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Naked Shorting on ETFs in the Modern Economy

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ABSTRACT

Executionary naked shorting, or cellar boxing, is a form of manipulation found within the stock market. To combat naked shorting, the SEC adopted Regulation SHO. Regulation SHO also includes the threshold list which publishes the securities that have an excessive amount of fails. Exchange-traded funds are relatively new securities that trade like stocks. Richard Evans, University of Virginia, (2019) found that around 1% of ETFs are failing at any given time. Additionally, many ETFs are always found on the threshold list. This study analyzes the effects naked shorting has on ETF behavior during a recessionary and calm period. A data analysis was performed on the Regulation SHO threshold list appearances and the French-Fama-Carhart 4 Factor Model was used on the ETFs with the most severe naked shorting cases. The ETF market was affected by the recession, but I found that it recovered very quickly. Additionally, the FFC 4 Factor model revealed that momentum was neither negative nor significant, indicating that cellar boxing does not take place in the modern ETF market. The FFC 4 Factor model also revealed that the only consistently significant factor was the market risk premium, indicating that ETFs fail simply because of the market conditions. I show how executionary naked shorting is not pervasive in the modern ETF market.

Introduction

Naked short selling has been a hot topic in the financial world for years as another form of manipulation present in the market. Even the earliest economies experienced manipulation through bull and bear models. In the second century BC, Roman playwright T. Maccius Plautus identified two types of investors in the economy: 'mere puffers' and 'impudent, talkative, malevolent fellows' (Moffett et al., 2012). Plautus simply observed a form of bulls and bears. Bear pools continued to operate in the Amsterdam and London Stock Exchanges during the seventeenth and eighteenth centuries. Manipulators timed their bear raids to exert maximum selling pressure and attract free riders to guarantee profits. Shorting became so intense in the London Stock Exchange that the British parliament was forced to outright ban short selling (Bernheim and Schneider, 1935). These economies witnessed the brutal effects manipulation and illegal shorting can have on the market overall.

Though manipulative short selling can be damaging to the economy, short selling cannot be banned. It is often the scapegoat during a downturn in the market cycle but is essential in keeping efficient capital markets. It facilitates keeping securities at their intrinsic value, contributes to liquidity, and positively impacts corporate governance (Committee on Capital Markets Regulation, 2018). To keep the market objective, participants need the ability to take a positive or negative approach. Diamond and Verrecchia (1987) exemplify the importance of short selling by comparing security purchases/sales to voting yes or no on a referendum. When the voter can vote "yes" or "no," an unbiased result is achieved. If they are constrained to only vote "yes" or not at all, then there will be an upward bias in favor of the "yes" voters. When stocks can be shorted, they stay at their intrinsic value more consistently. When shorting is restricted, arbitrage opportunities are eliminated causing prices to inflate (Guimaraes & Pannella, 2021) (Kocherlakota, 1992). As shown, shorting is essential to all economies.

As time has passed and technology has improved, the bear and bull model remains in today's market. The bears now participate in naked shorting. The SEC defines naked shorting as "selling short without borrowing the necessary securities to make delivery, thus potentially resulting in a "fail to deliver" securities to the buyer" (SEC, 2003b). Naked shorting is a problem that arose recently, with it not being publicly acknowledged until 2003 after the estimated proceeds exceeded $100 billion (Moffett et al., 2012). Because the shares fail to deliver, the price never slightly increases, therefore enabling cellar boxing. The SEC designed Regulation SHO to prevent naked shorting, but research has found it ineffective in ending this behavior. As there has been no further legislation, naked shorting is still a relevant concern, especially during recessionary periods. An immense amount of research exists regarding naked shorting on stocks, but almost none exists regarding naked shorting on exchange-traded funds.

Due to the lack of information on naked shorting on ETFs, the question driving this research study is "Does executionary naked shorting and cellar boxing on ETFs cause risk in the modern economy?"

Literature Review

Naked Short Selling

To begin, it is important to note that borrowing shares, in general, is costly. John D. Finnerty, a professor of finance at Fordham University, discusses this in his study on naked shorting. The Internal Revenue Code taxes all profits from short sales at the short-term capital gains rate. There is also the additional risk of a short squeeze (Finnerty, 2005). In most stock-loan agreements, the loan must be repaid on demand, so if the lender demands the shares to be returned, the borrower could be forced to repurchase the shares in the open market. The shares can be especially expensive if the stock is thinly traded or if other short-sellers are trying to close their positions (Finnerty, 2005). Frank and Jagannathan (1998) add that stock loan agreements require the borrower to reimburse the lender in full for any dividends or other distributions, which increases the cost of shorting. In Finnerty's model, he analyzes how the cost influences if a pooling or separating equilibrium exists. In both situations, naked shorting can be used to maximize profit.

If not regulated, naked shorting can severely depress a stock below its intrinsic value. Essentially, when naked shorting, the seller does not borrow or locate borrow shares before selling them and instead sells shares that do not exist (sometimes referred to as 'phantom shares'). This is possible because in the case of a FTD (fail to deliver), the buyer's broker creates a 'marker' in the account and the stock shows up as being owned by the buyer (Moffett et al., 2012). When phantom shares are involved, the buyer is unaware that his shares were naked shorted. This also causes voting rights issues, as there can be more votes cast than exist (SEC, 2003b). Naked shorting can destabilize a company's share price with its intense downward pressure, cellar boxing them in extreme cases. The manipulator's goal is to drive the price as low as possible to maximize profits.

Further, the manipulator must stay hidden to maximize profits. This is evident in Finnerty's naked shorting model. When short sellers fail to deliver after T+3 days, they are recorded by the DTCC as a FTD. To be successful in naked shorting, the active traders and uninformed traders must be unaware of its presence. If they detect manipulation, they will flee the market and remove a strong source of short sales to enhance the negative momentum (Finnerty, 2005). While trading, the uninformed traders gain market information via the informed trader's (or manipulator's) actions, so the uninformed traders can be used as pawns when the manipulator's presence is hidden. When the manipulator naked shorts, the price decreases, adjusting the volume and volatility. The uninformed investors observe this and decide to also short the stock, thinking it is overvalued. Desai et al. (2002) agree with Finnerty's model by stating that the manipulator can depress the price to reduce the market value of the firm's float and discourage the informed investor and active traders from trading the

stock, also intensifying downward pressure. The manipulator fully takes advantage of the other traders to decrease the price as much as possible.

Additionally, the manipulator must naked short as close to zero as possible to maximize profits. This is known as cellar boxing. When the stock price gets too low, the company is forced into liquidation, allowing the manipulator to cover his position at zero cost (House Report, 1991). Therefore, the manipulator's incentive is to drive the firm's share price as close to zero as possible by extending his FTD or by rolling over the naked short position (Finnerty, 2005). If the firm is driven to bankruptcy, the manipulator will be relieved of its obligation to cover the short position. To do so, a mass amount of naked shorting needs to take place, potentially exceeding the firm's outstanding shares. The manipulator is willing to become a large trader, an investor whose trades change prices, and take a massive naked short position on the stock (Jarrow, 1992). When the price reaches the floor price ($0.0001), securities are delisted and transferred to a new market, such as the OTCBB and Pink Sheets. These over-the-counter markets facilitate naked shorting since the NASD's bid test restriction does not apply (Moffett et al., 2012) (SEC, 2003b). Without this regulation, it is very easy to naked short the firm into liquidation. To maximize profits, the manipulator cellar boxes the security until it's delisted and then drives it to bankruptcy.

In 1938, the newly formed SEC adopted the Uptick Rule to combat severe shorting (Ziegler & Truitt, 2011). The rule only allows shorting when a stock is on the uptick to prevent aggressive bear raids and extreme cases of cellar boxing. After the uptick rule, there were no short-selling regulations added until January 3rd, 2005, when the SEC adopted Regulation SHO (SEC, 2003b). Regulation SHO prohibits the broker-dealer from accepting a short sale order unless it has arranged to borrow or believes it will be able to borrow the security before the settlement date. They also must complete a bona-fide borrowing arrangement before selling a 'threshold security' (Finnerty, 2005). With these rules, Regulation SHO attempts to diminish the obscene amount of FTDs by requiring the borrowing or locating of a proper security. Prior to SHO, there was no acknowledgment of the existence and dangers of naked shorting. Brokers were able to delay the delivery of the securities almost indefinitely by passing FTDs to other brokers. Now, delivery failures must be fully closed by the 13th day, but there are no penalties or enforcement provisions if they do not close within that time (Ziegler & Truitt, 2011) (Moffett et al., 2012). After the uptick rule was dropped in 2007 and the market meltdown in 2008, the SEC added Rule 204T which required immediate closures of all transactions by the 4th day. It had overnight success by reducing the volume of FTDs by 60% (Ziegler & Truitt, 2011). Even with SHO, a reinstatement of the uptick rule was requested by many. So, the SEC approved a modification aimed at preventing short selling from further pushing down a firm's stock price if the price has already dropped more than 10% in a day (Committee on Capital Markets Regulation, 2018). Yet, even with the extended legislation put forth by the SEC, naked shorting continues to persist.

A key piece of Regulation SHO is the threshold list. It was created to identify companies that had potentially been naked shorted, requiring each self-regulatory organization to publish a list of the securities with a significant FTD problem daily. To qualify for the list, a security must have at least 10,000 aggregate shares failing to deliver and fails for at least 0.5% of the shares outstanding for five consecutive settlement days (Finnerty, 2005) (Moffett et al., 2012). If a security meets those requirements, it is published on the list for the public to view.

Moffett et al. (2012) completed a study on the efficacy of SHO and found significant evidence that Regulation SHO has been ineffective in reducing the naked short positions of the threshold list stocks. They also found little support from their regressions and non-parametric tests that an extended appearance on the list had an impact on the security's trading over the 100-day post-SHO window. Essentially, they found that Regulation SHO is ineffective in reducing naked shorting.

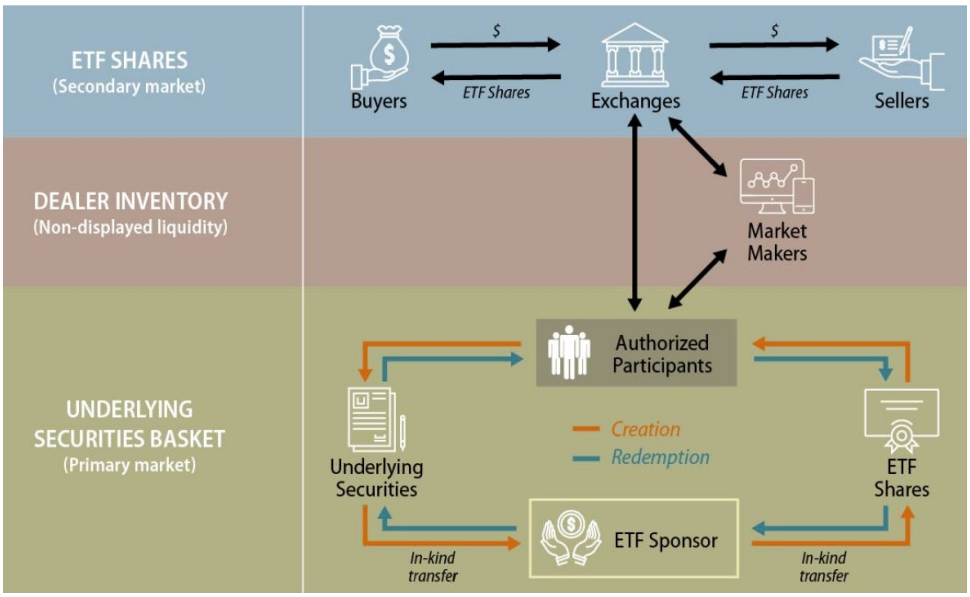
The governing body in charge of monitoring naked shorting in the market is the National Securities Clearing Corporation, a branch of the DTCC. When someone naked shorts, their broker fails to deliver the shares to its clearing firm, which fails to deliver shares to the NSCC by the trade settlement date. Since their

side of the trade doesn't settle with the NSCC, the fail is recorded (Finnerty, 2005). When a fail is registered with the NSCC, they can wait another day for the seller to deliver, use the stock borrow program, demand a dealer buy-in, buy the shares in the open market and charge the cost to the seller, or demand the seller break the trade and compensate for the associated cost (NSCC, 2003). Yet, many studies such as Finnerty, Moffett et al., and Ziegler and Truitt, show how naked shorting persists in the previous 20 years. Due to the lack of recent literature, the current pervasiveness of naked shorting is unknown.

Exchange-Traded Funds

Exchange-traded funds, or ETFs, are a basket of securities that are traded on an exchange. They are fairly new, only being invented in 1993, and have already become a significant factor in the economy. In 2019, ETFs represent more than 30% of the daily trading volume in US stock markets on average and almost all of the 25 largest asset managers in the US offer ETF plans (Pagano et al., 2019) (Ballentine and Maglione, 2021). ETFs have become a significant piece of the market and have grown rapidly in recent years, especially since the 2008 financial crisis. After the crash, investors became less trusting of money managers and gravitated towards largely passive and transparent ETFs (Ballentine & Maglione, 2021). Total ETF AUM grew from $0.5 trillion in 2008 to over $3 trillion by the end of 2017 (Ockham's Notebook, 2019). ETFs are a significant factor in the market, as most people are attracted to their low cost, high liquidity, and reputation for being a safe instrument. Even though ETF growth appears to be positive, its newness provides unknown risk. Evans studied the operational and naked shorting of ETFs, but the 2020 recession had still not occurred at that time. There is no further research showing how the recession affected the ETF market, so the risks remain unknown.

It is important to note the structure of ETFs to truly understand the market risks they possess. The Congress Research Service provides this graphic displaying the creation and redemption process.



In a typical creation process, the ETF sponsor publishes a list of ETF securities in a basket. Authorized participants then assemble and deliver the basket to the sponsor in exchange for the new ETF shares. The AP can sell the new ETF in the open market. The redemption process is the reverse. The ETF shares are sold to the APs in exchange for the basket of underlying securities or a cash equivalent (Investment Company Institute, 2018). Essentially, the APs complete the trading in the primary market. In the secondary market, market makers are broker-dealers that provide liquidity and ensure continuous and efficient trading by giving two-sided quotes

(Blackrock). The supply of ETF shares is flexible, so they can be created and redeemed in correspondence to the demand in the market as long as sufficient underlying exists.

APs are important to the function of ETFs, so the market will suffer if they leave. Instead of receiving direct compensation from the fund sponsor, they profit from arbitrage when there is a deviation between the ETF's NAV and its secondary market price (Pagano et al., 2019). Thus, in a down market, APs could decide not to engage in ETF redemptions (Autorité des marchés financiers, 2017). During times of financial stress, the prices of the ETF deviate significantly from their underlying, removing the incentive and/or capacity for APs to realign ETF prices with those of the constituent securities. In some situations, the underlying can become so illiquid that the APs cannot perform arbitrage at all (Pagano et al., 2019). When there is a downturn in the market cycle, the deviation between the ETF and its underlying grows, lessening the AP's desire to stay involved. If the APs withdraw, the ETF can plummet and the market would face severe consequences.

The relationship between the ETF and its underlying plays a key role in the ETF ecosystem. One standard deviation increase in ETF ownership leads to a 16% increase in the standard deviation of the stock price (Ben-David et al., 2018). Additionally, Evans found that a dollar of trading in the ETF relates to $0.09 in the underlying (2019). Due to frequent arbitrage, the movements between the ETF and its underlying are dependent on one another, with some securities more at risk of overreacting than others. Pagano et al. (2019) find that when arbitrage exists, the demand shocks arising from such traders can increase the volatility of these securities and thus of the index underlying the ETF. On the contrary, Ben-David et al. (2018) provide evidence that ETFs have a causal impact on the volatility of the underlying because the arbitrage mechanism transmits noise trade shocks generated by ETF investors to the underlying securities. According to Ben-David, arbitrage protects against the volatility and price overreactions Evans and Pagano et al. detected in their studies. Additional conflicting evidence provided by Madhaven (2016) argues that, while ETF trading volumes are highly correlated with volatility, ETF trading does not necessarily lead to spillover effects to the underlying stocks. The exact relationship between the ETF and its underlying is in disagreement amongst experts, but evidence ensures that a significant relationship exists. Thus, in the case the ETF market faced disruptions, the underlying would also be affected.

Short interest has grown increasingly large for some ETFs, outnumbering the shares outstanding due to the shares being repeatedly lent out. They constitute around 20% of the short interest overall (Evans, 2019). Though these chains of sales can be long, the danger is minimal since every link requires full collateral to protect the position. This collateral gives the shares physical value and prevents investors from creating phantom shares. There is also no possibility of every owner trying to redeem their shares because the redemption of lent shares is banned (Kay, 2010). If the owner wants to redeem, the physical ETF is required. They could demand the ETF be returned, potentially causing a short squeeze, especially when shares are thinly traded in the open market. Although ETFs have collateral as a safety feature to prevent phantom shares, a risk of a short squeeze is present with high short interest.

ETFs are vital, so executionary manipulation can cause risk to the entire economy. Throughout the literature, Pagano et al. (2019) discuss numerous ways ETFs have systemic risk and can cause a complete market failure. The high liquidity and continuous trading of ETFs allow investors to take large short-term directional positions on entire asset baskets. These bets can eventually result in market crashes, and thus worsen the volatility of the index and the sensitivity of security prices. The structure of ETFs causes market risk when short-term positions are taken by large traders. If a large trader were to continuously fail to deliver without repercussions, the entire economy is at risk. This is also the additional risk of the APs fleeing if the market goes down. ETFs are essential to the function and operation of the current economy, so any disruptions would have devastating effects.

Research Gap

Though there is extensive research completed on the naked shorting of stocks, there is next to none on the naked shorting of ETFs. ETFs are traded like stocks, so it is completely possible. It is also unknown how ETFs will react during a recessionary period with tremendous amounts of FTDs. Richard Evans touched on ETF fails briefly during a presentation at the *Wharton School of Business*. At any time, 1% of ETFs are failing to deliver and they constitute over 78% of the dollar volume of fails (Evans, 2019). Additionally, the Regulation SHO threshold list always lists several ETFs. Clearly, there is some naked shorting on ETFs.

Even though there are still securities appearing on the list, there has not been any serious literature regarding naked shorting recently published. Instead, the internet is swamped with blog posts making claims about the market. One recent example is "Cellar Boxing — The Predatory Secret That Wall Street Uses to Exploit an Infinite Money Glitch in the Stock Market" by Quy Ma. He describes naked shorting as "fraudulent practices that Wall Street uses to take, steal, and profit off regular everyday people and businesses" (Ma, 2021). Ma believes he is informing the public that naked shorting is persistent and something Wall Street is trying to keep quiet. There has been no sound research completed in the previous 10 years, so it is unknown if naked shorting still persists in the market, let alone the ETF market. Ma also claims that GME and AMC were cellar boxed because the system allows fails to deliver without serious consequences (Ma, 2021). Ma fails to acknowledge that GME and AMC were just not of use to the public at that time. The information regarding naked shorting is very cloudy in the modern economy with immense uncertainty of the situations it occurs in.

Naked shorting has been shown by previous literature that it has devastating results, yet there is no research regarding the naked shorting of ETFs. The researcher plans on analyzing if naked shorting is persistent in the modern ETF market and if the ETFs face serious naked shorting issues during times of financial stress.

Methodology

The researcher completed a 2-part quantitative study using a data analysis and linear regression to analyze naked shorting in the ETF market. This paper differs from those by Finnerty (2005) and Moffett et al. (2012) by analyzing naked shorting strictly for ETFs on the NYSE Arca during different market periods. This is the first paper to my knowledge that documents Regulation SHO and linear regression information on exchange-traded funds.

The sample data was collected from the NYSE Arca (the primary ETF exchange) securities that appeared on the Regulation SHO threshold list during the two 60-day periods. Period A was the recessionary period, taking place from March 6th, 2020 to June 1st, 2020. Period B was the calm market period, taking place from November 3rd, 2021 to January 31st, 2022. Additionally, the ETFs needed to have proper data available on Yahoo Finance to be included in the study.

ETFs are traded on an exchange, like stocks, so the following hypotheses were composed based on the results of Moffett et al.'s study on the impact of Regulation SHO on stocks. Both Moffett et al. and this paper utilize the Regulation SHO threshold list for the respective securities as well as the Fama-French-Carhart 4 Factor Model. Due to the nature of a recessionary period, it was hypothesized that more ETFs are at risk of naked shorting.

Hypothesis 1*: There will be a significant increase of ETFs listed on the Regulation SHO threshold list during period A than in period B.*

Many sources such as Finnerty, Moffett et al., and Ziegler & Truitt displayed naked shorting as an action that destroyed firms and brought them near zero. Cellar boxing is a steep and devastating slope. So, it was hypothesized that the stocks had negative momentum. Because the ETFs from both periods appeared on the threshold list, they both should have had negative momentum. Additionally, Period A should have had more severe negative momentum than period B since period A existed in a pooling equilibrium. Finnerty's study explained that naked shorting is easier and more common during a pooling equilibrium, so it was hypothesized that the momentum will be more severe.

Hypothesis 2: *Period A and Period B will both experience negative momentum*

Hypothesis 3*: Period A will have more severe negative momentum since it took place during a recession.*

Regulation SHO Data Analysis

The Regulation SHO threshold list was created to analyze the stocks that had significant FTDs. To make the threshold list, the security must:

- Fail for 5 consecutive settlement days
- Have 10,000+ FTDs
- Have FTDs for at least 0.5% of shares outstanding

These limits were included to ensure that the threshold list only lists securities that had naked short positions. Because Regulation SHO listed the securities that were being naked shorted, an analysis of the Regulation SHO data provided how frequently firms were having naked shorting issues. The researcher gathered SHO data and organized it by ticker symbol to compare and contrast trends between the two periods, including the total number of companies to appear on the list per day.

The Fama-French-Carhart 4 Factor Model

The Fama-French-Carhart 4 Factor Model was based on the Fama-French 3 factor model, but with the addition of the 4th factor, cross-sectional momentum. This new factor, provided by Carhart, improved the model's explanatory factors (Breaking). Carhart executed his model on mutual funds, a similar security to ETFs (Carhart, 1997). The 4 factor model was chosen to determine if there is a momentum crash in period A and period B. Using data provided by Kenneth French and the Regulation SHO threshold list data, the researcher performed the FFC 4 factor model to properly analyze the momentum in each period. The ETFs included had to appear on the threshold list a minimum of 30 times to ensure the regression displayed the most serious naked shorted ETFs. The model is:

$$r_{i,t} = \alpha + \beta_1*(Mkt\text{-}RF_{i,t}) + \beta_2*(HML_{i,t}) + \beta_3*(SMB_{i,t}) + \beta_4*(MOM_{i,t}) + e_{i,t}$$

where:

$\mathbf{r_{i,t}}$	=	Expected Rate of Return
$\mathbf{Mkt\text{-}RF_{i,t}}$	=	Market Risk Premium Factor, difference between the return of the market and the risk free rate
$\mathbf{HML_{i,t}}$	=	Book to Market Factor, high minus low
$\mathbf{SMB_{i,t}}$	=	Size Factor, small minus big
$\mathbf{MOM_{i,t}}$	=	Momentum factor

The FFC 4 factor model compared the abnormal returns and independent variables provided by the model. The researcher used this model for the data set each period. After determining the coefficients and p-values, the significance of each variable was compared, giving the researcher insight of the significance of the market situation on naked shorted ETFs.

Analysis

Data Analysis

Table 1. Period A Company Appearance on the Regulation SHO Threshold List.

Minimum # of Days on the Threshold List	# of Companies
At least 13	96
At least 18	63
At least 25	32
At least 35	18
At least 45	6
At least 55	4
At least 60	1

This table displays the persistence of companies on the Reg SHO threshold list for period A. 227 companies appeared on the threshold list during this period. This table lists the number of companies that were on the list for a minimum number of days for each period. The data was provided by the NYSE Regulation SHO site.

As shown in Table 1, many companies appeared on the threshold list, especially for 13 days. Though, there is a significant decrease in appearances between 13, 18, and 25 days, revealing that the NSCC was successful in forcing mandatory closeouts. There was only one firm that appeared for all 60 days, XRT (SPDR S&P Retail ETF). It can be assumed that XRT had excess appearances due to the nature of the Covid-19 recession and not due to executionary naked shorting.

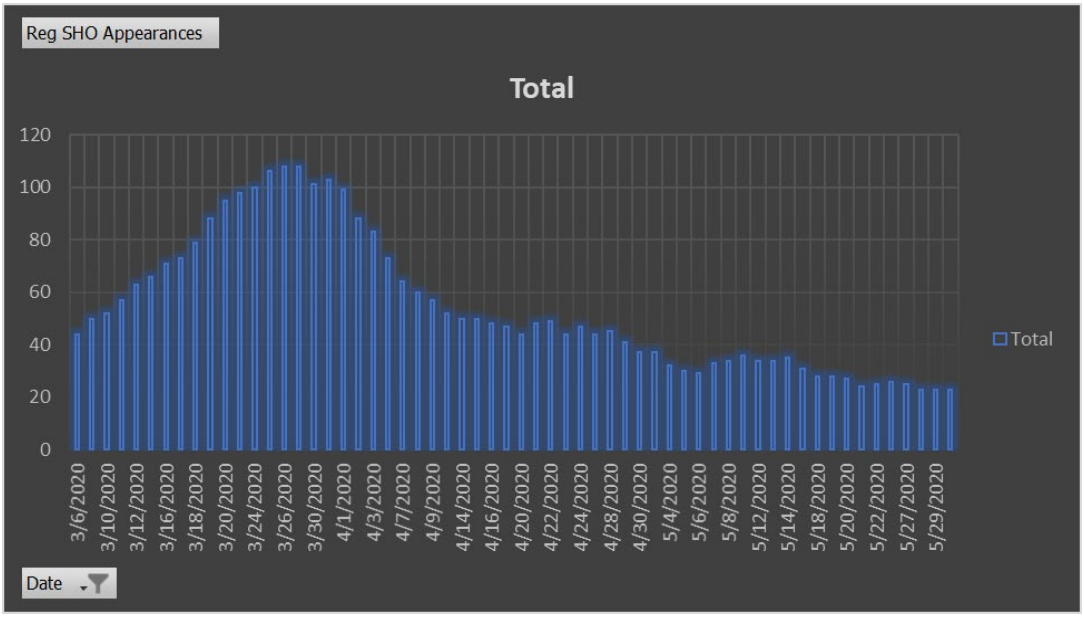


Figure 1. Number of ETFs appearing on the Reg SHO threshold list per day in Period A. Period A lasted from 3/6/2020 - 6/1/2020. The data was provided by the NYSE Regulation SHO site.

Figure 1 displays Regulation SHO data as well. Evidently, the number of companies appearing on the threshold list each day drastically increased, drastically decreased, and then subtly decreased back to a steady range. The appearances peaked on March 26th with 108. Though 108 is a large number of firms appearing on the list, there are over 8,000 US-listed securities on the NYSE Arca (NYSE). So, even during extreme market circumstances, the ETF market remained strong.

Table 2. Period B Company Appearance on the Regulation SHO Threshold List.

Minimum # of Days on the Threshold List	**# of Companies**
At least 13	31
At least 18	17
At least 25	6
At least 35	4
At least 45	2
At least 55	1
At least 60	0

This table displays the persistence of companies on the Reg SHO threshold list for period B. 119 companies appeared on the threshold list during this period. This table lists the number of companies that were on the list for a minimum number of days for each period. The data was provided by the NYSE Regulation SHO site.

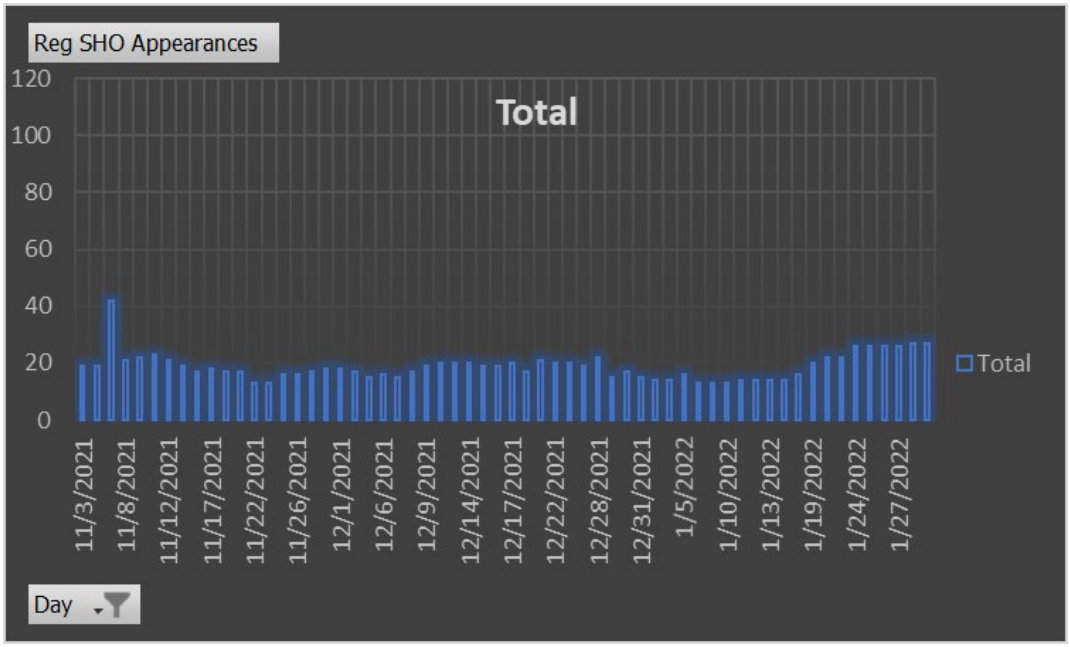


Figure 2. Number of ETFs appearing on the Reg SHO threshold list per day in Period B. Period B lasted from 11/3/2021 - 1/31/2021. The data was provided by the NYSE Regulation SHO site.

Table 2 and Figure 2 represent the appearances on the threshold list for Period B. It can be observed that the appearances remain constant and fairly minimal. Very few companies appeared on the list over 18 days, and almost zero appeared for more than 25 days. The data's range for appearances per day is only 13-27, excluding the single outlier of 42 on November 5th. This small range indicates that the ETF market remains free of cellar boxing.

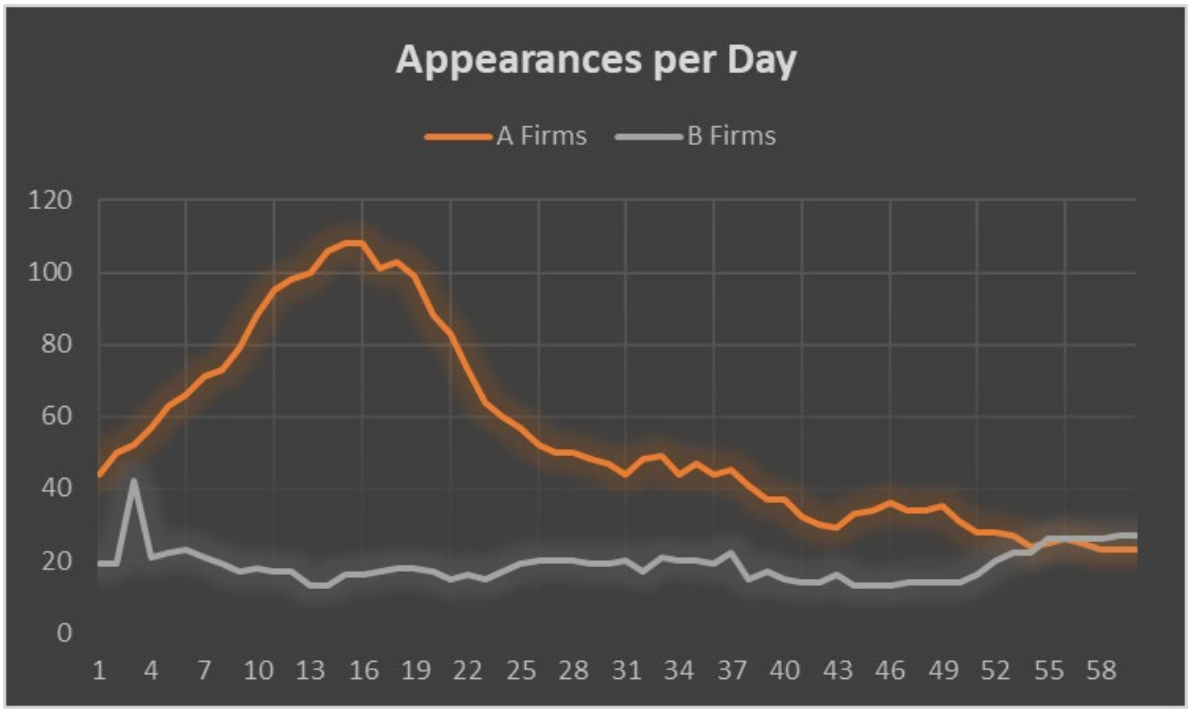


Figure 3. Appearances per day for each period. Figure 3 shows the total number of ETFs appearing on the Regulation SHO threshold list per day over the 60 day period for each group.

Finally, Figure 3 displays the number of appearances for both periods. Clearly, the ETF market was impacted by the recessionary climate in Period A, but the market recovered extremely quickly, returning to the constant line represented by period B. Figure 3 supports hypothesis 1 by revealing that period A did indeed have more ETFs listed on the Regulation SHO threshold list. But, this study also supports that ETFs are not severely impacted by recessions since the appearances did not increase to a severe amount and promptly returned to the "calm economy" range as the recession continued. The ETFs were impacted by the Covid-19 recession, but it is evident that they faced minimal effects and recovered rapidly. Therefore, ETFs do not pose risk to the economy.

French-Fama-Carhart 4 Factor Model

Table 3. FFC 4 Factor Model results for the Momentum coefficient for periods A and B.

Period A		**Period B**	
Negative MOM	Positive MOM	Negative MOM	Positive MOM
XRT JETS INDL OGIG SOXS PEJ EWW	JDST DUST AVUV EUM ONLN HDGE SCO DRIP CLIX MVV AAAU LABD SPDN	SOXS XRT	LABD TMF ALTL

Due to the intense cellar boxing many sources such as Finnerty (2005) and Moffett et al. (2012) describe, it was hypothesized in hypothesis 2 that both periods would consist of mostly negative momentum factors. Yet, the regression results completely disagree with the hypothesis during both periods. The negative and positive momentum factor ETFs are listed in table 3 above. In period A, only 35% of the ETFs had a negative coefficient for the momentum factor. In Period B, only 40% had a negative coefficient for the momentum factor. These ETFs had appeared on the Regulation SHO threshold list many times, essentially being the "worst of the worst" naked shorting cases. Yet, not even 50% of the cases in either period experienced a steep drop. This indicates that there is not a manipulator cellar boxing ETFs to zero. These results do not reflect the work of aggressive executionary naked shorting during either period.

Table 4. FFC 4 Factor Model results for the momentum factor for periods A and B.

Period A		**Period B**	
ETFs with significant momentum factors	ETFs with insignificant momentum factors	ETFs with significant momentum factors	ETFs with insignificant momentum factors
AVUV HDGE	XRT JDST DUST JETS SOXS EUM ONLN SCO DRIP CLIX PEJ EWW INDL MVV AAAU LABD SPDN OGIG	LABD SOXS	TMF ALTL XRT

Additionally, it was hypothesized in hypothesis 3 that period A's momentum would be more significant than period B's. This would mean that Period A would have a higher percentage of ETFs whose statistically significant momentum factor. The results from the regression do not support hypothesis 3 at all. The ETFs are displayed in table 4 for each period. Only 10% of the ETFs from period A and 40% from period B had momentum as a significant factor. Moreover, the significant momentum factors did not correlate with negative momentum coefficients. Overall, momentum is not significant during either period, suggesting that executionary naked shorting is not at work. If these ETFs were being cellar boxed, the momentum factor would be significant.

Table 5. FFC 4 Factor Model results for the Mkt-RF factor for periods A and B.

Period A		**Period B**	
ETFs with significant Mkt-RF factors	ETFs with insignificant Mkt-RF factors	ETFs with significant Mkt-RF factors	ETFs with insignificant Mkt-RF factors
XRT JDST JETS SOXS AVUV	DUST	LABD SOXS TMF ALTL XRT	

EUM ONLN HDGE SCO DRIP CLIX PEJ EWW INDL MVV AAAU LABD SPDN OGIG			

Though the FFC 4 factor model results do not support hypotheses 2 or 3, it does provide another interesting finding. As shown on table 5, every ETF's Mkt-RF (except for DUST in Period A) is statistically significant. No other independent variable was significant nearly this much. The Mkt-RF is the market risk premium (market return - risk-free rate). In the model, the dependent variable is the returns for each ETF. So, the market return has a high correlation with the individual returns of each ETF. This indicates that the ETFs are appearing on the threshold list due to the market conditions and not a tangible external factor like a manipulator. Period A only had more appearances because it occurred during a downturn in the market. Overall, the Mkt-RF indicates that the FTDs are occurring because of the state of the market and not solely due to naked shorting.

The research supports the new finding that naked shorting is not a serious issue within the modern ETF market during a recessionary or calm period. The data analysis provides knowledge that the ETF market bounced back relatively quickly in period A after feeling the pressures of the recession. The regression displayed that the market risk premium was the only significant factor in each ETF's returns and that momentum was positive most of the time, indicating that naked shorting is not present. These results do not support the naked shorting studies done by Finnerty, Jarrow, or Moffett. The results produced by these tests signify naked shorting is not occurring or damaging the ETF market, therefore supporting that ETFs are a safe and worthwhile investment.

Limitations

The information brought forth by this study is only partially conclusive for a few reasons. First, the researcher was unable to access the majority of published work regarding naked shorting due to them being closed access. Although the studies used were impeccable and extremely vital, a larger and more diverse list would have made this study more ideal.

Secondly, market data was also restricted. High-level data is only accessible for research institutions, so what the researcher could access was minimal. There was no way to access additional factors, such as the total number of fails per ETF. The NYSE Arca was also the only market that had accessible Regulation SHO threshold list data. Other markets, such as the NASDAQ, the Over-the-Counter Bulletin Board, and Pink Sheets, were unable to be considered. Overall, the study had access to a sufficient amount of information, but additional information that could improve the research was unattainable.

Future Directions

In continuation with analyzing the pervasiveness of naked shorting in the modern ETF market, naked shorting must be investigated with a broader scope. Greater amounts of time need to be studied as well as other exchanges. This study only analyzes a short time period from one exchange, so it is necessary to see if this pattern persists in the economy overall. The next steps would be to use samples from the previous eleven years and to study trends in the primary markets such as the NYSE and NASDAQ as well as the Over-the-Counter Bulletin Board and Pink Sheets. Further research may also include additional linear regressions to add to the FFC 4 Factor Model, such as the fixed-effect models used by Moffett et al. (2012). There have been significant technological advancements since the periods of the other naked shorting studies, so modern research must take place.

Conclusion

This paper offers significant evidence that naked shorting is not pervasive in ETFs during recessionary periods or calm periods. This study impacts all investors by showing the safety of ETFs during any market period.

Regulation SHO appearances initially increased during the start of the 2020 recession but quickly recovered to the standard trend witnessed during the calm period, showing the strength of the ETF market during a dire economic time. The French-Fama-Carhart 4 Factor Model provides that the only significant factor in each severely naked shorted ETF's returns is the market risk premium. There was a strong trend of the Mkt-RF factor being statistically significant during each period. Momentum was also positive in most cases, indicating that a steep slope of cellar boxing did not take place during either period for any ETFs. Based on the Regulation SHO data and the results of the French-Fama-Carhart 4 factor model, there is evidence that cellar boxing does not exist in the modern economy, indicating that ETFs are a safe and worthwhile investment.

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