QUANTIFYING STOCK MARKET OVERREACTIONS

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ABSTRACT

Many stock market watchers have speculated that stock markets sometimes perform in an irrational manner. This paper will attempt to illustrate examples of investor irrationality by looking at the phenomenon of investor 'overreaction' in stock markets during and shortly after particularly volatile market days. This task will be accomplished by analyzing widely available stock market data with SAS during periods of exceptional share price fluctuations, and comparing that information with long term stock market performance. Any emerging trends during periods of volatility will help validate the idea that financial markets do not always behave in a rational manner, and that perhaps a wise investor with enough capital can take advantage of periods of high stock market volatility.

INTRODUCTION

It had been noticed by the author that large point losses in stock market indices often seem to be followed by strong 'rebounds' the following day. The question of whether such a phenomenon exists is more than an academic one. If such a predictable trend does exist then a couple of important implications would follow.

One implication of such a 'rebound' phenomenon is that it could provide a mechanism for some investors to try to time the market and cash in on a quick return. Such a predictable trend would also suggest that the market is not always performing in a rational manner, at least in the sense that the prior day would seem to be an overreaction and the subsequent rebound would seem to be a price correction to the previous day's volatility. This also is of some interest to economic theorists who often assume rational responses by investors in their financial models.

One way of thinking about the daily returns of the stock market is to treat each day's return as an independent event. However, it is often believed that 'bull' and 'bear' markets exist. During these periods it is often thought that the results of any given day is more likely to move in a positive or negative direction depending on the market trend.

Given that momentum of bull markets would seem to be stopped by a large loss, or boosted by a large gain, it is of interest to see the reaction of the market on the day following a large gain or loss.

The focus of this paper is simply to determine if there is a recognizable trend of stock share prices on days following large stock market fluctuations.

DATA SOURCE

For this study the Composite New York Stock Exchange (NYSE) index was used. The data utilized in this paper is the closing price of this index on each market day from 1980 until 2002.

There are a couple reasons that the NYSE Composite Index was selected. First, this index is a broad index that includes a majority of US stocks and thus provides a good summary of overall stock market behavior. This index is also a wider index then the Dow Jones, S&P 500 and NASDAQ indices, and consequently the NYSE Composite has a broader amount of information contained within it than most other indices. Second, the index is widely published and widely available.

PROCEDURE

The daily return for the NYSE Composite was calculated in the SAS data step for each market day from 1980 until 2002. The return cited throughout this paper is the one-day percentage change in the NYSE Composite index and not the change in the point value.

Changes in the value of the NYSE Composite index of more than 2% and more than 3% in were decided to constitute a large daily change. The days with such a change in value are relatively rare. In the period between 1980 and 2002, slightly less than 5% of days recorded a change of 2% or more, and only about 1% of market days had a change of 3% or more.

The study is broken into 4 time periods: 1980 – 1989, 1990 – 1999, 2000 – 2002, and 1980 – 2002. The idea of looking at different periods is to determine if the market reaction has changed over time.

Most data manipulation and analysis for this paper was accomplished in SAS using the data step and proc means.

Using proc means, the mean daily return, standard deviation of the mean daily return and number of observations were calculated for the 1980's, 1990's, 2000's and the entire period from 1980 to 2002. Each of these statistics were compiled for the subsets of days following a 2% or greater gain, a 3% or greater gain, a 2% or greater loss and a 3% or greater loss for each of the four time periods.

Finally, the p-value was calculated from the results generated by proc means. The p-value is a statistic that is calculated using the number of observations, the mean daily return of days following a volatile day, the mean for all days of a given period and the standard deviation for days following a volatile day.

The p-value reflects the probability that the mean does not deviate from the mean of all market days for a given time period. Thus, a lower p-value suggests that the deviation between the mean return for all days of a given period and for the days examined is more significant.

RESULTS

Results 1980 - 2002

Generally between 1980 and 2002 the market had a positive trend, returning an average of 0.04% per day. This period also includes several economic recessions and one substantial crash in 1987. The NYSE Composite lost nearly 20% of its value on one day in 1987, but the market recovered and continued an upward trend

Below the results are listed of the daily return on days that follow a substantial price change for the period from 1980 until 2002. The total return for all listed days is also displayed.

NYSE Composite Results 1980 – 2002

Description	Mean of Daily Returns	P-Value
All Market Days	0.04%	
Days after 2% gain	0.35%	0.01
Days after 3% gain	0.57%	0.10
Days after 2% loss	(0.08%)	0.31
Days after 3% loss	(0.07%)	0.44

The results indicate that there is no such rebound effect during this period. Instead, there is a reverse effect, suggesting that when the market is rising it is likely to continue to rise the next day.

This is in line with the idea that there are 'bear' and 'bull' markets, that the day following a gain is likely to produce another gain.

Results 1980 – 1989

During the 1980's there were 2,526 market days, of which 122 days had a change of greater than 2%. This period was characterized by generally rising share prices and strong economic growth, although there were periods of poor returns. The market results of this period are shown below:

NYSE Composite Results, 1980 - 1989

Description	Mean of Daily Returns	P-Value
All Market Days	0.05%	
Days after 2% gain	0.54%	0.02
Days after 3% gain	1.55%	0.06
Days after 2% loss	(0.57)%	0.11
Days after 3% loss	(0.81)%	0.28

The results of the 1980's decidedly show that a rebound effect did not occur during that time frame. In fact, just the opposite occurred, as a strong gain was often followed the following day by another strong gain and a strong loss was often strongly followed by a loss.

Results 1990 – 1999

It may be recalled that the period from 1990 through 1999 was a period of generally strong stock market growth and the infamous internet 'bubble.' Most internet company stocks were not traded on New York Stock Exchange so much of the internet stock phenomenon is not directly included in this data. However, it is true that most stocks in the NYSE Composite Index enjoyed a period of strong growth during the 1990's, though generally not to the same extent as the technology-heavy NASDAQ index.

During the 1990's there were 2,528 market days, of which 70 days had a change of greater than 2%. The market results of this period are shown below:

NYSE Composite Results, 1990 - 1999

Description	Mean of Daily Returns	P-Value
All Market Days	0.05%	
Days after 2% gain	0.29%	0.07
Days after 3% gain	(0.06)%	0.41
Days after 2% loss	0.44%	0.07
Days after 3% loss	1.40%	0.05

Interestingly, the results of the 1990's do seem to indicate that there was a 'rebound' effect following particularly large losses. The average increase of 1.4% on days following a 3% or greater loss is quite substantial, making up a large portion of the previous day's loss.

Results 2000 – 2002

The period from 2000 through 2002 was generally characterized by declining stock prices. During that period, there were 752 market days, of which 99 days had a daily change of more than 2%. The results are displayed below:

NYSE Composite Results, 2000 - 2003

Description	Mean of Daily Returns	P-Value
All Market Days	(0.03)%	
Days after 2% gain	0.14%	0.23
Days after 3% gain	0.03%	0.44
Days after 2% loss	0.09%	0.35
Days after 3% loss	0.23%	0.33

The results of the 2000's show that the same rebound effect does appear to continue from the 1990's, albeit at a substantially reduced rate and with much less significant p-values. This is interesting, since over this period the market was loosing value, however the rebound effect at least weakly continued to exist.

CONCLUSION

The results of the study show that there certainly was not a widespread occurrence of stock market 'rebounds' during the 1980's. However, it does appear that that there is some evidence that such a phenomenon did exist in the 1990's and to a lesser extent in between 2000 and 2002.

This is an interesting dichotomy in time periods, since the both the 1980's and the 1990's were marked by strong stock market growth.

One possible explanation for the different results between the time periods is that the increase in computing power and personal access to stock trades have allowed quicker (and perhaps panicked) responses to large fluctuations in the stock markets. It will be interesting to see if the tendency will continue to exist or if the 1990's and early 2000's were an aberration.

REFERENCES

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