Over-Pessimism of Bank Stocks since the Great Recession of 2008

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Abstract

In September of 2008, the "Great Recession" began and wreaked havoc on the global financial system. This severe panic caused fear, volatility, and a rise in the perceived risk of securities. In this unique environment, banks were a deserved scapegoat of the recession and the future profitability of banks was in question. This research investigates whether this severely negative sentiment led to investors being over-pessimistic in their views regarding bank stocks. Did internal psychological biases play a role in investors' disdain towards bank stocks?

If this hypothesized pessimistic behavior can be shown, this research can provide evidence that either investors are irrational actors who have routinely incorrect views towards future cash flow streams of securities or that human biases obscured the ability to see the opportunity for a recovery in these securities.

For this work, earnings per share (EPS) announcements act as adjustments to the stock's intrinsic value as the market theoretically reacts accordingly, to either affirm past predictions or edit those previously false forecasts immediately after earnings are announced. In order to turn EPS metrics into earnings reactions, we measured the price reaction from the 3 day period before earnings announcements through the day after to gauge investor sentiment. From this, we were then able to find whether investors and analysts were over/under-optimistic or over/under-pessimistic towards a sample of 48 banks from 2008-2019.

Through a detailed examination of earnings reactions and regression analyses, it can be determined that investors were significantly over-pessimistic towards financial stocks. For example, in Q2 2008, the sample had an average "positive surprise" of 11.34%, meaning that the stock prices increased 11.34% on average from the day before its earnings announcement to the day after's closing price, signifying that analysts and investors were too pessimistic before

earnings revealed the new reality of bank conditions. This phenomenon is tested for many variables including testing over differing time periods, for banks of different sizes by market cap, among many other factors. Through these tests, we are able to determine that irrational behavior persisted in this time period, providing evidence towards incorrectly biased actors in the market, and thus evidence against the Efficient Markets Hypothesis (EMH).

I. Introduction

In September of 2008, the "Great Recession" started a chain of events that would have wide ranging implications for years to come. At the center of these events were financial institutions. Lending standards for mortgages had declined, leading to the prominence of subprime mortgages. Those mortgages were then securitized; making them purchasable as an asset by investors or other banks. However, their low quality and high risk meant they were truly "junk" bonds, despite the overly lenient and misleading ratings of agencies like Moody's or Standard & Poor's. As the housing market slowed and mortgage delinquencies/defaults began to increase in late 2006, these mortgage-backed securities (MBSes) declined sharply in value. As banks were the majority holders of these assets, they quickly tightened their lending practices to only those borrowers with very strong credit. Banks, like the infamous Lehman Brothers and Bear Stearns, were among the parties who made these subprime mortgage bets. Further, a critical factor in this story were credit default swaps. These swaps act as insurance for the buyer of the bond against default risk, sold by companies like American International Group (AIG), who would later receive an injection of $85 billion from the U.S government to save it from bankruptcy. These swaps stated that AIG must financially compensate banks like Lehman Brothers should the mortgages default. When the value of these junk assets diminished as defaults rose, the financial framework was at risk. The U.S Federal Reserve (Fed) aided Bear Stearns in facilitating a merger with JP Morgan and helped bail out AIG. However, due to a lack of real assets to be used as collateral in a bailout, the Fed ruled that Lehman was not "too big to fail" and let them fall into bankruptcy on September 15th, 2008. The fall of Lehman was a central catalyst for global stock markets to then further the decline that began in late 2007. Although foreign banks and the U.S government injected capital into these banks to attempt to reverse the downfall, ultimately, the stock market was reasonably

pessimistic on the banks' ability to turn this crash around, as well as the economy in general. By March of 2009, the S&P 500 had declined almost 54% from its most recent peak, signaling a severe recession that would have repercussions still being felt in 2020. This decline was an indictment on the shortcomings of the financial system, and the financial stocks responded accordingly with sharp declines in value.

By the very nature of a significant crash, fear, volatility, and the perceived risk of securities rise. Unique to 2008, banks were a deserved scapegoat of the recession and the future profitability of banks was in question. On top of that, consistently negative news in the media made investments in bank stocks seem even less attractive to investors. This research investigates whether this severely negative sentiment led investors to be overly pessimistic in their views of investment opportunities regarding bank stocks. Did investors not foresee a potential reversion to the mean of bank profitability? Likewise, did internal psychological biases play a role in institution's and retail investor's disdain towards bank stocks? This analysis will be done using earnings surprise (the extent to which earnings over/underperform relative to analyst consensus) as a proxy for investor sentiment. Investor sentiment is whether investors were overly optimistic or overly pessimistic in their projections. As outlined in this introduction, the backdrop of the financial crisis may have played a significant role in the sentiment of investors towards banks. If this pessimistic behavior exists, this research can provide evidence that human biases obstructed the ability to see the opportunity for a recovery.

II. Literature Review:

There exists a significant quantity of past literature that will be important for this research. This is especially true given the extent of research regarding the financial crisis in the past decade that attempts to explain the events before, during, and after the crash of 2008. This research will need to define and understand the financial crisis of 2008, the importance of earnings, behavioral finance theory, and bank stock behavior. Each of these topics have their own unique basket of literature to learn from. It is therefore essential to address all of these issues and blend the ideas together effectively in order to achieve a valid conclusion. Given this, it is important to address these carefully studied phenomena before beginning an in-depth analysis of bank stock behavior in this time period.

1. Financial Crisis Behavior

First, it is important to look at what makes a financial crisis so impactful. Birru and Figlewski (2012) explain investor sentiment at ground zero of the 2008 financial crisis. This work captures the gravity of the volatility in the S&P 500 index, showing a severe increase in intraday swings. It describes traders as "skittish", overreacting to every new influx of news, thus overshooting the true intrinsic value followed by an eventual correction. This chaotic, combustible environment is crucial to understanding how a mispricing of assets can occur. One can assume that an investor in this environment might be frightened watching their portfolios swing so rapidly, potentially inhibiting them from making many stock purchases, especially ones with a higher level of perceived risk.

Irresberger, et al. (2015) argued that bank stocks performed poorly from 2004 - 2012 in part due to investor sentiment surrounding a financial crisis. They are able to find that bank stock performance was driven by "noise" trading, in which an investor makes a decision void of rationality or proper consideration. They say that sentiment among investors devalued bank stocks without focusing on firm specific or market-wide catalysts that could reverse bank stocks poor performance.

Fahlenbrach, et al. (2011) attempted to find predictability in bank stocks given past financial crises. Specifically, they looked at the 1998 crisis as a potential explanation for 2008. They hypothesize that a bank's business model is relatively persistent and thus the impact on the firm can be predicted from one crisis to the next. They found this proposal to be true; if a bank in 1998 lost 1% point of market cap, that same firm would go on to decline .66% in 2008. Therefore, a loss in one crisis has strong predictive capabilities in another crisis. Beltratti and Stulz (2011) similarly looked to find predictability in a crisis scenario by analyzing the specific variables that allowed some banks to weather the storm of 2008 better than others. Banks with more cash deposits, less leverage, and less activity in US real estate performed better on average. Additionally, banks that had highly positive returns in 2006, did worse than average in 2008. This obscure detail is presumably due to the risky nature of bank assets in 2006 yielding high returns, but the same risky assets declining dramatically in 2008.

Cornell, Bradford, and Shapiro (1986) looked at whether bank stock prices incorporated the riskiness of low-quality bonds from Latin countries in 1982. They were able to find that banks with large holdings of this form of debt had significantly worse stock returns than those with no Latin debt, up to a 64% discrepancy. They were also able to find that negative press on the failures of Latin bonds had a continuous impact on the returns of bank stocks. That is, there was no

immediate response to worsening conditions. Therefore, an underestimation of negative stock returns preceded the full impact of these losses being incorporated into a security's pricing.

Wisniewski and Lambe (2010) attempted to explain the role the media may play in impacting returns, specifically of bank stocks during 2008. They state that the negative speculation within the media may not only report the negative state of the market, but add to it as well. They tested this by looking at media publications with negative, fear-initiating verbiage. As the research looked into, the likelihood of a bank run nowadays is limited, so investor sentiment is paramount in restoring the public's trust in financial institutions. They discussed the distinct difference between freedom of speech and dramatizing stories to drive views, and the harmful repercussions that dramatization can have. Their research found that an increase in negative media speculation led to a statistically significant related negative response in future bank stock returns. Given that finding, their research is an important warning to the media, as well as investors seeking predictability in the markets based off of excessively negative news coverage. Tetlock (2007) supports this examination by finding that significant media pessimism causes stock prices to fall followed by a reversion to the mean.

1a) Bank Stock Behavior within a Financial Crisis

The literature on bank stock behavior is important because it describes the variables that drive bank stock returns and the predictable patterns that occur among these firms. Cooper, et al. (2003) looked at bank fundamentals in an effort to predict future stock performance. Some variables observed include earnings, reserves, leverage, and non-interest income. Their findings conclude that changes in these variables are under reacted to, creating an undervaluing of bank stocks. Pelster, et al. (2016) found that a higher capital requirement during crises leads to better

stock performance, presumably because of the increased mandatory safety. However, they also found that bailout guarantees lower stock performance, enabling them to conclude that larger banks have worse returns directly because they are more likely to receive government bailouts.

The following works detailed here refer to bank stock reaction within the environment of a crisis. Given, the fact that this research depends upon the conditions surrounding crises and how stocks react, it is necessary to examine the research related to these critical time periods in financial history. Irresberger, et al. (2015) discussed bank stock performance given the negative sentiment of a financial crisis and the overly pessimistic nature of investor judgements. Wisniewski and Lambe (2010) looked at the media's potential role in the dramatic drop in bank stock prices in 2008, finding that an increase in negative media speculation led to a statistically significant related negative response in bank stock returns. Cornell, Bradford, and Shapiro (1986) looked at bank stock returns during the 1982 Latin debt crisis, finding that banks with exposure to low quality debt had 64% worse stock returns versus banks who did not. Fahlenbrach, et al. (2011) found that bank stock reactions to past crises can predict bank stock reactions to subsequent crises. They are able to find a direct relationship and point out variables common in both stock price declines, including large amounts of debt, reliance on short term debt, risky debt, and rapid, substantial earnings growth. Beltratti and Stulz (2011) tested why some banks avoided the brunt of the 2008 crisis unlike other banks did. Their study found that recent positive returns correlated strongly with substantially negative returns during 2008. They also found that bank exposure to U.S debt, particularly mortgages, was a trigger for poor performance.

Falato and Scharfstein (2016) discussed the problems with the short-term nature of the stock market where earnings are heavily scrutinized every three months. The hypothesis is that the

immediacy of the stock market may have led banks to be overly risky to drive impressive stock returns if those risks paid off.

2. The importance of earnings

Central to this research are earnings, and the assumptions made about them, in order to draw conclusions about the hypothesis. This section outlines past research that unearths an understanding of earnings and the judgements made concerning company earnings reports.

Lakonishok, et al. (1994) tested why value companies outperform glamour stocks. Their paper first proposes that the past meteoric performance of glamour stocks led to over extrapolation of high growth rates in the past quarters into the future and thus yielded high expectations that can't and won't be lived up to on average. Relatedly, investors may overreact to stocks that have done poorly in the past and oversell them. Their research also tested whether value stocks are fundamentally riskier and thus demand a higher return from investor, which the authors found to be invalid. Additionally, the authors found that both individual and institutional investors prefer glamour portfolio styles to value ones, undervaluing value stocks. This fallacy may be caused by investors projecting extreme past growth too far into the future, equating well run companies with wise investments regardless of their price, or that institutional investors buy glamour stocks because they are easy to explain to the public and other stakeholders. This research also examined the short time horizon of the financial markets where investors seek rapid spikes in short term growth as opposed to steady earnings over the long run. LaPorta, et al. (1997) extended the research of Lakonishok, et al. (1994) by explaining that value stocks outperform glamour stocks because of expectational errors made by analysts and investors alike. Those errors are most glaringly evident surrounding earnings reports. The authors found that earnings surprises were

directly responsible for a hefty percentage of the differences in returns between portfolios and thus, the difference in reaction to earnings (positive or negative). This work discussed how expectations can be skewed by intrinsic biases and other factors, subsequently impacting price reactions around earnings reports. They were able to find that approximately 30% of the overall discrepancy between annual returns is due to the three days surrounding earnings, which are reported four times per year.

Nichols and Whalen (2004) provided a high-level explanation of the direct relationship between earnings and firm returns. They looked at three "links" between the two variables. Firstly, earnings reports go directly into forecasts typically of buy-side analysts to see if a security is undervalued through a Discounted Cash Flow analysis (DCF) or an alternative valuation model. Secondly, that model finds a Present Value of Future Cash Flows or Dividends. And finally, that expectation of future inflows drives share price movements. Given that base understanding of the flow from earnings report to valuation tool to stock price movements, the authors observe the strong positive correlation between earnings and returns. This serves as evidence as to why so many people with an interest in a firm pay close attention to the earnings season.

Chan, et al. (2003) discussed an important argument against analysts being reasonable representations of market expectations. It is a helpful assumption to think of analysts as representations of the profit maximizing public, with biases similar to the entire investing public. However, the use of analyst projections of earnings should be made with the caveat that they also have their own set of biases, separate from the investing public. This research focused primarily on conflicts of interest, whereby the analyst's company inherently wants to gain investment banking clients, creating an incentive for implementing rosier projections. The key takeaway is not to entirely trust that analyst's projections are exact replications of what the market expects.

Caruso, et al. (2015) talked about how we often view earnings as a proxy of positive or negative macroeconomic factors, in tandem with company specific factors driving earnings beats or misses. However, earnings depend not only on those external factors but the often-flawed behavior of the analysts who analyze and predict such earnings. The research points out a particular trend from 2013-2015 in which earnings estimates start out the year extremely optimistic and get subsequently become more pessimistic as the reality of actual earnings sets in. This simple example is evidence of analyst bias, and that humans want to inject predictability and patterns onto a seemingly unpredictable medium (the stock market). Further bias is spotted by the simple fact that 69% of earnings releases were "beats" from 2008-2015. This shows that for whatever reason, analysts are routinely underestimating earnings so much so that earnings beats are occur more regularly than on target estimates. This prevents investors from fully gauging the impact of new information from an earnings report. For example, a semi-rational retail investor may see a particular stock recorded beats four quarters in a row, logic would allow investors to conclude that the company and external factors must be better than previously assumed and encourage them to buy the stock. But, that investor may fail to comprehend the analysts' potential bias in creating those "beats". The authors describe their skepticism with the fact that beats are more likely than misses by such a wide margin. In a market without bias, these so-called predictions should occur about evenly at 50% above and 50% below the actual reading in the long run. The authors also believe that the term earnings surprise should be reconsidered in the way we think of it. Instead of allowing these seemingly biased analysts and news organization headlines to dictate whether a company beat or missed earnings, a more logical alternative would be to let the market decide.

3. Behavioral Finance

In order to properly analyze why expectational errors occur with regards to earnings, it's necessary to lay a groundwork of Behavioral Finance theory to describe the anomalies and biases present in the markets. Engelberg, et al. (2018) built upon the work of LaPorta, et al. (1997) which states that in order for investors to be rational, half of all earnings announcements should be positive surprises and the other half should be negative surprises. Further, if a certain subset of stocks has an average earnings surprise that is negative, that would show that investors were overly-optimistic, on average, for that subset of stocks. Engelberg, et al. (2018) took this knowledge and tested many anomalies within the market. A stock market anomaly is defined as a return on a security that is unexpected. By its very definition, anomalies contradict the Efficient Markets Hypothesis (EMH) which is a critical piece of Modern Financial Theory. The EMH states that at all times, share prices reflect all available information, therefore it's impossible to receive alpha (excess return) consistently. On top of that groundwork that outlines the EMH's flaws in predicting market behavior, their research attempted to narrow the focus towards anomalies potentially existing in a predictable pattern, thus making successful active management of stocks possible, in theory. Testing these anomalies, the authors were able to find that abnormal returns were 50% higher on official corporate news days and an astounding six times higher on earnings announcement days. Those figures were notably narrowed down to firm specific factors, not macroeconomic events.

This work also looked at psychological biases that lead investors to make irrational decisions by not maximizing our expected returns for a given level of risk. Given that, this research examines whether investors are routinely over-optimistic or over-pessimistic about a given stock. If they are in fact overly optimistic or overly pessimistic, earnings releases then change the

information available to investors, causing an immediate adjustment in stock price, pushing stock prices closer to their true intrinsic value. Similarly, stocks with high past earnings or sales growth have subsequently lower stock returns, because people do not realize that high past growth numbers often revert to the mean more often than accelerate continually. This makes built in expectations inevitably too high to be matched by actual earnings reports. In summation, this research finds that investors are routinely overly pessimistic and overly optimistic about the prospects of different firms, thereby driving the anomaly returns on earnings dates where firms force the change in sentiment and thus stock price.

Baker and Wurgler (2007) further discussed the battle between classical and behavioral financial theory. Historically, believers of classical (pro-efficient markets hypothesis) theory relied on the fact that security prices were driven by rational decision makers discounting all available information to get a reasonable valuation and act on that valuation in the markets. This assumption is in contradiction with the existence of stock market crashes where some irrationality, or a lack of valid information, was present. Given that classicalist theory has its own flaws, behaviorists have attempted to put together a framework to better explain the market. Core to this behavioral theory is that investor sentiment plays a role in obstructing investors from acting on the facts at hand for a given security. The classicalist would argue that there are still wise rational players in the stock market, called arbitrageurs, who will spot these anomalies and profit off of the mistakes of others. But over the years, behaviorists have outlined “limits to arbitrage”. Limits to arbitrage is the idea that arbitrage opportunities require a lot of capital and can be extremely risky if public sentiment continues to get carried away into the future; this idea is confirmed in many papers including Barberis and Thaler (2002) who discussed the late 1990’s internet stock bubble as proof of the behavioral view. In this scenario, incorrectly optimistic sentiment pushed asset prices to

unrealistic valuations which these companies couldn't live up to. The bubble became so inflated before it popped that many arbitrageurs lost large amounts of money betting against this sentiment.

Barberis, et al. (1998) conducted an analysis of investor sentiment, as well as addressed behavioral heuristics. These heuristics are cognitive shortcuts, or "rules of thumb" that allow investors to simplify their decision-making processes. One of these heuristics is representativeness, which is the idea that investors tend to view an event as typical of a certain stock sector, given past events. Another important phenomenon is conservatism, the slow updating of forecasts in light of new factors. Barberis and Thaler (2002) added to this discussion of popular heuristics by including overconfidence, wishful thinking (optimism), belief perseverance, anchoring, and prospect theory (loss aversion); all of which should be analyzed as potential biases that can cause a significant mispricing in behavioral finance theory.

Barberis (2011) used the financial crisis housing price data to analyze the psychological bias of over-extrapolating past prices. The simple hypothesis being, the housing "bubble" is directly attributable to people predicting future house price movements, where they over-extrapolated recent past growth rates in to those future estimates. This caused house prices to become too high, with many homeowners having large loans on over-valued properties from the aforementioned over-optimistic valuations. Further, the home price bubble was caused by mortgage backed securities with often underserved safe, credible asset ratings. The people assigning these ratings also over-extrapolated past asset growth rates and simultaneously did not foresee a reasonable level of defaults on these mortgages based on the credit quality of the borrowers. This bias can at least partially be explained by the "representativeness" heuristic, discussed earlier in Barberis, et al. (1998), whereby a subject categorizes their assumptions with too much respect to recent statistics.

III. Hypothesis

Given an understanding of the past literature, this research examines whether financial stocks have been overly pessimistic since the great recession of 2008. Due to the swell of fear among the investing public and professional money managers alike, financial stocks in particular were viewed as risky investments. So much so that these banks were consistently able to overachieve against the low bar of these pessimistic expectations. These over-pessimistic expectations reflect share prices that were too low, therefore future returns will be higher than expected because the price will eventually move towards its correct, much higher, stock price in the long run. This will be examined by stock price reaction surrounding earnings which acts as a proxy for investor sentiment.

Recessions usually lead the investing public to become skeptical and fearful of trade opportunities for all stocks. Uniquely, the negative front-page news surrounding banks, including mortgage backed securities, and the fall of Lehman Brothers, were all factors in obscuring logical trade opportunities after the price of these stocks fell. This paper intrinsically hypothesizes that these fears caused by internal psychological biases came to the forefront and created a widespread mispricing among financial services stocks, in particular from the years 2008-2019. Feelings of belief perseverance, conservatism in future profitability estimates, availability bias, and loss aversion all could have played a role in this mispricing. This research hypothesizes that bank stock prices since 2008 can be in part explained by these phenomena. Also, this research is expected to show that earnings expectations were consistently low, allowing banks to beat those expectations, regardless of external factors, causing bank profitability to slip during the financial crisis. These beats will show that investors were biased against bank stocks, which fed into their overly pessimistic view. This research about bank stocks is uniquely important because these banks

played such a central role in the most recent financial crisis. Therefore, this research attempts to achieve a greater understanding of bank stock behavior, and the stock market in general, to hopefully unlock meaningful discoveries to be further researched.

We have also observed the differences in earnings reactions in the years within the sample to see if this behavior is dynamic; that is, whether there is an observable change in reactions over time. This paper will additionally look at whether this phenomenon affects large financial institutions in a different manner than small ones.

IV. Methodology

This study of whether bank stocks have been overly pessimistic since the infamous financial crisis of 2008 will be empirically tested. Specifically, we will be looking at the share price reaction to actual earnings results, and therefore the rapid market correction of consensus analyst Earnings Per Share (EPS) estimates. EPS is a standard representation of a company's profitability, and relatedly, the value an equity holder has a residual claim on. With that understanding, new EPS announcements act as adjustments to the stock's intrinsic value and the market theoretically reacts accordingly to either affirm their past predictions or edit those previously false forecasts immediately after earnings are announced.

A wide portfolio of small, mid-sized, and large bank stocks that are traded on a main North American stock exchange from Q1 2008-Q2 2019 were chosen for the sample of banks to be tested, looking at a strategic three-day window return surrounding earnings to capture how investors reacted to those earnings. This inherently quantifies how an investor interprets the change in the company's future prospects given the newfound information of a 10-K or 10-Q (Annual and

Quarterly earnings release reports, respectively), as well as implementing any future guidance or newsworthy information a firm has disclosed.

Data was collected from the Bloomberg Terminal within Mason Hall in the Fisher College of Business. Key parameters such as announcement date, analyst earnings estimate, actual reported EPS, as well as closing share prices from the day before, the day of, and the day after earnings were sourced. Perhaps the most key variable collected from the terminal was the daily close share price. These prices allowed for the calculation of a three day percentage change (i.e., the three-day stock return) encapsulating investor reaction to the announcement. Solely looking at the reaction day of or the day after earnings can create issues in the validity of the reaction. Further, looking at the day before accounts for the possibility that the earnings date might be slightly off and could have been available to the market on the day before. The idea is that by looking at one day before, day of, and day after, we can capture any immediate market response to earnings news. As an example of the importance of this methodology, there were numerous instances where on the day of earnings, stock prices rallied on excitement after the bell earnings. However, the day after earnings may tell a different story if earnings are perceived to be negative. This three day method is used by Caruso, et al. (2015). It is for this reason that the three day metric was so important for the analysis. These metrics were collected in an excel spreadsheet for 48 unique banks observed from Q1 2008 to Q2 2019. The 48 banks tested are in Table 1 of the appendix. This long time period of 46 quarters was used to get a wide view of how investors reacted to bank earnings over time. That is, can we observe clear disparities in behavior from the heart of the crisis in 2009 as opposed to 2019. By doing this, we are able to get a broad understanding of how the crisis may or may not have caused the public to fall prey to biases that led to over-optimism or over-pessimism in the banking sector longitudinally.

It is important to point out an obstacle in the data collection process. The Bloomberg Terminal happens to only hold a fixed number of quarters of earnings data. 15 banks in the sample of 48 were collected and stored in an excel document in early 2019 with data ranging from Q1 2008- Present when data collection began. Following a gap in data collection during summer 2019, it was discovered that Quarter 1 2008 and Quarter 2 2008 data had disappeared from the terminal due to the limitation on the number of past quarters available. As such, the remaining 33 banks were quickly collected from Q3 2008 onward before any more data could be lost. There is no other way to access this data from 2008 for free as a student at this time. Despite this, my advisor Professor Birru has helped to explain that the research can still be conducted with limited loss. Since the research is taking a longer-term view to observe differences from 2008 to today, the loss of 33 data points for 2 quarters has an impact, but not one that will halt the research.

Once data collection was completed, it was condensed into summary tables organized to easily observe overall means, medians, and standard deviations of the data set each quarter. Importantly, for the purpose of this research, a "quarter" was manufactured by looking at the period end date by each individual bank. That is, a bank ending its quarter between January and March would be viewed for our purposes as quarter one, April to June for quarter two and so on. This is done to avoid unnecessary frictions in which there is a misalignment of banks ending quarters at slightly different times leading to variations in sample size from quarter to quarter.

For the analysis of banks of different sizes, the Bloomberg Terminal was used to collect market cap data for each bank during each quarter from Q1 2008 to Q2 2019. This was necessary because assuming present market caps as fixed would limit the accuracy of the analysis. A bank that was classified as a "small bank" by market cap in our sample in 2009 may or may not have the same "small" classification in present day and this methodology reflects that possibility. Once

these dynamic market caps values were found, medians were found. These medians were used for each quarter in order to divide the sample equally between small banks (those with a market cap below that quarter's median) and large banks (those with a market cap above that quarter's median). This divided sample allowed the same analysis of means, medians, and standard deviations to be divided between large and small banks to see if a disparity exists between the two groups. This practice of having banks freely and flexibly flow from "large" to "small" market cap in our analysis allows us to make judgements as to whether analysts and investors made conscious or unconscious decisions differently based on the size of the bank. Potentially, investors made decisions based on the size of these banks, or other miscellaneous variables related to size impacted by the financial crisis (likelihood of bankruptcy, bailout, or perceived public perception).

Stock return data was also collected for a "financials" Exchange Traded Fund (ETF), Vanguard Financials (ticker VFH), for the focused period Q1 2008 to Q2 2019 divided by quarter. This was done to perform regression analysis to determine whether bank earnings were correlated with the stock action of bank financials as a whole. That is, were the earnings of banks impacted by contemporaneous (same period) stock returns? Likewise, were earnings reactions impacted by "lagging" (t-1, previous period) stock returns? This analysis of earnings surprises compared to lagged stock returns will allow us to determine if investors were extrapolating past stock returns into their current and future projections. This will show whether periods of significantly positive financial stock returns resulted in investors being overly optimistic in the next quarter, or if negative or low stock returns influenced investors to be overly pessimistic in the earnings capability of banks going forward. These ideas are discussed at length in Lakonishok, et al. (1994) and Barberis (2011) within the literature review. Importantly, for the standard deviation regressions, the ETF returns were examined on an absolute value basis. Further, a regression with

standard deviation is only meaningful if the other term is an absolute value because standard deviation is not impacted by whether the returns are severely positive or negative. Multiple regressions were tested using means, medians, and standard deviations of our divided data set of large and small market cap banks to determine whether size has an impact on the results. Additionally, different time periods were tested to determine whether the effects were dynamic.

V. Analysis and Anticipated Results

a) Anticipated Results

The percentage surprise value being used in this research is valuable in seeing how much EPS was correctly predicted or falsely optimistic/pessimistic in its prediction. If this method is able to find a positive surprise, or "beat", that can be labeled as an overly pessimistic market for bank stocks. If a substantial pattern of positive surprises exists, that further can be interpreted as systematic biases or other factors influencing the view of investors in the long term from capitalizing on an underpriced security given its profitability metrics built within EPS. A positive earnings surprise represents a fundamental misevaluation of over-pessimism by investors and analysts, and the subsequent price reaction represents the market evaluation of the new-found reality presented by quarterly earnings reports. If the model finds a pattern of successive earnings positive surprises (beats), that is an indictment on the investing public as incapable of foreseeing the true value of these firms, and pricing in that false value for the future by not increasing the EPS estimates enough to bring future estimates and actual earnings into relative equilibrium. Relative equilibrium does not necessarily mean having predicted values equal actual values. It can be

assumed that EPS predictions can be entirely rational, yet still off from actual values by either being mildly overly optimistic or pessimistic. Rather, this analysis is searching for significant differences between expectations and actuals, or a consistent pattern over some time period. In researching this, evidence could be presented against the Efficient Markets Hypothesis and point to a failure on the part of arbitrageurs to identify and capitalize on the predictable nature of a bank recovery after a recession. This strategy will hopefully shed light on how specifically bank stocks reacted to the events of the most recent financial crisis, adding to the historical knowledge of the numerous factors and variables simultaneously affecting fear and greed in financial markets, and subsequently, security prices.

b) Overall Results

The analysis of the three day reaction surrounding bank earnings yields the finding that investors were overly pessimistic in Q1 and Q2 of 2008. This conclusion is reached because the Quarter 1 2008 reactions had an average positive surprise of 4.85% and median of 4.52% for the sample. For Q2 2008, the average surprise was 11.34% and the median was 11.35%. To put this into context, a bank's stock price in Quarter 2 of 2008 would increase 11.34% on average from the day before its earnings announcement to the day after's closing price. These values are significant because of the scale of the bias. As will be seen in analyzing the following quarters, successive quarters of 4% surprise and greater is comparatively large. This shows that investors were expecting far worse results than the true results that banks were able to deliver, despite logical assumptions that the financial crisis would lead to banks being unable to meet such expectations. We can contextualize this bias by looking at the financial crisis at large. Financial stocks started to exhibit strong price declines towards the end of 2007 and this downward trend continued into

2009 when prices hit their lows and began a reversal in March of 2009. From this background, we can assume that analysts and investors during Q1 and Q2 of 2008 had likely seen and faced significant losses in late 2007. This likely drove investors to expect further harsh negative price action, driving down the stock prices significantly. This created a "shifting of the goalposts" effect, whereby lower EPS targets became easier to achieve. Banks then successfully achieved those targets (that in hindsight were too low), causing the meaningful price increases when banks revealed the better than feared earnings.

c) Average Three Day % change

This section of the analysis looks at the three day reaction period in average terms. Figure 1 plots average earnings surprises by quarter and shows the notable overly pessimistic attitude across all bank stocks in Q1 and Q2 2008. To a lesser extent we see overly pessimistic behavior in Q1 and Q2 of 2010 with an average 2.38% and 1.94% positive surprise, respectively. Another example of a moderate but notable pattern of biased pessimism is seen in successive periods of positive surprise ranging from 0.18-1.48% for 5 consecutive quarters between Q1 2011 and Q1 2012. Similar patterns of positive surprises exist throughout the sample including a 3 quarter series between Q3 2017 and Q1 2018 with average positive surprise ranging from 0.75-1.63%. It is also important to note the most overly optimistic behavior, found in Q3 2008- Q1 2009 where there were overall negative surprises of 1.7%, 2.16%, and 1.31% successively. This was certainly the clearest instance of optimism that backfired on investors across the analysis. It can be hypothesized that severe losses during this time drove optimism to turn into pessimism toward financials in later quarters. It is important to understand the context of the financial sector at this time whereby share price losses had continued from 2007 into 2009, driving overall sentiment lower in the midst of

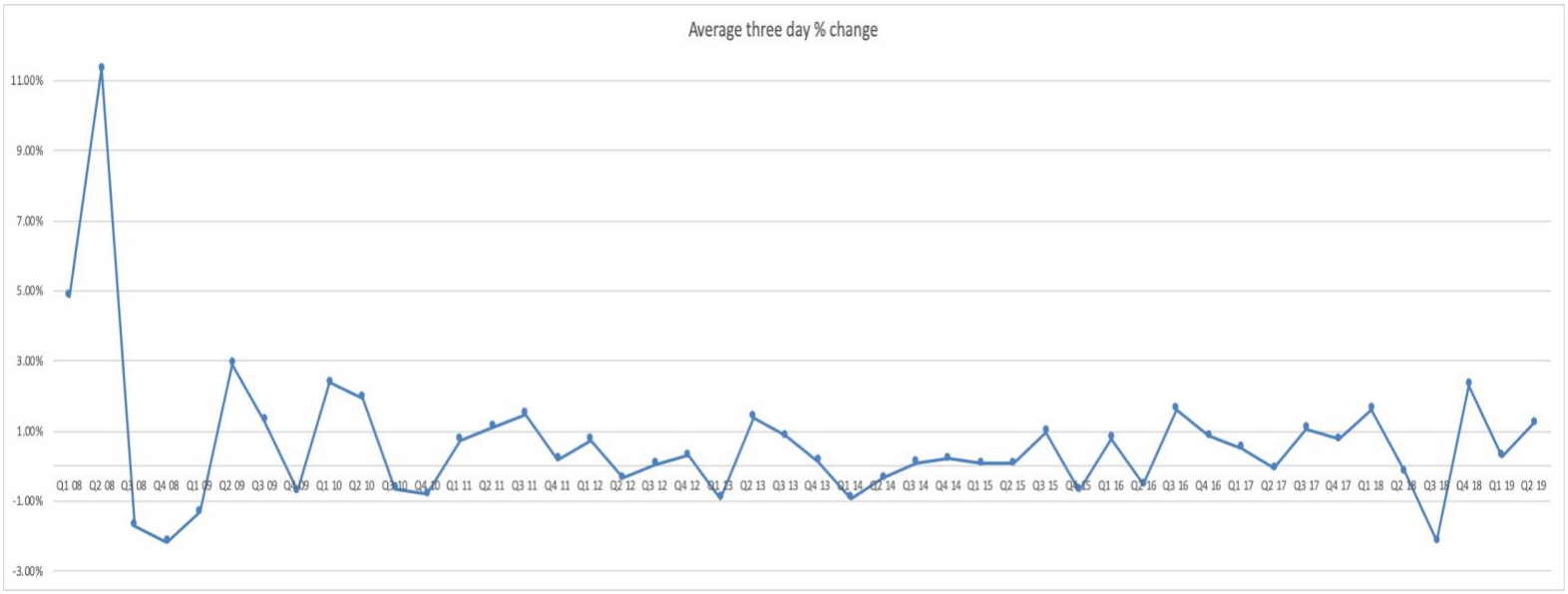
recession. Additionally, fears of overall global recession, widespread distrust of banks, and other negative factors arose. This, among other things, may have played into the optimism in Q3 2008-Q1 2009 quarters turning into pessimism for most of the rest of the sample. From Q2 2009 to Q2 2019, 29 of the 41 quarters (70.73%) had an average positive surprise, and thus, exhibited pessimistic behavior from analysts and investors. Notably, Q2 2009 is the same time the recession ended. Thus, it can be hypothesized that the 70+% positive surprise ratio since that landmark time is a result of investors systematic negative bias toward the banking sector.

When taking the sample of all banks and all quarters tracked, we find an average overall 3 day surprise value of positive 0.67%. That is, from the beginning of 2008 to present day, bank stocks can be expected to have on average a share price return of +0.67% when held from the day before to the day after earnings announcements.

Notable banks with significantly pessimistic behavior across the sample include East West Bancorp (EWBC) with an average +3.18% stock price reaction, SVB Financial Group (SIVB) with an average +2.6% reaction, Signature Bank (SBNY) with an average +1.96% reaction, and KeyBank (KEY) with an average +1.66% reaction. Interestingly, Bank of America (BAC) had an average negative 2.39% reaction, the most negative reaction in the sample. Since this was an average and not a median, it can be surmised that extremely negative reactions for BAC in Q3 2008 with a negative 31% and Q4 2008 with a negative 38% were paramount in dragging down the averages for BAC.

Figure 1 below is a graphical depiction of earnings three day reactions in percentage terms for the sample using averages. As previously mentioned, negative percent change values indicate over-optimism and positive percent change values indicate over-pessimism.

Figure 1:



d) Median Three Day % change

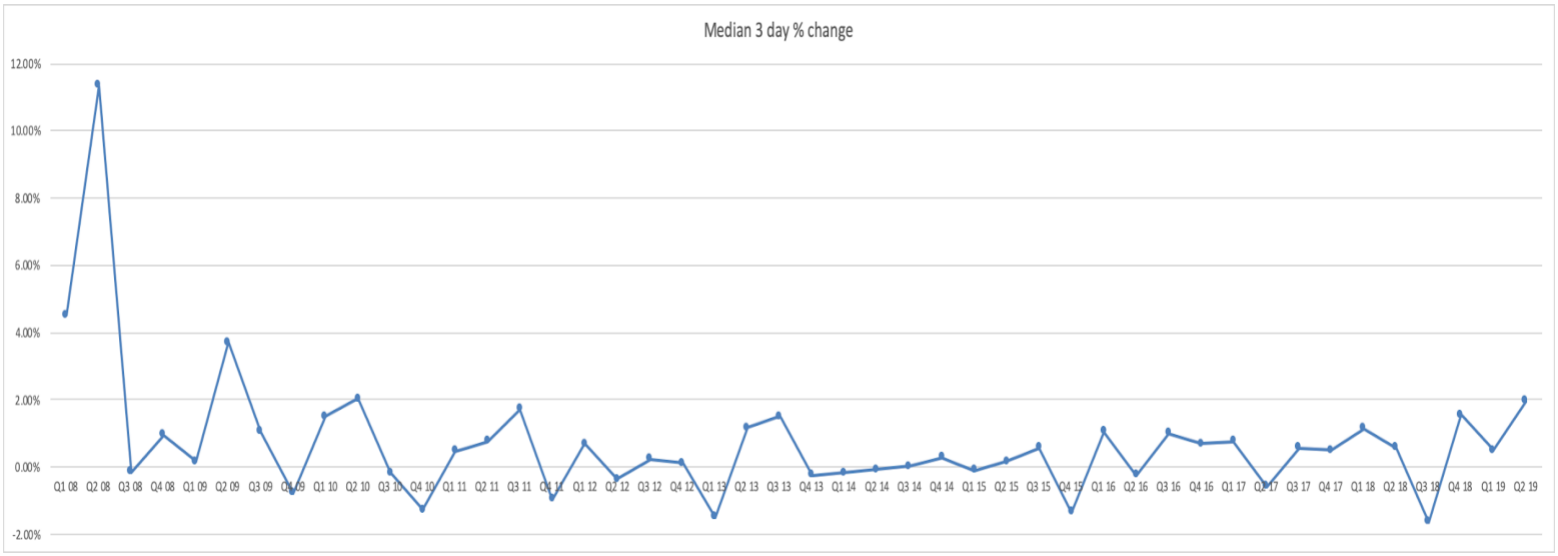
This portion of the analysis examines the same data tested in the previous section, however now using medians. There were many reasons why this median metric is important. Firstly, it was necessary to "back up" the average results with median results; determining if the averages were swayed by a few large or outlier values that may yield very different findings. Some individual positive or negative bank results or quarters as a whole significantly alter the average values, impacting the conclusions we can make from the data findings. By solving for medians, some of these worries are alleviated.

Figure 2 shows results for medians. By calculating the same values with medians, we are able to show similar findings with the same end result; investors were overly pessimistic toward bank stocks during the periods observed. This includes the previously discussed Q1 and Q2 2008 values at positive 4.52% and 11.35% respectively. We also find large instances of over-pessimism

in Q2 2009 at 3.71% median reaction, Q2 2010 at 2.04%, Q3 2011 at 1.72%, among other instances. There are 4 consecutive quarters from Q3 2017 to Q2 2018 with positive reactions ranging from 0.5-1.15%. We also find that 31 of the 46 quarters observed (67.9%) yield positive earnings surprises. Further, of the 2,142 observations of bank surprises overall, 1,172 had positive 3 day reactions, or 54.6%. Since the end of the recession in Q2 2009, 27 of the 41 quarters had a median positive earnings reaction, or 65.8%. When looking at all of the banks, the median overall earnings 3 day reaction was positive 0.49%.

Notable banks with significantly pessimistic behavior across the sample include East West Bancorp (EWBC) with a median +3.31% reaction, SVB Financial Group (SIVB) with a median +1.93% reaction, SunTrust Bank (STI) with a median +1.85% reaction, and Morgan Stanley (MS) with a median +1.57% reaction. Important to mention is that Bank of America (BAC) had a previously mentioned average negative 2.39% reaction. However, when looking at medians, that average value turns into a more modest negative 0.25% median. This is certainly a significant disparity and was a large reason why looking at both median and mean was so vital. Meanwhile, People's United Financial (PBCT) led banks in overly optimistic behavior with a median negative 1.04% reaction.

Figure 2:



e) Standard deviation of Three Day % change

In addition to evaluating the mean and median three day change, we conducted an analysis of the standard deviations. In many cases within finance, standard deviation can be a proxy for disagreement and thus, volatility in the share price. However, in this case, a relatively high or low standard deviation of earnings reactions in a particular quarter allows us to see how much analysts missed their estimates. In this case, we were able to find relatively large standard deviation values, meaning that analysts and investors were significantly off in their forecasts of bank stocks at a given time, specifically in 2008 and 2009.

The overall sample had an average standard deviation of 4.83% and a median standard deviation of 3.79%. Taking into consideration the timeline of the Great Recession from December 2007-June 2009 (Roughly Q1 2008- Q2 2009), those periods had a median 10.63% standard deviation. Comparatively, the rest of the sample had a median standard deviation of 3.7%, which is shown graphically in Figure 3. This shows us that analysts had large dispersions in their forecasting errors, specifically in 2008 and 2009, with standard deviations mostly trending

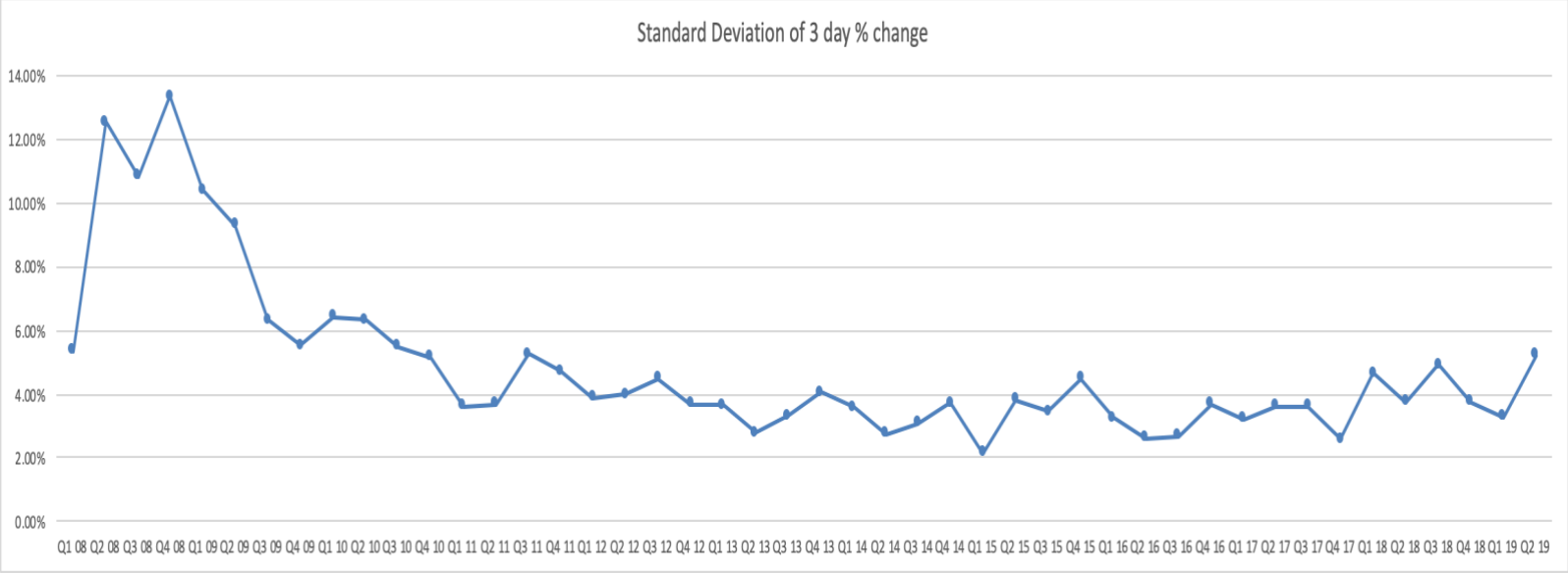
downwards from the highs of those quarters. It can be hypothesized that this widespread disparity within the public opinion of banks and corresponding errors in the forecasts of those banks were driven by the overall uncertainty during the financial crisis. The extreme price movements and overall market volatility likely drove the disparity in analyst expectations of banks and their ability to withstand the crisis, especially considering additional factors affecting the financial industry in particular.

Bank of America (BAC) led banks with a standard deviation of 9.11% across all quarters observed. Citibank (C) also had a large standard deviation of 7.22%, along with Morgan Stanley (MS) at 7.11%. Notably, these banks with larger volatility readings were all large in terms of market cap, and also were heavily involved in the financial crisis and would have divided public opinion as to whether they would rebound from the crash or not. Meanwhile, Northwest Bancshares (NWBI), Great Southern Bancorp (GSBC), and People's United Financial (PBCT) were the three banks with the lowest standard deviation at 2.64%, 2.78%, and 2.96%, respectively. These banks are undeniably not of the same recognizability as the prior three. In fact, as of Q2 2019, those three small banks (NWBI, GSBC, and PBCT) had an average market cap of $3.102B. For comparison, the average market cap for the entire data set was $34.5 B for the same time period.

The large standard deviations observed for the dataset in 2008 and 2009 suggest that there is a large variation in the forecast errors made by analysts and investors. This sparked the idea to test whether there is some pattern to these errors. The idea was to divide the bank sample into two distinct groups. This was done by dividing banks by size, as determined by market cap. This may yield a realization that analysts were pessimistic specifically towards larger or smaller banks. The evaluation of large and small market cap banks will be judged in the same way the sample as a

whole was analyzed. Likewise, we will observe whether a clear distinction in behavior exists between the two groups or whether that behavior changes over time. This analysis will be discussed in the following sections.

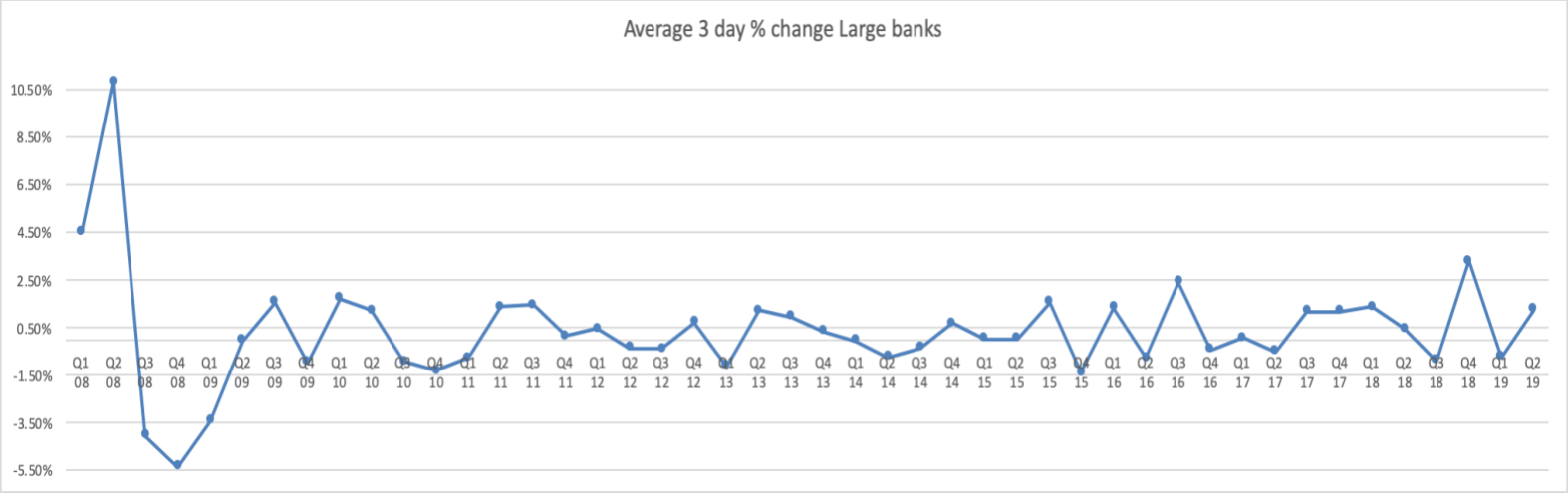
Figure 3:



f) Average of 3 day % reaction (Large market cap banks)

As reasonably expected, the analysis of large bank 3 day percentage reaction is similar to the 3 day reaction for the sample as a whole, with a few notable differences. Most importantly, large banks were overly pessimistic in Q3 2008 through Q2 2009 to be discussed in section g. Overall, Figure 4, which plots average reactions by quarter of large banks, looks similar to the entire dataset for average reactions Figure 1. The reaction for large banks was smaller than the data set as a whole with an average reaction from Q1 2008- Present of +0.37% and a median of +.09% compared to the undivided data which had an average stock price reaction of +0.67% and a median of +0.28%.

Figure 4:



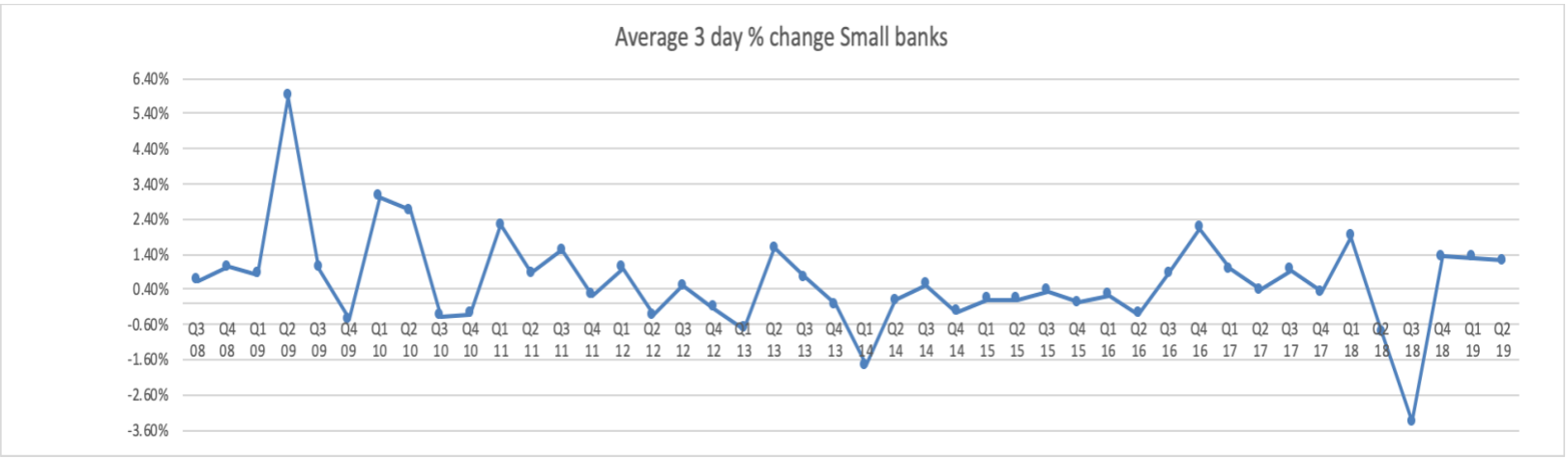
g) Average of 3 day % reaction (Small Market cap banks)

Notably, the observations of small market cap banks start with Q3 2008 instead of Q1 2008 because of the gap in data collection previously discussed in the methodology section, which can be seen in Figure 5. As far as notable deviations between the small banks and the entire sample are concerned, Q2 of 2009 for the combined dataset had a +2.91% reaction whereas the small banks had an average +5.87% reaction for the same time period, showing that analysts were overly pessimistic in their forecasts of small banks. At the same time, the large banks had only a -.05% reaction, showing that analysts were accurate in their assessment of large banks and possibly even optimistic, which seems odd given the circumstances of the financial crisis. In Q1 2009 there was also a wide disparity with large banks being significantly over-optimistic with a negative 3.44% reaction and small banks being moderately pessimistic with a positive 0.82% reaction. Similar deviations can be found in Q3 and Q4 2008. With this information, it is curious to see such a wide

disparity between the two datasets from Q3 2008- Q2 2009 in particular. Why were investors significantly pessimistic towards small banks while being overly optimistic in Q1 2009 and moderately accurate in Q2 2009 in assessing large banks future profitability? Fully understanding why by comparison, analysts were significantly more optimistic towards large banks as opposed to small banks is difficult, but many theories can be presented. Potentially large banks in the public eye did a good job in temporarily reassuring investors that their business would recover more quickly than expected. Additionally, it is possible that fears swelled that if the recession continued, small banks would have a harder time recovering asset losses than large banks. Since bank assets are significantly leveraged, it could present liquidity issues if the bank does not have enough capital on hand. Banks usually operate with leverage; leverage allows banks to utilize debt in addition to its existing capital to amplify returns, but at the cost of higher risk. That is, because of leverage, a reasonable percentage loss in bank assets can wipe out capital and lead it into insolvency. Therefore, maybe small banks, taking the brunt of six consecutive quarters of recessionary pressures could have caused pessimism among investors as to whether these small banks could survive long enough to withstand the current conditions.

When compared to large banks, small banks were more overly pessimistic, with an average 3 day reaction of +0.62% compared to large banks +0.37%. This is also shown by the fact that small banks posted on average overly pessimistic behavior (a reaction greater than 0%) in 32 out of 44 quarters observed (72.73%). By comparison, large banks had overly pessimistic behavior in 26 of 46 quarters observed (56.52%).

Figure 5:



h) Median 3 % day reaction (Large Cap vs. Small Cap Banks)

Similar to the average reaction section, the divided datasets look similar to the combined dataset in most instances. The most distinct deviation in investor opinion between large and small banks can be found in the four consecutive quarters between Q3 2008 and Q2 2009, shown graphically in Figures 6 and 7. In the average reaction section, we highlighted this distinction, and when looking at medians the same variation can be found. Small banks exhibited notably pessimistic behavior while large banks exhibited notably optimistic behavior. In this timeframe, large banks had an average reaction (using medians) of negative 3.18%. Simultaneously, small banks had an average reaction (using medians) of positive 2.76%. This represents a difference of 5.94% in medians, on average.

For the entire Q1 2008- present time frame, small banks exhibited higher median reactions and therefore greater pessimism than large banks. Small banks had a median reaction of 0.61% while large banks had a median reaction of 0.15%. Further, when looking at medians, large banks exhibited positive reactions (pessimistic behavior; a median reaction greater than 0%) in 25 out of

46 observed quarters or 54.3% of the time. Meanwhile, small banks exhibited the same overly pessimistic behavior in 34 out of 44 tracked quarters or 77.2% of the time. This disparity which can be found when examining both mean and median reactions is noticeable and should be considered when trying to understand investor perception of the financial crisis and the impact it could have on banks, and how that perception was related to the size of the bank. Potentially, when examining investor behavior, it is important to consider ulterior factors beyond size. It may not be simply the fact that banks which were smaller that led investors to not believe in their future EPS; a larger bank may naturally generate more trust from investors. Additionally, there may have been a greater belief that large banks can 'turn it around' when the recession ends. This can be considered an example of bias, as the reaction analysis shows that investors were overly pessimistic towards smaller banks as a whole. This proposed potential trust of large banks even defies wisdom to some degree, as it were these large banks (Bear Stearns, Lehman Brothers, JP Morgan, Goldman Sachs) that especially ventured into these risky junk bonds and punished investors with significant share price declines or even bankruptcy.

Figure 6:

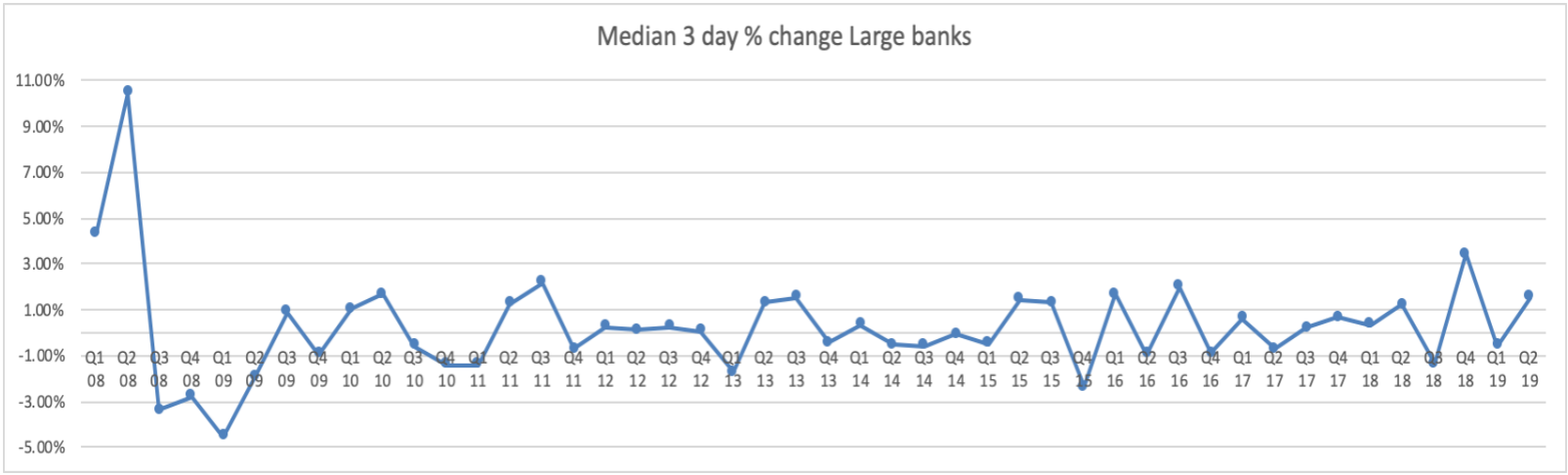
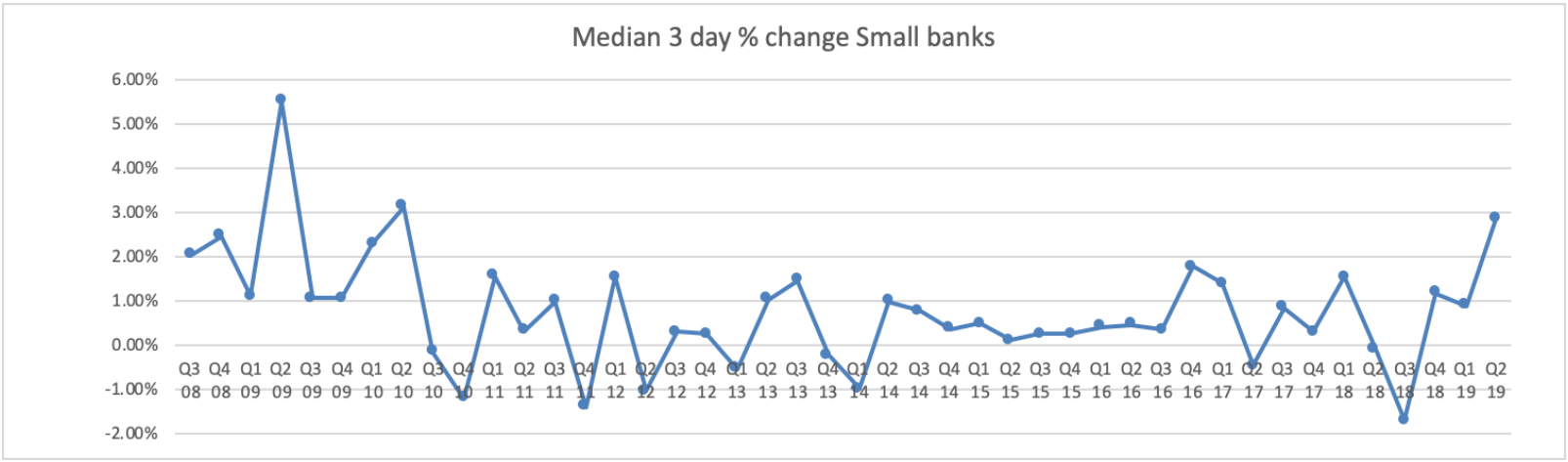


Figure 7:



i) Standard deviation of three day % reaction (Large vs. Small Banks)

As described previously, standard deviations in our samples allow us to judge the accuracy of analyst forecasts and the overall uncertainty of investors looking at financials. Interestingly, there is a significant disparity between small and large banks in the most recently observed quarter, Q2 2019, which is outlined in Figures 8 and 9. Large banks had a standard deviation of 2.84% while small banks had a standard deviation of 6.93%. We also find that large banks had a standard deviation 5.95% higher than small banks in Q4 2008 (15.76% vs. 9.81%). However, after that Q4 2008 period, from Q1 2009 to Q4 2010 (8 consecutive periods), small banks had a higher standard deviation every period by an average of 1.32%, signaling uncertainty and disagreement about small banks. Interestingly, in the 44 quarters we can compare standard deviation between large and small banks, 22 times the large banks standard deviation exceeded small banks, and the other 22 times small banks exceeded large banks. Overall, large banks for the entire collection period had a

slightly higher standard deviation with an average standard deviation of 4.75% and a median of 4.02%. By comparison, small banks had a slightly lower average at 4.59% and median at 3.78%.

Figure 8:

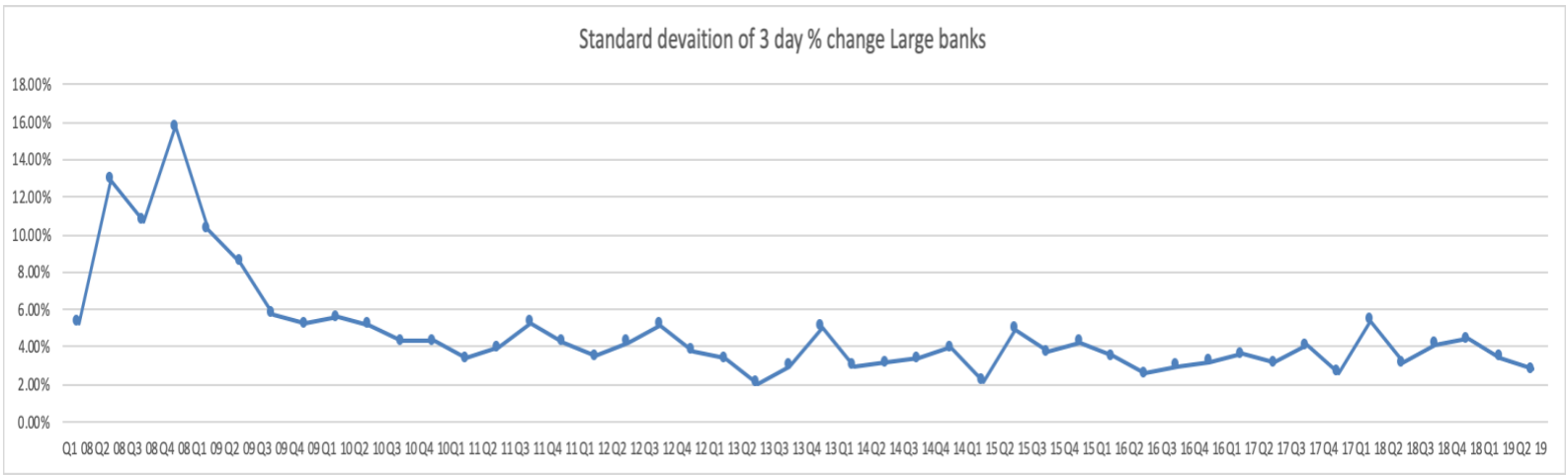
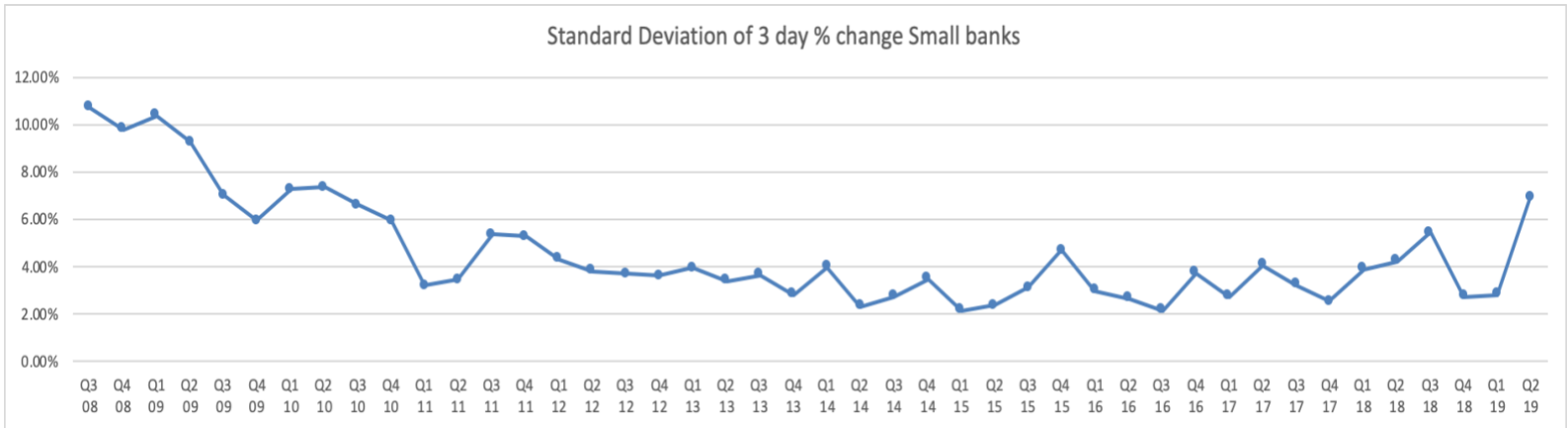


Figure 9:



j) Regression Background

In order to further the research, regression analysis was performed under a number of circumstances. The dependent (Y) variable is the earnings surprise performed earlier in this paper, the three day % earnings reaction. The independent (X) is the return of a financials ETF, ticker VFH (Vanguard Financials). This X variable was maneuvered to make a "quarterly" return to match directly with the quarterly nature of the earnings surprise. This was done by taking stock price action for VFH from January 1- March 31 for Quarter 1, April 1- June 31 for Quarter 2, and so on.

First, a regression was done to test whether the average 3 day reaction had a statistically significant relationship to the VFH returns. The term contemporaneous is used to signify that the regression was done on a one for one basis; that the relationship between Q2 2008 returns would be tested directly with Q2 2008 bank reactions. The same was done for median reaction and standard deviation of reactions. Further, regressions were analyzed on the split data set of large and small market cap banks. Later, the dataset was further split in half into smaller time periods (one set from Q1 2008-Q3 2013 and another portion Q4 2013-Q2 2019). This allows us to evaluate whether either time sample exhibited more or less uncertainty. Further, it may be possible that the first half (2008-2013) of the sample shows that investors were more reliant on internal biases because of less tangible information available surrounding the crisis.

The same regressions were done on a single quarter lag basis. This signifies that the independent variable of VFH returns were lagged to make Q2 2008 reactions be tested for their relationship to (previous quarter) Q1 2008 VFH returns. This is a way to determine whether extrapolation exists, that is, if investors witness a severely negative quarter in the present and project overly negative earnings assumptions into future expectations. This will attempt to show

whether investors are overconfident in their belief that negative stock performance will prolong long into the future.

k) Regression Analysis Findings

After conducting an analysis of 63 unique regressions varying by bank size, time period, lag, and other variables, we are able to make some conclusions surrounding our hypotheses. To begin, we conducted numerous contemporaneous regressions (judging the relationship between earnings and stock returns of the same period). Logically, one would expect that if earnings reactions are positive, concurrent stock returns will be positive. Likewise, if earnings are negative, returns will be negative for the same time period. That correlation is looked at as a "sanity check" because the earnings behavior is overwhelmingly expected to be related to stock returns in the same period. This baseline evaluation is interestingly found to be not true; the actual results of the median earnings surprise regression have an x variable that is surprisingly negative with a significant p value of 0.033 as shown in panel b of Table 1 below. From the negative x variable, we can determine that in periods in which financial returns are positive, earnings reactions are negative. That is, median earnings three-day reactions are negatively correlated to bank returns. We cannot necessarily theorize the root of this surprising result, as one would suppose that there would be a positive correlation. One possible theory is that especially during the height of the crisis from 2008- 2012, even if earnings reactions are positive in a period, share prices may still decline given the overwhelming environment of a recession. Therefore, our sample size of 11 years and 46 quarters may be too small and should be revisited after more time passes and is an area for further research. Additionally, we cannot make a judgement based off of the average earnings surprise regression because it returned a p value that was not significant at 0.3 as shown in panel

a of Table 1. It is also important to mention that a few of these readings were not statistically significant, particularly when trying to decipher the bias between large and small banks, indicating that the regression results were not all clear. The p-values were not significant at a 5% level and/or 0 was contained within the upper and lower 95% confidence intervals, likely because we are decreasing the sample size. As a whole, we can conclude that if median earnings reactions are positive (negative) for a given quarter, stock returns are likely negative (positive) for the same quarter within the 11-year sample.

The next hypothesis was looking at whether extrapolation existed in the market during the time periods tested. Were investors overconfident in taking what they see in terms of returns today and projecting those beliefs too far in the future? An example of extrapolation would be an investor witnessing positive stock returns in one quarter and taking that information as a sign that positive earnings can be expected to carry forward a quarter from today. This was tested by lagging a financial ETF's returns against our mean and median earnings reactions of many different variations (split dataset by bank size, by time period). Once the lags were implemented, the regressions did not return the hypothesized results, as shown in columns c and d of Table 1 with insignificant (greater than .05) p values of .762 and .352. Therefore, there was no statistically significant evidence to suggest this extrapolation behavior was present. However, it is important to mention this finding still does not rule out the possibility of extrapolation. Likewise, the lack of statistical significance pointing towards irrationality is not the same as proof of rationality in the markets. It can be further theorized that investors may very well be extrapolating as predicted, but the given analysis could not pick it up. Investors may have been extrapolating on a different frequency than the current quarter to next quarter as tested. Investors may instead have been extrapolating on a shorter-term scale; projecting biased views from day to day or week to week,

thus leading the regression to fail to observe this behavior by quarters due to the time buckets of the data available. But overall, based on a one quarter lag, there does not seem to be any systematic optimism or pessimism bias by investors resulting from recent financial sector returns.

The regressions of the standard deviations of reactions are compared to the absolute value of quarterly financial ETF returns. This is because the standard deviation is always in positive terms. Further, standard deviation measures the magnitude of returns, not the direction (positive or negative). The lagged regression that shows whether earnings standard deviation is a predictor of future returns is statistically significant with a p value of .002 as portrayed in column e of Table 1. From this significant reading we can deduce that there was uncertainty in the market. This shows that for large positive or negative returns in the past, uncertainty among investors and analysts rolls over into future quarters. In digging deeper into this significant reading, we wanted to find whether standard deviation was different based on the size of banks by market cap. We initially hypothesized that there would be positive surprise (over-pessimism) for smaller banks when uncertainty is high. The subsequent tests were able to find statistical significance across the large bank sample as well as the small bank sample (shown in columns f and g of Table 1), but we are ultimately unable to determine which subset is disproportionately driving results and the bias we were searching for.

We also wanted to determine whether time periods would affect the readings, however we found no statistical significance for either portion of the divided dataset, possibly due to the reduced sample size in splitting the data.

Table 1:

	a) Average Earnings Reaction vs. ETF returns (contemporaneous)	b) Median Earnings Reaction vs. ETF returns (contemporaneous)	c) Average Earnings Reaction vs. ETF returns (lagged)	d) Median Earnings Reaction vs. ETF returns (lagged)	e) Standard Deviation of Earnings Reaction vs. Absoloute ETF returns (lagged)	f) Standard Deviation of Earnings Reaction for Large Banks vs. Absoloute ETF returns (lagged)	g) Standard Deviation of Earnings Reaction for Small Banks vs. Absoloute ETF returns (lagged)
Intercept	0.007	0.008	0.006	0.007	0.036	0.038	0.033
(p value)	(0.028)	(0.007)	(0.061)	(0.024)	(0.000)	(0.000)	(0.000)
X Variable 1	-0.026	-0.050	-0.007	-0.022	0.132	0.109	0.145
(p value)	(0.304)	(0.033)	(0.762)	(0.352)	(0.002)	(0.022)	(0.000)
obs	46	46	45	45	45	45	44
r-squared	0.024	0.099	0.002	0.020	0.195	0.117	0.312

VI. Concluding thoughts, what to work on going forward

This analysis finds that the hypothesized anticipated results can be confirmed. Since the financial crisis, investors and analysts alike have been overly pessimistic in their analysis of banks' abilities to emerge from the crisis and subsequently the degree to which those banks can be profitable in the future. This finding is supported by a mean three day reaction of +0.67% and median of +0.49%. In other words, looking at a large sample of 48 banks from 2008 to Q2 2019 shows that holding banks from the day before earnings to the day after would yield a positive +0.49% to 0.67% per quarter return. This in effect shows that investors were biased against the financial sector for the observed time period. While this is understandable given the factors of uncertainty surrounding the stock market and financial institutions during the climax of the most recent crisis, it also exemplifies the persistence of such biases and irrationality as discussed in the literature review. The Efficient Markets Hypothesis claims that share prices always incorporate all available information, making excess returns (alpha) unattainable. This research shows that due to inherent patterns of biases that led to overly pessimistic behavior, alpha was possible by

recognizing this behavior. Engelberg, et al. (2018) discussed this observation and looked at the psychology of human decisions causing irrationalities and anomalies that the Efficient Markets Hypothesis does not recognize. Likewise, Engelberg, et al. (2018) discussed the over-optimistic and over-pessimistic nature of investors analyzed in this paper. It states that earnings announcements are a way to immediately adjust stock prices, answering the question of whether people were previously too optimistic or too pessimistic. Patterns of such behavior can be assumed to be irrational behavior. The findings of the analysis conducted here can back up the conclusion of Engelberg, et al (2018) that investors can be systematically over-optimistic or over-pessimistic about a certain firm or group of firms, leading to anomalous returns surrounding earnings.

As this research continues, many different factors can be analyzed to find unique disparities to get further insight into investor mindsets and behaviors at the critical time of the most recent financial crisis. This research delved into market cap to determine discrepancies in the size of firm and corresponding factors that go along with size including public notoriety and perceived proximity to the risky assets that were partially to blame for the crisis, but numerous other factors are of interest.

The topics focused on in this paper such as Behavioral Finance, the Financial Crisis, and earnings behavior are certainly broad enough so that numerous iterations and extensions of this research can be conducted. Given more time was available to research this topic further, we would want to further explore the characteristics of the sample banks that would make them more or less prone to bias. Further research could also examine how the behavior of these banks compares to that of other industries, or the market as a whole. This would be accomplished by comparing the three day percentage change values between banks and the market. Likewise, an analysis could be done to test the relationship (using regression) between the returns of the market and the

corresponding earnings reactions for the broad market sample. Later editions of this research would also examine how time periods like the chosen 2008-2019 timeframe compared to bank behavior in prior periods. This would be interesting to compare the findings of this research with time periods of relative stability and also with other financial crisis periods.

The research performed and analyzed in this paper gives insight into complex investor behavior as a whole and during the financial crisis of 2008 in particular. Given a background understanding of behavioral finance detailing how a rational decision maker should and should not act, and providing evidence to support a financial system that is devoid of rationality in a key time period such as 2008-2019, readers can make claims about the biases that may have caused this pattern of anomalous behavior.

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Appendix:

Table 2:

ASB	BAC	BBT	BK	BOH	BOKF	BSRR	C
CBSH	CFR	CMA	COF	CVBF	EGBN	EWBC	FHN
FITB	FMBI	FNB	GBCI	GS	GSBC	HBAN	JPM
KEY	MS	MTB	NWBI	NYCB	ONB	PACW	PBCT
PFBC	PNC	PPBI	RF	SBNY	SIVB	SNV	STI
STL	TCBI	TCF	TRMK	USB	VLY	WBS	WFC

Tickers of 48 Banks Tested