Stock price overreaction: evidence from bull and bear markets

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Abstract

Purpose – In this paper, we provide new evidence to strengthen the stock market overreaction hypothesis by examining a new context that has not been explored before. Our research is inspired by the widely held belief that investor sentiment experiences abrupt changes from optimism to pessimism as the market switches between bull and bear states.

Design/methodology/approach – If the stock market overreaction hypothesis is correct, it implies that investors are inclined to become excessively optimistic during bull markets and overly pessimistic during bear markets, resulting in overreaction and subsequent market correction. Consequently, the study first develops two testable hypotheses that can be used to uncover the presence of stock market overreaction with subsequent correction. These hypotheses are then tested using long-term data from the US market.

Findings – The study's findings support the hypothesis while also revealing a significant asymmetry in investor overreaction between bull and bear markets. Specifically, our results indicate that investors tend to overreact towards the end of a bear market, and the subsequent bull market starts with a prompt and robust correction. Conversely, investors appear to overreact only towards the end of a prolonged bull market. The correction during a bear market is not confined to its initial phase but extends across its entire duration.

Research limitations/implications – Our study has some limitations related to its focus on investigating stock market overreaction in the US market and analyzing the pattern of mean returns during bull and bear market states. Expanding our study to different global markets would be necessary to understand whether the same stock market overreaction effect exists universally. Furthermore, exploring the relationship between volatility and overreaction during different market phases would be an exciting direction for future research, as it could provide a more complete picture of market dynamics.

Practical implications – Our study confirms the presence of the stock market overreaction effect, which contradicts the efficient market hypothesis. We have observed specific price patterns during bull and bear markets that investors can potentially exploit. However, successfully capitalizing on these patterns depends on accurately predicting the turning points between bull and bear market states.

Social implications – The results of our study have significant implications for market regulators. Stock market overreactions resulting in market corrections can severely disrupt the market, leading to significant financial losses for investors and undermining investor confidence in the overall market. Further, the existence of overreactions suggests that the stock market may not always be efficient, raising regulatory concerns. Policymakers and regulators may need to implement policies and regulations to mitigate the effects of overreactions and subsequent market corrections.

Originality/value – This paper aims to provide additional support for the stock market overreaction hypothesis using a new setting in which this hypothesis has not been previously investigated.

Keywords Stock market overreaction, Investor overreaction, Market correction, Bull and bear markets

Paper type Research paper

1. Introduction

The stock market overreaction hypothesis is a financial theory that asserts that investors tend to overreact to news and information concerning a company or market. This overreaction can lead to stock prices moving beyond their intrinsic value, causing potential stock mispricing. As more information becomes available and the initial reaction subsides, the stock price eventually reverts to its fundamental value over time. This restorative process is known as a correction, whereby the market eliminates mispricing and brings the stock price back in line with its intrinsic value.

JEL Classification — G10, G14, G40

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The stock market overreaction hypothesis has been scrutinized extensively in academic research. Studies, such as the winner/loser portfolio test proposed by De Bondt and Thaler (1985), support this hypothesis, showing that portfolios of top-performing stocks (winners) underperform those of worst-performing stocks (losers) over the next period ranging from 2 to 5 years after the portfolios' formation. This pattern aligns with the expectation that winners' prices fall and losers' prices rise. Additionally, research examining market reactions to large price changes supports the hypothesis, revealing that extreme movements typically lead to subsequent corrections in stock prices, indicating market overreactions to initial news (see Amini *et al.* (2013) for a comprehensive review of this strand of literature).

This paper aims to provide additional support for the stock market overreaction hypothesis using a new setting in which this hypothesis has not been previously investigated. The main idea behind our study relies on the well-established fact that investor sentiment tends to be a key driver of market movements, with bullish sentiment driving up prices and bearish sentiment driving them down. The stock market overreaction hypothesis suggests that investors may become excessively optimistic (pessimistic) in a bull (bear) market. This optimism (pessimism) can lead to an overreaction. The overreaction in a bull (bear) market should cause a market correction during the subsequent bear (bull) market. A correction represents a significant price movement in the opposite direction of the overreaction.

The study first develops two testable hypotheses that can be used to uncover the presence of stock market overreaction with subsequent correction. These hypotheses are then tested using long-term data from the US market. The empirical results not only confirm the hypotheses but also reveal a significant asymmetry in stock price overreaction between bull and bear markets. In particular, the findings suggest that investors typically overreact by the end of a bear market, leading to a quick and strong price correction at the beginning of the next bull market. On the other hand, investors seem to overreact only towards the end of a prolonged bull market. Crucially, price corrections during a bear market are not limited to the initial phase but extend throughout its entire duration.

The rest of the paper is organized as follows. Subsequent Section 2 provides the literature review. Section 3 motivates and elaborates on the hypotheses developed to assess the existence of stock market overreaction. Section 4 presents the data and the descriptive statistics, while Section 5 describes the methodology used to test our hypotheses. Section 6 reports and discusses the empirical results. Finally, Section 7 concludes the paper.

2. Literature review

The overreaction hypothesis in the context of stock markets suggests that investors tend to overreact to news or information, causing stock prices to go beyond their fundamental value. According to this hypothesis, investors become excessively optimistic when positive information is revealed and bid up prices beyond what is justified. Similarly, when negative information is released, investors become overly pessimistic and push prices lower than they should be. This overreaction can lead to price bubbles and subsequent market corrections as prices eventually return to more reasonable levels.

The paper by De Bondt and Thaler (1985) is a seminal work on stock market overreaction. In this paper, the authors not only introduced the overreaction hypothesis but also proposed the winner/loser portfolio test. In this test, the winner (loser) portfolio is constructed from stocks that outperformed (underperformed) the market in some prior periods. Their study showed that the loser portfolio outperformed the winner portfolio over 2- to 5-year subsequent periods.

The insights of De Bondt and Thaler (1985) were groundbreaking at the time, and their work has become a classic in behavioral finance. This initial study was supported by later

studies, such as De Bondt and Thaler (1987), Jegadeesh (1990), and Lehmann (1990), which showed that a contrarian strategy of buying losers and selling winners yields significant returns. Subsequent research has refined the De Bondt–Thaler methodology, using different US stock universes, time periods, formation/holding periods, and countries, generally supporting the overreaction hypothesis.

Besides the winner/loser portfolio test, another popular method to test market overreaction involves examining market reactions to large price changes. The idea behind this test is straightforward: if investors overreact to news, then an extreme positive market return should be followed by lower than expected returns, and an extreme negative market return should be followed by higher than expected returns. Pioneering studies by Atkins and Dyl (1990) and Bremer and Sweeney (1991) proposed this test. Research on market reactions to large price changes generally supports the market overreaction hypothesis, showing that extreme movements are often followed by subsequent corrections in stock prices.

It is crucial to emphasize that in the winner/loser portfolio test, each portfolio is constructed from individual stocks. Therefore, this test examines whether investors overreact to firm-specific information. In contrast, the test based on large price changes can be conducted using either individual stocks (as in the studies by Atkins and Dyl (1990), Bremer and Sweeney (1991), and Park (1995)) or market indices (such as the studies by Nam *et al.* (2006) and Bali *et al.* (2008)). The results of these tests reveal that investors overreact not only to firm-specific news but also to market-wide news. This indicates that stock price overreaction is a universal phenomenon.

Research on stock market overreaction has also revealed an asymmetric reaction to positive and negative news. Specifically, De Bondt and Thaler (1989), Atkins and Dyl (1990), and Nam *et al.* (2006) document that investors exhibit a stronger reaction to negative news than to positive news. Additionally, Veronesi (1999) observes that stock prices tend to underreact to good news during bad economic times.

To the author's best knowledge, no one has tested the market overreaction hypothesis by examining the pattern of stock market returns during bull and bear markets. The study by Miralles-Marcelo *et al.* (2014) does use bull and bear markets, but its goal is to investigate whether there is an asymmetric reaction to large price changes in good and bad economic times. This study reveals that positive shocks are much more important than negative shocks, especially during downward price trends. In other words, the stock market overreaction effect is strongest after large price increases during bear markets.

According to research in behavioral finance, stock market overreaction can be attributed to cognitive decision biases. One example is the representativeness bias, as suggested by Barberis *et al.* (1998). This bias makes investors too optimistic or pessimistic about a company's future profitability when they receive a long sequence of good or bad news. Consequently, stocks that experience extended periods of earnings growth become overvalued, while those undergoing prolonged earnings declines become undervalued. Eventually, the prices of these stocks will revert to their fundamental values.

Investors who exhibit the representativeness bias tend to make financial decisions based on a limited and selective range of information, often relying only on the most recent sequence of news about a firm. In a similar vein, De Bondt (2020) suggests that market overreaction can be attributed to predictable errors in forecasting future cash flows, which are later corrected. Specifically, investors tend to naively extrapolate past earnings trends and develop unrealistic expectations of future profitability. This can lead to distorted stock prices and market overreaction that eventually adjusts to reflect the underlying realities of the firm's performance.

Research in behavioral finance often emphasizes the link between investor sentiment and stock market overreaction. Investor sentiment refers to the overall attitude and emotions of investors towards the market and specific stocks. It can range from extreme optimism to extreme pessimism and can influence investment decisions.

When investor sentiment is overly optimistic, it can lead to stock market overreaction. This means that investors may overvalue certain stocks based on positive news or trends, causing the prices to rise to levels that are not justified by the fundamentals of the company. This overvaluation creates a situation where the stock is more likely to experience a correction or decline in value in the future. Conversely, when investor sentiment becomes excessively pessimistic, it can lead to stock market overreaction in the opposite direction. Investors may undervalue certain stocks due to negative news or trends, causing the prices to fall below their true fundamental value. In this case, the underpriced stocks are more likely to experience a rebound in the future as market sentiment improves and investors recognize the true value of the company.

Numerous studies, including those by Clarke and Statman (1998) and Fisher and Statman (2000), have found a positive relationship between stock market returns and future changes in investor sentiment. These findings suggest that high (low) market returns can lead to bullish (bearish) sentiment among investors. As a result, investor sentiment becomes a significant driver of market movements, with bullish sentiment driving up stock prices and bearish sentiment pushing them down. These conclusions are corroborated by several other studies, such as those conducted by Brown and Cliff (2005), Baker and Wurgler (2007), Kurov (2010), Garcia (2013), Chau *et al.* (2016), Yang *et al.* (2017), and Hanna *et al.* (2020). All of these studies provide evidence that supports the idea of investor sentiment playing a crucial role in market dynamics.

Finally, in the context of our study, it is important to emphasize the influence of herd behavior and the positive feedback effect in financial markets. As highlighted by Shiller (2005), positive news regarding a specific stock or the broader market tends to initiate buying activity, creating a cascade effect that drives prices higher. This cycle results in a "run-up" that can lead to overvaluation of the asset's price when it continues for an extended period. Herd behavior and the positive feedback effect can contribute to stock market overreaction when investors interpret positive news as a signal of sustained growth, causing the stock's price to become overvalued. If this trend persists over time, the price can detach from its underlying intrinsic value, ultimately leading to a correction. Similarly, a negative news cycle can trigger a cascade of selling, as one investor's actions prompt others to sell, ultimately leading to undervaluation and a potential rebound in price.

3. Hypotheses development

Bull and bear markets refer to extended periods of rising and falling stock prices. In a rational economic model, these market phases align with periods of positive and negative economic news. Axiomatically, the mean market return is positive during a bull market and negative during a bear market. However, rather than assuming a constant mean return, we anticipate a specific pattern in the mean market return throughout a bull or bear market. Additionally, we expect a negative relationship between cumulative returns in two consecutive market states.

Our story goes as follows. During a bull market, the release of positive economic news and earnings growth give investors a boost of optimism. With many feeling confident about the economy and market conditions, there is a surge in stock demand as investors aim to capitalize on rising prices and potential profits. This cycle of positive news and market growth repeats as investors become more bullish and confident, which drives further investment. However, this cycle can lead to excessive optimism, causing an overreaction by the end of the bull market and causing the stock market to become overvalued.

In contrast, during a bear market, negative economic news fuels pessimism among investors. Many feel anxious and uncertain about the economy and market conditions, causing a decrease in demand for securities as investors aim to avoid any potential losses and reduce their risk exposure. This cycle of negative news and market declines can lead to an

overreaction as investors become increasingly bearish and cautious, which causes further selling. Ultimately, excessive pessimism can result in the stock market becoming undervalued by the end of the bear market.

Our narrative indicates that investors tend to become more optimistic (pessimistic) as a bull (bear) market progresses. Consequently, we anticipate an increase in the mean market return by the end of a bull market. In contrast, we expect the mean market return to decrease (become more negative) by the end of a bear market. Due to investors' tendency to overreact, market prices typically deviate significantly from their fundamental values by the late stage of a bull (bear) market. As a result, we foresee a market correction during a new market state. In the context of our empirical study, we define a stock market correction as a relatively short-term phenomenon. Specifically, it refers to a swift and significant price movement that occurs in the opposite direction of the initial overreaction observed at the beginning of a market state.

In summary, our narrative suggests two testable hypotheses. The first hypothesis is that investors' tendency to overreact leads to more pronounced mean market returns at the onset and ending of a market state compared to the middle. Specifically, a bull market commences with a correction marked by a substantial increase in stock prices. Subsequently, the price growth stabilizes for a period, followed by an escalation as investors adopt a more bullish stance. Conversely, a bear market initiates with a necessary correction characterized by a significant decrease in stock prices. The price decline then moderates for a period before intensifying as investors turn more bearish.

The second hypothesis is that the tendency of investors to overreact implies a negative relationship between cumulative returns in two consecutive market states. This expectation arises from the observation that overreaction leads to significant overvaluation at the end of a bull market state and undervaluation at the end of a bear market state. This departure from fundamental values prompts a correction in the subsequent bear or bull market. As originally proposed by De Bondt and Thaler (1985), if market prices systematically overshoot or undershoot, two specific properties of price dynamics should be observed. First, extreme movements in market prices should be offset by subsequent movements in the opposite direction. Second, the more extreme the initial price movement, the greater the subsequent adjustment.

Finally, given that investors exhibit a stronger reaction to negative news than positive news, we anticipate asymmetric price overreaction in bull and bear markets. For example, it would not be surprising to find a more pronounced overreaction at the end of a bear market compared to a bull market. This asymmetry also implies that the market correction at the beginning of a bull market is expected to be stronger than that at the beginning of a bear market. As highlighted by Shiller (2005), the positive feedback effect tends to be more potent during extended periods of positive or negative economic news. Therefore, we can assume that the longer the duration of a market state, the stronger the overreaction effect should be.

4. Data and descriptive statistics

Our data come at the monthly frequency and represent the capital gain returns on the Standard and Poor's (S&P) Composite index. Robert Shiller introduced the S&P Composite index to extend the returns on the S&P 500 index back to 1871. We obtain data on the S&P Composite index from two sources. Specifically, William Schwert [1] provides the index returns from January 1871 to December 1925, while the Center for Research in Security Prices (CRSP) supplies the index returns from January 1926 to December 2022.

Using the returns, we reconstruct the index values. The bull and bear market turning points are identified using the method proposed by Pagan and Sossounov (2003). This method seems to be the most widely accepted method among researchers for such purposes

(some notable examples are Gonzalez *et al.* (2005), Kaminsky and Schmukler (2007), and Claessens *et al.* (2012)). The method is based on Bry and Boschan (1971)'s dating algorithm for US business cycles. It involves two main stages: identifying initial turning points and performing censoring operations. During the first stage, peaks and bottoms are determined by comparing points within an 8-month window around the date. The highest peak and lowest bottom are then selected to ensure alternation. In the second stage, censoring operations are applied to guarantee a stock market state lasts at least 4 months (unless exceeding a 20% market move), and a complete market cycle spans at least 16 months.

Table 1 presents the summary statistics of the bull and bear markets. Specifically, this table reports the number of states, the minimum, median, average, and maximum state duration, as well as the mean state return and standard deviation of returns. Over the sample period, there were 41 bull and bear markets. The average (median) bull market duration is 29 (26) months, while the bear market's average (median) duration is 15 (14) months. Consequently, a bull market's average (median) duration is approximately double as long as that of a bear market. The mean monthly return is equal to 1.9% (−2.1%) in a bull (bear) state of the market, while the standard deviation of returns amounts to 4.4% (5.0%) in a bull (bear) state of the market.

5. Methodology

5.1 Testing the first hypothesis

Our first hypothesis says that investors' tendency to overreact results in more pronounced mean market returns at the beginning and end of a market state compared to the middle. To investigate this hypothesis, we divide each observed state into three periods based on its duration: the first 25%, the middle 50%, and the last 25%. These periods represent the initial quarter, central half, and final quarter of the state, respectively. Subsequently, we sort the market returns over all bull (bear) states into three bins based on these time partitions. Finally, we calculate the mean market returns in each bin and test the null hypothesis that the mean market returns in the first and last quarters of the market state are greater than the mean market return in the central half of the state. To this end, we use the standard two-sample *t*-test.

However, the issue arises from dating market states based on the analysis of price peaks and troughs, introducing a bias that leads to elevated returns around turning points. For instance, market returns immediately before a peak tend to be higher compared to periods preceding it, while returns right after the peak are mechanically lower than returns observed sometime after the peak.

Statistic	Bull markets	Bear markets
Number of states	41	41
Minimum duration	4	3
Median duration	26	14
Average duration	29	15
Maximum duration	75	44
Mean return	1.9	−2.1
Std. deviation	4.4	5.0

Note(s): Duration is measured in months. Monthly mean returns and standard deviations are reported in percentages

Source(s): Table created by author

Table 1. Summary statistics of the bull and bear markets

To assess the bias, we employ a non-parametric simulation methodology. Our null hypothesis posits that the mean market state return remains constant. A benchmark model consistent with this hypothesis is a two-state regime-switching model, where returns are independent and identically distributed within each state, albeit with state-dependent distributions. Utilizing this model, we generate an extensive time series of artificial returns. The state durations are simulated by resampling with replacement from observed state durations. Within each market state, bull (bear) state returns are simulated by resampling with replacement from the observed returns across all bull (bear) states.

In the end, we reconstruct prices by utilizing simulated returns and apply the dating algorithm to the simulated prices. We categorize the returns into three bins and then calculate the mean returns. Our simulation results reveal that, despite simulating state returns with constant means, the mean market returns in the first and last quarters of the identified bull (bear) market state are approximately 10% (29%) larger (in absolute value) than the mean market returns in the central half. Consequently, our bias correction involves adjusting the mean market returns in the central half of the bull state by 10% and by 29% in the bear state.

5.2 Testing the second hypothesis

Our second hypothesis posits that investors' tendency to overreact tends to result in the market being significantly overvalued at the end of a bull market state and undervalued at the end of a bear market state. This deviation from fundamental values necessitates a market correction during the subsequent bear or bull market phase. Therefore, we anticipate a negative relationship between the market movements before and after a turning point.

Regrettably, information about the speed and duration of a market correction is unavailable within the context of bull and bear markets. Some corrections may occur swiftly and abruptly, while others may be more prolonged and gradual. Given the inherent uncertainty regarding the duration of a correction, we measure the market movements before and after a turning point between two subsequent market states i and $i + 1$ using the cumulative returns over m months before a turning point and m months after a turning point. We vary the number of months m within certain limits.

Let $r_{j,i}$ denote the log return in month j of market state i, and let n_i denote the duration of the market state i (in months). The cumulative return at the end of market state i, denoted as $CR_i(m)$, and the cumulative return at the beginning of subsequent market state $i + 1$, denoted as $CR_{i+1}(m)$, are defined as follows:

$$CR_i(m) = \begin{cases} \sum_{j=1}^{m} r_{n_i-j+1,i} & \text{if } m \le n_i \\ \sum_{j=1}^{n_i} r_{n_i-j+1,i} & \text{if } m > n_i \end{cases}, \quad CR_{i+1}(m) = \begin{cases} \sum_{j=1}^{m} r_{j,i+1} & \text{if } m \le n_{i+1} \\ \sum_{j=1}^{n_{i+1}} r_{j,i+1} & \text{if } m > n_{i+1} \end{cases}$$

Note that in both cases, if the duration of the market state is shorter than m months, the cumulative return equals the cumulative return over the whole state.

Let $CR(m)$ denote the collection of all $CR_i(m)$, and let $CR_{+1}(m)$ denote the collection of all $CR_{i+1}(m)$. If investors tend to overreact, the correlation coefficient between $CR(m)$ and $CR_{+1}(m)$ is expected to be negative and statistically significantly different from zero.

It is worth noting that the number of bull and bear market states in our sample is 41. Consequently, all correlations are estimated using samples with a maximum of 41 observations. Because the sample size is rather small, the statistical inference based on parametric assumptions is unreliable. To address this concern, p-values for tests of zero correlation coefficients are computed using the bootstrap method.

Utilizing the benchmark regime-switching model outlined in the preceding section, we examine whether the bull-bear dating algorithm introduces bias in estimating the correlation coefficient between market movements before and after a turning point. Our comprehensive simulation experiments revealed no discernible bias.

6. Empirical results

Table 2 presents the estimated mean monthly returns for the first quarter, central half, and last quarter of the state duration for both bull and bear market states. The mean market returns for the central half are adjusted for bias under the null hypothesis. Additionally, this table presents p-values from testing the null hypothesis that the mean market returns in the first and last quarters are higher (in absolute values) than the mean market returns in the middle half. Panel A (B) of Figure 1 features a bar plot that visually represents the mean bear (bull) market returns relative to the state duration partitioning.

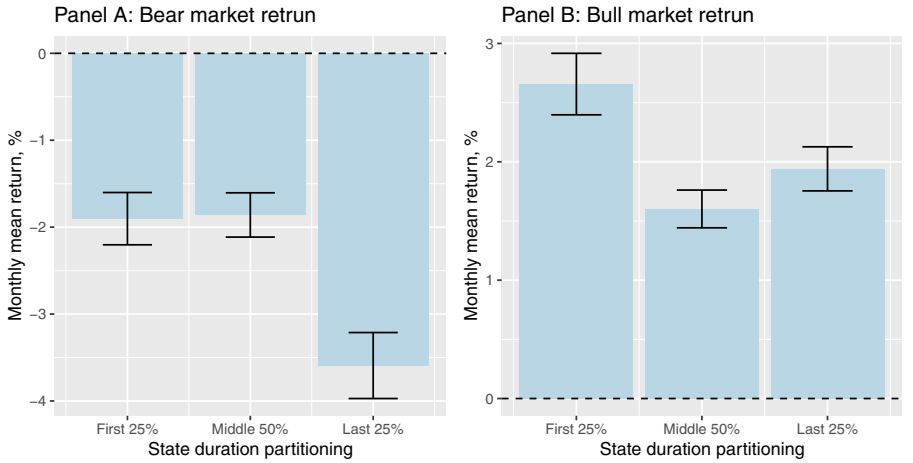
Our findings provide clear evidence that the mean market returns in the end of a bear market and the beginning of a bull market are more extreme than the mean market returns in

	Bull markets		Bear markets	
State duration partitioning	Mean	p-value	Mean	p-value
First 25%	2.66***	(<0.01)	−1.90	(0.46)
Middle 50%	1.60		−1.86	
Last 25%	1.94	(0.11)	−3.59***	(<0.01)

Note(s): The table presents the estimated mean monthly returns for the first quarter, middle half, and last quarter of the state duration. Mean returns are expressed in percentages. The p-values are from the test of the null hypothesis that the mean market returns in the first and last quarter are higher (in absolute values) than the mean market returns in the middle half. The p-values are given in parentheses with starts indicating *p<0.1; **p<0.05; ***p<0.01

Source(s): Table created by author

Table 2. Results of testing the first hypothesis



Note(s): Error bars show the standard error of estimations of mean returns

Source(s): Figure created by author

Figure 1. Mean returns in bull and bear markets versus the state duration partitioning

the middle of each corresponding market state. Specifically, a bear market typically concludes with a substantial price decline, while a bull market commences with a notable price increase. Conversely, our results indicate that the mean market returns at the beginning of a bear market and the end of a bull market do not differ significantly from the mean market returns in the middle of each respective market state. Although we note a substantial economic difference in the mean returns at the end of a bull state compared to the middle, this difference does not attain statistical significance at conventional levels. Consequently, our first hypothesis testing results support the notion of price overreaction to negative news but not positive news.

Table 3 reports the results of testing the second hypothesis. Specifically, this table reports the correlation coefficient and its associated p-value between the cumulative returns over m months before a turning point and the cumulative returns m months after a turning point. Considering that the average length of a bear market is roughly half as long as that of a bull market, the number of months (m) being analyzed will vary accordingly. Specifically, for the turning point between a bear and subsequent bull market, the range will be between 2 to 20 months. For the turning point between a bull and the next bear market, the range will be between 2 to 40 months. Additionally, the table reports the correlation coefficient between the total cumulative returns over the bull (bear) market states and the total cumulative returns in the subsequent bear (bull) market states.

First of all, the results reported in Table 3 reinforce evidence of price overreaction to negative news. In particular, regardless of the number of months m, all correlation coefficients between cumulative returns at the end of bear markets and the cumulative

Months	Bear to bull	Months	Bull to bear
2	−0.46***	4	−0.07
	(0.01)		(0.35)
4	−0.48***	8	−0.13
	(<0.01)		(0.22)
6	−0.47***	12	0.05
	(<0.01)		(0.42)
8	−0.37***	16	−0.12
	(0.01)		(0.25)
10	−0.54***	20	−0.14
	(<0.01)		(0.20)
12	−0.61***	24	−0.19
	(<0.01)		(0.14)
14	−0.65***	28	−0.24*
	(<0.01)		(0.07)
16	−0.51***	32	−0.30**
	(<0.01)		(0.04)
18	−0.52***	36	−0.33**
	(<0.01)		(0.04)
20	−0.58***	40	−0.36**
	(<0.01)		(0.02)
All	−0.15	*All*	−0.55***
	(0.17)		(<0.01)

Note(s): This table reports the correlation coefficients between the cumulative returns over m months before a turning point and m months after a turning point. *Bear to Bull* denotes the transition period between a bear market and the subsequent bull market. *Bull to Bear* indicates the transition period between a bull market and the next bear market. The row with *All* months reports the correlation coefficients between the total cumulative returns over two subsequent market states. The p-values are given in parentheses with starts indicating *p<0.1; **p<0.05; ***p<0.01

Source(s): Table created by author

Table 3.
Results of testing the second hypothesis

returns at the beginning of the subsequent bull markets are negative and statistically significant at the 1% level or better. This finding suggests that a large price drop at the end of a bear market tends to be followed by a strong price rebound at the beginning of the subsequent bull market. Apparently, investors overreact to negative news, and by the end of a bear market, the market prices are notably below their fundamental values.

Second, although the results from testing the first hypothesis do not support the presence of price overreaction at the end of a bull market, the findings from testing the second hypothesis indicate that investors tend to exhibit overreaction in bull markets when their duration is sufficiently long. Specifically, starting from $m = 30$ months and encompassing all subsequent months, the correlation coefficients between cumulative returns at the end of bull markets and the cumulative returns at the beginning of the following bear markets are consistently negative and statistically significant at the 5% level or better.

Investors' tendency to overreact in a prolonged bull market is not surprising. As the market ages, herd behavior and positive feedback effect gradually develop, becoming stronger over time. This positive feedback effect, seen during a prolonged bull market, gives rise to what Alan Greenspan famously referred to as "irrational exuberance." This phenomenon involves investors displaying an intense reaction to positive news during a bull market, causing them to overestimate the value of securities. These artificially inflated prices do not accurately reflect the market's underlying fundamentals. The issue with irrational exuberance lies in creating a bubble where investors continue to buy overvalued securities fueled by excessive optimism in pursuit of profits. However, this bubble eventually bursts, leading to a sudden price decline and significant financial losses for investors.

To confirm whether investors tend to overreact in a prolonged bull market, we calculate correlation coefficients between $CR(m)$ and $CR_{+1}(m)$ separately for long and short bull markets. We define long (short) bull markets as those lasting longer (shorter) than the median duration. The findings from these computations are presented in Table 4. These results verify

Months	Long bull to bear	Short bull to bear
1	−0.23	0.06
	(0.14)	(0.42)
2	−0.59***	−0.27
	(0.01)	(0.12)
3	−0.72***	−0.09
	(<0.01)	(0.33)
4	−0.55***	0.33*
	(0.01)	(0.09)
5	−0.31*	0.25
	(0.10)	(0.14)
10	−0.61***	0.09
	(<0.01)	(0.38)
15	−0.39*	0.08
	(0.05)	(0.36)
All	−0.62***	0.04
	(<0.01)	(0.47)

Note(s): This table reports the correlation coefficients between the cumulative returns over m months before a turning point and m months after a turning point. *Long Bull to Bull* denotes the transition period between a long bull market and the subsequent bear market. *Short Bull to Bear* indicates the transition period between a short bull market and the next bear market. The row with *All* months reports the correlation coefficients between the total cumulative returns over two subsequent market states. The p-values are given in parentheses with starts indicating *p<0.1; **p<0.05; ***p<0.01

Source(s): Table created by author

Table 4. Results of testing the second hypothesis for long and short bull markets

the evidence of price overreaction in long bull markets while indicating the absence of such behavior in short bull markets.

We also tested the first hypothesis for the long bull markets and subsequent bear markets (these results are not reported due to space limitations). We found that the mean market return in the last quarter of the long bull markets is statistically significantly higher than that in the middle half at the 7% level. However, we could not reject the null hypothesis that the mean market return in the first quarter of the subsequent bear markets equals that in the middle half.

In summary, the outcomes of testing our two hypotheses indicate that the stock market tends to overreact to both negative and positive economic news. However, a significant asymmetry exists in how the stock market overreacts to negative and positive news. This asymmetry can be explained through the concept of loss aversion (Kahneman and Tversky (1979)). Loss aversion posits that investors feel stronger emotional responses to losses than gains. Consequently, negative news tends to trigger more rapid and pronounced reactions in the market than positive news.

The evidence supporting overreaction to negative news remains consistent regardless of the news duration. Our results suggest that investors' pessimism during a bear market tends to develop into a full-blown panic, triggering a market crash. However, a market crash is a relatively short-lived phenomenon during which the market prices drop notably below their fundamental values. Typically, a market crash at the end of a bear market is followed by a period of market rally known as a "V-shaped recovery." This recovery signifies a rapid and robust market correction at the onset of a subsequent bull market.

In contrast, our findings indicate that investors overreact to positive economic news only when their duration is sufficiently long. Specifically, we observe evidence of overreaction in bull markets when their duration surpasses the median duration. Ultimately, the duration of a bull market hinges on the longevity of positive market news, typically characterized by periods of robust and sustainable economic growth. Strong economic growth contributes to increased corporate profits, reduced unemployment, and heightened consumer spending. These factors gradually foster a supportive environment, elevating investor optimism that leads to overreaction.

Overreaction in a prolonged bull market tends to be followed by a correction during the subsequent bear market. In stark contrast to a bull market, a correction in a bear market is not concentrated in its beginning. In an unreported study, we find no relationship between the duration of a bull market and the duration of the subsequent bear market. Thus, a lengthy bull market does not necessarily lead to an extended bear market. However, a strong negative relationship emerges between the duration of a bull market and the cumulative return in the subsequent bear market. Besides, we also detect a robust negative relationship between the cumulative return in a bull market and the mean return in the next bear market. These results suggest that a strong bear market tends to occur as a response to an overreaction in a preceding bull market.

7. Conclusions

This paper examines stock market dynamics during bull and bear markets to validate the price overreaction hypothesis. The hypothesis suggests that investors become excessively optimistic in bull markets, while in bear markets, they become overly pessimistic, resulting in overreactions and subsequent corrections. Two testable implications arise from this hypothesis. First, the mean market returns at the start and end of a market state should be more pronounced compared to the middle. Second, there should be a negative relationship between cumulative returns in two consecutive market states.

The outcomes of our investigation largely support the stock market overreaction hypothesis predictions. Nonetheless, aligning with earlier research, we observe a notable asymmetry in

how investors respond to negative and positive news and how overreaction is corrected. Specifically, our findings indicate that investors tend to overreact by the end of bear markets, and the subsequent bull markets start with a swift and strong correction. Conversely, investors tend to overreact only towards the end of a prolonged bull market. The correction during a bear market is not confined to its initial phase but is dispersed across its entire duration.

Our paper investigates the stock market overreaction hypothesis in a novel context that has not been studied in the past. Our study confirms the presence of the stock market overreaction effect, which contradicts the efficient market hypothesis. We have observed specific price patterns during bull and bear markets that investors can potentially exploit. However, successfully capitalizing on these patterns depends on accurately predicting the turning points between bull and bear market states.

The results of our study have significant implications for market regulators. Stock market overreactions resulting in market corrections can severely disrupt the market, leading to significant financial losses for investors and undermining investor confidence in the overall market. Further, the existence of overreactions suggests that the stock market may not always be efficient, raising regulatory concerns. Policymakers and regulators may need to implement policies and regulations to mitigate the effects of overreactions and subsequent market corrections.

Finally, our study has some limitations related to its focus on investigating stock market overreaction in the US market and analyzing the pattern of mean returns during bull and bear market states. Expanding our study to different global markets would be necessary to understand whether the same stock market overreaction effect exists universally. Furthermore, exploring the relationship between volatility and overreaction during different market phases would be an exciting direction for future research, as it could provide a more complete picture of market dynamics. Overall, our study signposts several promising avenues of research that could enhance our understanding of asset pricing and strengthen investment decision-making frameworks.

Note

1. https://www.billschwert.com/gws_data.htm

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