analysis Strategies for Beginners. Retrieved from <https://www.investopedia.com/articles/active-trading/102914/technical-analysis-strategies-beginners.asp>

Switzer, L. N. (2011). Erratum to ‘The Behaviour of Small Cap vs. Large Cap Stocks in Recessions and Recoveries: Empirical Evidence for the United States and Canada’. *SSRN Electronic Journal.* doi:10.2139/ssrn.1937407

Twin, A. (2021, March 12). What Is Volume of Trade? Retrieved from <https://www.investopedia.com/terms/v/volumeoftrade.asp>

Zhang, L. (2011). Too Good to Ignore? A Primer on Listed Penny Stocks. *SSRN Electronic Journal.* doi:10.2139/ssrn.1968678

Zucchi, K. (2020, September 16). Institutional Traders vs. Retail Traders: What's the difference? Retrieved from <https://www.investopedia.com/articles/active-trading/030515/what-difference-between-institutional-traders-and-retail-traders.asp>