

## **LARGE DAILY PRICE CHANGES AND SUBSEQUENT RRESPONSES:**

### **THE CASE OF THE S&P 500**

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#### **ABSTRACT**

This paper presents the results of an analysis of daily price-changes for the S&P 500 for the period August 16, 1958, through August 15, 2008. Price changes of more than 1%, 2%, 3%, 4%, 5%, and 6% were identified and presented for the 50-year period. In addition, relative price changes for days following “large” price changes were analyzed in order to determine if a profitable market timing strategy could be generated based on the analysis of the data.

#### **INTRODUCTION**

Anyone who has ever invested, whether in real estate, gold, the stock market, or beanie babies, will immediately recognize and be empathetic to the psychological dementia that sometimes overwhelms even the most prudent of investors, causing them to suddenly veer off from what for them might have been a proven investment strategy. As with any other investment strategy, investing in stocks is often about timing---buying into the market when stock prices are low and relatively undervalued, and selling when prices are high and perhaps overvalued. The age old question, however, is how does anyone know for certain whether the market valuation is low enough to enter, or, too high and ripe for exit? Experience has shown that even the most erudite stock analysts (including Nobel Prize economists) often incorrectly predict not only the magnitude but the direction of market moves. The safest strategy then, particularly for long term stock investors, is simply to stay invested over the long haul, making only minor adjustments by sector based on prudent analysis of current economic conditions. The worst possible move, over time, appears to be those situations where investors panic and sell after large downturns, or when they buy under conditions of irrational exuberance. But again, how can anyone know, even generally, whether to buy or sell during periods of highly volatile markets? Everyone, apparently, is an expert when it comes to picking historical market high and low points given the benefit of hindsight---but that is never an option.

#### **PURPOSE**

Armed with the knowledge that no one is consistently able to make accurate predictions in the magnitude and direction of the market, professional analysts are still, apparently, genetically programmed to prognosticate. And we the investor are still, apparently, prone to listen and make snap judgment investment decisions that may or may not be in our best interest. Given the economic uncertainty of the

past decade, however, it would be interesting to determine whether investors might be justified in attempting to micro-manage their portfolios using rules similar to those employed by market timers. In other words, should investors be looking at specific percentage moves in stock indexes as a hint for when to buy and sell stocks----and if so, what percentage moves would that be in order to beat the returns one would receive if s/he simply stayed invested over the long haul? Additionally, once the change data is investigated, will a clear pattern emerge validating the proposition that incremental decreases and increases provide specific buying and selling opportunities? Further, do these “opportunities” offer greater advantage to investors than simple long term buy and hold strategies? If market timing works, the authors expect that evidence should emerge pointing to that effect.

The authors of the current study thus investigated five separate decade long increments beginning 1958-1968 and running through the period 1998-2008 for evidence that buying and selling during periods of market turbulence will demonstrate an advantage over buy and hold strategies. By isolating daily incremental fluctuations (of between 1% and 6%) occurring in the S&P 500 over these periods, the authors were able to make some tentative conclusions on the validity of buying and selling of stocks based solely on specific percentage movements in the market. A recap of the study and methodology is provided in the following sections.

## DISCUSSION

Consider, for example, the economic news investors have endured just over the past ten months: rapid increases in energy costs associated with the rising price of imported oil; weak consumer confidence due to rising inflation, high unemployment, and the potential (if not actual) specter of recession; increased foreclosures in the housing market and the subsequent evaporation of housing prices; bank foreclosures; problems at Fannie Mae and Freddie Mac, record losses at big brokerage houses such as Bear Stearns and Merrill Lynch; the declining value of the dollar in relation to other major currencies such as the Euro; the demise of the American auto industry; etc. From an economic perspective, American consumers have been treated to a constant stream (ad-nauseam) of bad economic news, punctuated of course by incendiary political rhetoric from both sides of the political aisle claiming that the fault lies with the other side. No small wonder then that having exacted its “pound of flesh,” the stock market has acted rather erratically. Table 1 below presents aggregate changes over the most recent ten months using the market-close peaks for the three most common market measures, the DJIA, the NASDAQ, and the S&P 500.

As can be gleaned from Table 1, a substantial decline in market value began in October 2007 and extended through July 15, 2008. In addition to the decline in market value, it should be noted that the period has also seen higher than average variations in closing stock index values from one trading day to the next. Hence, as one might expect, the uncertainty surrounding the economic environment appears to be reflected in the increased number of significant (i.e., > 1%) daily advances and declines in the market. Analysis of the daily changes in the S&P 500 index from October 9, 2007 to August 15, 2008 reveals that of the 214 available trading days, 87 witnessed market-closings changes of 1% or greater from the previous trading period. In other words, when daily market changes of more than one percent occur roughly 40% of the time, daily changes of this magnitude are quite obviously no longer a rarity. As indicated in Table 2 below, 39 of the 87 daily changes of  $\geq 1\%$  were increases while 48 were decreases, with several increases/decreases being 3% and one increase during the period of 4%.

**TABLE 1**  
**Recent Price Changes**

Measure	Decline from Peak* to Low**	Decline from Peak* to 8/15/08	Decline from Beginning of 2008	Increase from Low** to 8/15/08
DJIA	23.6%	17.7%	12.1%	6.4%
NASDAQ	24.1%	14.2%	7.5%	13.1%
S&P 500	22.4%	17.1%	11.6%	6.9%

\* The peak-close for the DJIA and the S&P 500 occurred on October 9, 2007. The recent peak-close for the NASDAQ occurred on October 31, 2007. Obviously, the NASDAQ peaked earlier (March 10, 2000).

\*\* The low-close for 2008 for the NASDAQ occurred on March 10. For both the S&P 500 and the DJIA, the 2008 low-close was July 15.

**TABLE 2**  
**Daily Increases and Decreases**  
**October 9, 2007 to August 15, 2008**

<u>Daily Change at Least</u>	<u>Increases</u>	<u>Decreases</u>
5.0%	0	0
4.0%	1	0
3.0%	3	2
2.0%	12	18
1.0%	39	48

In order to evaluate whether the percentage of change frequencies appear large in comparison to historical average daily price fluctuations, the authors investigated the daily price change of the S&P 500 over the past 50 years. Table 3 is a compilation of our investigation.

Table 3 presents evidence of increasing variability over time, with the 10-year period ending in 1998 being the only decade not experiencing an increase from one period to the next. From an overall perspective, there were 60 more “large” price-change increases than decreases (i.e., 1297 verses 1237) occurring over the last five decades, suggesting that down turns of 1% or greater are being offset by incremental upturns of similar magnitude. Further analysis of the data indicates that as the percentage changes increase to 2% or higher, advances still outnumber decreases by 45 (351 versus 306) over the same period with more percentage change advances than decreases until we reach the 5% level (with one more decrease of the magnitude than increase). Relatively speaking, changes of 5% or more have

**TABLE 3**  
**Cumulative Fifty-Year Daily Changes in the S&P 500**  
**(Year-end August 18)**

<u>Decade</u>	<u>Change</u> <u>≥ 1%</u>	<u>Change</u> <u>≥ 2%</u>	<u>Change</u> <u>≥ 3%</u>	<u>Change</u> <u>≥ 4%</u>	<u>Change</u> <u>≥ 5%</u>	<u>Change</u> <u>≥ 6%</u>
98-08	776	213	55	16	6	1
88-98	435	55	10	3	3	2
78-88	600	113	24	11	6	4
68-78	481	74	14	4	1	0
58-68	242	30	8	2	1	1
Total	2534	485	111	36	17	8

<u>Decade</u>	<u>Up</u> <u>≥ 1%</u>	<u>Up</u> <u>≥ 2%</u>	<u>Up</u> <u>≥ 3%</u>	<u>Up</u> <u>≥ 4%</u>	<u>Up</u> <u>≥ 5%</u>	<u>Up</u> <u>≥ 6%</u>
98-08	383	105	32	11	4	0
88-98	246	28	4	1	1	0
78-88	328	63	12	4	2	1
68-78	228	45	11	4	1	0
58-68	112	16	5	1	0	0
Total	1297	257	64	21	8	1

<u>Decade</u>	<u>Down</u> <u>≥ 1%</u>	<u>Down</u> <u>≥ 2%</u>	<u>Down</u> <u>≥ 3%</u>	<u>Down</u> <u>≥ 4%</u>	<u>Down</u> <u>≥ 5%</u>	<u>Down</u> <u>≥ 6%</u>
98-08	393	108	23	5	2	1
88-98	189	27	6	2	2	2
78-88	272	50	12	7	4	3
68-78	253	29	3	0	0	0
58-68	130	14	3	1	1	1
Total	1237	228	47	15	9	7

historically been quite rare, with only 7 daily periods experiencing an extreme price-change of greater than 6% in the last fifty years. Unfortunately, out of that seven days of 6% fluctuation, six have been price-decreases. Losses at the 6% or greater level, while severe, have occurred no more than three times during any one ten-year period. While some declines have been of enormous magnitude (e.g., October 19, 1987), from an historical perspective, such declines now appear an aberration and pale in comparison to the overall increase in the valuation of the market indices since that period. A 419 point decline in 2008, for example, would amount to around 4%---a bad day, but hardly the earth shaking crisis such a drop had on the financial markets back in 1987. Overall, it would appear from the historical data that missing out on the incremental increases would, in the long run, be more costly than simply absorbing the decreases while being fully invested in the market. Over time, there are clearly more advances than there are declines. This trend appears to hold even at the 5% or greater level. Only at the 6% of greater level do we see significantly more declines than advances, but those declines have occurred only 7 times during periods of 1% or greater change in market valuations---out of over 2500 available periods---or, less than 3 in 1000 odds. Based on historical trends, the fact that market advances appear to have a distinct advantage

over market declines of any significance, the best bet still appears to be one of a buy and hold strategy as opposed to trying to beat the market.

In addition to analyzing the data by decade, we broke down the final decade (the most volatile) into one-year periods. Table 4 shows the price-change data by year.

Roughly 100 changes of more than 1 percent is approximately the norm for each year. Since there are about 250 trading days for each year, roughly 40% of the time we see changes of more than 1%. The year 2003 was unusual and had substantially more volatility than the typical year during that decade. For 2003, about 60% of the trading days experienced changes of more than 1%. The 4-year period after that, 2004-2007, was a period of substantially reduced volatility. Only about 15% of the trading days had changes of more than 1%. Inconsistency seems to be the norm.

**TABLE 4**  
**Large Price Changes for Past 10 Years**

Year Ended	Change	Change	Change	Change	Change	Change
<u>August 17</u>	<u>&gt; 1%</u>	<u>&gt; 2%</u>	<u>&gt; 3%</u>	<u>&gt; 4%</u>	<u>&gt; 5%</u>	<u>&gt; 6%</u>
2008	98	33	5	1	0	0
2007	36	7	1	0	0	0
2006	34	2	0	0	0	0
2005	32	0	0	0	0	0
2004	49	1	0	0	0	0
2003	153	59	20	6	2	0
2002	107	37	13	4	2	0
2001	105	29	9	3	1	0
2000	98	31	8	2	1	0
1999	99	35	8	3	2	1

  

Year Ended	Up	Up	Up	Up	Up	Up
<u>August 17</u>	<u>&gt; 1%</u>	<u>&gt; 2%</u>	<u>&gt; 3%</u>	<u>&gt; 4%</u>	<u>&gt; 5%</u>	<u>&gt; 6%</u>
2008	47	14	3	1	0	0
2007	16	2	0	0	0	0
2006	18	2	0	0	0	0
2005	16	0	0	0	0	0
2004	25	1	0	0	0	0
2003	69	28	12	5	2	0
2002	49	17	7	3	2	0
2001	45	14	6	2	1	0
2000	54	14	5	1	0	0
1999	55	21	4	2	1	0

Year Ended	Down	Down	Down	Down	Down	Down
<u>August 17</u>	<u>&gt; 1%</u>	<u>&gt; 2%</u>	<u>&gt; 3%</u>	<u>&gt; 4%</u>	<u>&gt; 5%</u>	<u>&gt; 6%</u>
2008	51	19	2	0	0	0
2007	20	5	1	0	0	0
2006	16	0	0	0	0	0
2005	16	0	0	0	0	0
2004	24	0	0	0	0	0
2003	84	31	8	1	0	0
2002	58	20	6	1	0	0
2001	60	15	3	1	0	0
2000	44	17	3	1	1	0
1999	44	14	4	1	1	1

### SUBSEQUENT PRICE CHANGES

In our attempt to determine whether investors might be justified in attempting to micro-manage their portfolios, we analyzed the returns for the day following a large price change. We used data from various time periods and found consistent results. Table 5 presents the results using the data for the entire 50-year period.

**TABLE 5**  
**Price Change Day-After Large Price Change**  
**(in Percent)**

<u>Increase</u>	Average <u>Change</u>	<u>Standard Deviation</u>
>1%	0.18	1.04
>2%	0.31	1.35
>3%	0.28	1.98
>4%	0.30	2.79
>5%	0.57	3.90
>6%	-3.92	Single Observation

  

<u>Decrease</u>	Average <u>Change</u>	<u>Standard Deviation</u>
>1%	-0.08	1.39
>2%	0.06	2.19
>3%	0.10	3.65
>4%	0.68	6.21
>5%	0.96	8.13
>6%	3.69	1.43

The data do not support any appreciable pattern of price-change after a large price change. Variation in the price-change is simply too great. Unfortunately, the data suggest that large price changes don't provide the investor with sufficient information which would lead to a profitable timing strategy. Buy and hold continues to be the investor's optimal policy.