

# Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency

By Daniel Nathan

Bar Ilan University (2006)

## Abstract

This paper, which is loosely based on the paper of Jegadeesh & Titman from 1993, documents the strategies of buying stocks which have performed well over the last 15 to 40 trading days and selling stocks which have performed poorly over the same period. We find our results distinctly different from that of Jegadeesh & Titman perhaps due to different time intervals or a much smaller sample. Our results imply that, contrary to Jegadeesh and Titman paper, buying past losers is a profitable strategy which cannot be explained by the seasonality, hence raising question to the validity of the efficient market hypothesis. This cannot be said to buying/selling past winners which did not yield any statistical significance.

Note: After analyzing the results of the loser's portfolio, it became apparent that **buying** and not selling the losers, contrary to the results by Jegadeesh & Titman is a highly profitable strategy. Hence, the table showing the results of the loser's portfolio is adapted for a strategy of buying the losers and not selling the losers since we thought it would not be interesting to see that selling losers is not profitable at all. Moreover, the paper concentrated on trying to explain why buying losers if profitable

## *Efficient Market Hypothesis Challenged*

Why bother checking if momentum investing can be an effective trading strategy if supposedly the market is efficient? The fact that money can be made based upon historical data and prices available to all people would challenge even weak-form efficiency. Never the less, over the last decade, multiple tests have been performed to try to challenge EMH and some will be mentioned in this text. A few of these explanations come from an area called Behavioral Finance.

Behavioral Finance is a study of investor market behavior that derives from psychological principles of decision making, to explain why people buy or sell the stocks they do. Behavioral Finance focuses upon how investors interpret and act on information to make informed investment decisions. Investors do not always behave in a rational, predictable and an unbiased manner indicated by the quantitative models. Behavioral finance places an emphasis upon investor behavior leading to various market anomalies.

A popular view held by behavioral economists and psychologist alike is that people overreact to information.<sup>1</sup> De Bondt and Thaler suggested because of this a strategy of buying past losers and selling past winners that will achieve abnormal returns.

Another popular notion in investment is called "Value" Investing. Stocks with low price-per-earnings ration are called "Value" Stocks. Value investors proposed that markets over reacted to negative news. Benjamin Graham and David Dodd in their classic book, *Security Analysis*, asserted that over reaction was the basis for a value investing style. David Dreman in 1978 argued that stocks with low P/E ratios were undervalued, coining the phrase overreaction hypothesis to explain why investors tend to be pessimistic about low P/E stocks.

Those stocks have appeared to provide higher rates of return than stocks with high price-per-earnings ratio as shown by Basu (1977) and Ball (1978). This method has gained a lot of attention due to Warren Buffet who is an advocate of choosing "Value" Stocks. These results put a question mark on the EMH and its validity but these findings do not necessarily imply inefficiency. Proponents of EMH say that this may be simply failure of the CAPM to take into account another risk factor<sup>2</sup>. As Fama and French (1993) have shown, beta is not the only factor that can explain all systematic risk. This may be true but we also have to remember that Fama and French did not come up with a reason to why such factors are an important measure of risk.

Proponents to the EMH such as Malkiel and Fama say that the EMH with all the anomalies that have been found through the years is still a valid hypothesis. In a paper from 2003, Malkiel confronts the recent anomalies found by critics and behavioral economists and claims that the EMH is still valid. Fluck, Malkiel and Quandt (1997) simulated a strategy of buying stocks over the last 13-year period during the 1980s and the early 1990s that had particularly poor returns over the past three to five years. They have found that stocks with very low returns over the past three to five years had higher returns in the next period, and that stocks with very high returns over the past three to five years had lower returns in the next period. However, they also found that returns in

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<sup>1</sup> See Kahneman and Tversky (1982) De Bondt and Thaler (1985)

<sup>2</sup> See Malkiel (2003), Fama and French (2002)

the next period were similar for both groups, so they could not confirm that a contrarian approach would yield higher than average returns.

### ***The De Bondt and Thaler 1985 study***

De Bondt and Thaler studied two portfolios of 35 stocks, one consisting of past extreme winners over the prior three years and one consisting of past extreme losers over the prior three years. Past losers subsequently outperformed winners over the next four years. Past losers were up 19.6 percent relative to the market in general. Past winners were down five percent relative to the market in general. A difference of 24.6 percent between the two portfolios. Study suggests that investors cause market prices to deviate from fundamental values creating inefficient markets.

De Bondt and Thaler results are questioned and some explanations<sup>3</sup> have been offered. Some of these include the size effect and the effect of systematic risk. In addition, the long-term losers outperform the long-term winners only in Januaries. Jegadeesh (1990) reported that a contrarian strategy, based on information from the previous month, yields statistically significant excess return of 1.99% per month over the 1934-1987 in the US markets, and 1.75% outside January. Jegadeesh proposed explanation is lack of liquidity in the market rather than over-reaction.

### ***The Jegadeesh & Titman 1993 study***

In contrast to De Bondt & Thaler, Jegadeesh & Titman took a different approach known as momentum investing. Jegadeesh & Titman argued that buying winners and selling losers can yield high returns that would result in a profitable strategy. They documented from 1965-1989 data, strategies which buy stocks that have performed well in the past and sold stocks that have performed poorly in the past over 3 to 12 months holding periods. They found out that these strategies are not due systematic risk or delayed reactions to common factors. However it is important to note that that they found out that some of the abnormal returns generated in the first year dissipate in the following two years. It is interesting to note that they did not check for seasonality to explain their higher returns.

### ***Research in recent years***

It has been 13 years since Jegadeesh & Titman have made their research paper. It is interesting to see what has been done with recent data and in different stock exchanges around the world. We could not find such articles covering Tel-Aviv Stock Exchange. We did find some data about other stock exchanges in the world.

To name a few there are Glaser, Markus and Weber, Martin (April 2002). In there, an analysis is shown of the German Stock Market with strategies that buy stocks with high

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<sup>3</sup> See Chan (1988), Ball and Kothari (1989) and Zarowin (1990).

returns over the previous three to 12 months and sell stocks with low returns over the same period.

In Carlos Forner & Joaquín Marhuenda (2003), empirical evidence shows profitability in a 12 month holding period with buying winners and selling losers in the Spanish Stock Exchange. Michael Drew (2004) found evidence that is consistent with Jegadeesh & Titman in the Australian Stock Market.

There has been more research done in many more countries trying to evaluate the profitability of relative strength portfolios. Some appeared to be profitable, some not profitable due to commissions.

Although it may seem that the EMH no longer holds with all these research against it, we have to remember that many could be the result of 'data snooping', letting the computer search through the data sets of past securities prices in the hopes of finding some relationships. With the advent of fast computers and easily accessible stock market data, it is not surprising that some statistically significant correlations have been found, especially because published work is probably biased in favor of reporting anomalous results rather than boring confirmations of randomness.

Moreover, Fama (1998) argues in his paper that apparent anomalies can also be due to methodology, the anomalies are sensitive to the techniques used to measure them, and many disappear with reasonable changes in technique. We also have to remember that momentum strategies in the US achieved abnormal returns in the early 1990s but negative returns during 2000. Could it be all due to chance alone? If that is the case then choosing a portfolio based on relative strength could be hazardous to our returns.

It is interesting to note that Schwert (2003), argues that many notorious anomalies have disappeared in recent years (Such as the seasonality effect). With no surprise, most of them disappear after an academic paper about them has been published.

### ***The Fama 1998 Study***

It is important to further explain Fama's paper since it is an answer to all critics such as Behavioral economists that already pronounced EMH dead.

Fama takes on different studies of empirical studies that seek to determine if stock prices respond efficiently to information.

These include such announcements as earnings surprises, stock splits, dividend, Actions, mergers, new exchange listings and initial public offerings. Fama finds That apparent underreaction to information is about as common as overreaction, And post event continuation of abnormal returns is as frequent as

Post event reversals. He also shows that many of the return anomalies are present only when very particular model and that the results tend to disappear when exposed to different models. For example, a study that gives equal weight to post announcement returns of many stocks can produce different results from a study that weights the stocks According to their value.

## Trading Strategies

If stock prices overreact or under react to information, profitable trading strategies that select past stocks based upon their historical returns will exist.

Our strategy was to sort stocks by their returns in the last 15 to 40 trading days in intervals of 5 trading days (15, 20, ..., 40), purchasing/selling them and then, after a period of 15 to 40 days selling/buying them, making a total of 6 intervals and 36 possible combinations (For instance, taking the winners of the past 15 days and holding for 40 days). We do not feel this has to make such an important difference in contrast of the choice of 4 quarters in Jegadeesh & Titman because it was simply anecdotal<sup>4</sup>. Moreover, if over-reaction or under-reaction is real, then the price correction should occur over a very short term since it is difficult to justify that any arbitrage opportunity would persist over a long period<sup>5</sup>. After sorting the stocks by their returns, they will be divided into deciles. A winner and a loser portfolio will be chosen based on the best and worst performing deciles. After a period of either 15 to 40 trading days have ended, new portfolios would be chosen again. This would be done for each of the 15-40 trading days for the period of 1999-2005<sup>6</sup>. Although 6 years gives enough information to whether the tests are statistically significant for **those years**, we know that in a whole this is not such a big sample. Sadly because of technical issues, we could not get a bigger sample. Also, as noted earlier in text, we are aware that the results we got can be due to randomness and there is no guarantee that the next 6 years or even 2 years would yield similar results.

It is important to note that the monthly returns shown below are excess returns.

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<sup>4</sup> See Jegadeesh and Titman (1993) mention as one of the reasons the anecdotal fact that Value Line assigns a price momentum factor based on the stock's past 3-12 month returns.

<sup>5</sup> See Daniel, Hirshleifer, & Subrahmanyam, 1998

<sup>6</sup> As in Jegadeesh & Titman (1993), only stocks that survived the full 6 years were taken into consideration. This can make the results more statistically significant than they really are.

Table I reports the average excess returns of the different buy and sell portfolios of the worst performing decile

Table I

**Loser portfolio**

	<u>15</u>	<u>20</u>	<u>25</u>	<u>30</u>	<u>35</u>	<u>40</u>
<u>15</u>	0.064 (1.51)	0.148 (1.23)	<b>0.030</b> <b>(2.28)</b>	-0.06 (1.40)	<b>0.027</b> <b>(2.67)</b>	<b>0.022</b> <b>(2.28)</b>
<u>20</u>	0.157 (1.28)	<b>0.032</b> <b>(2.50)</b>	<b>0.016</b> <b>(2.46)</b>	<b>0.031</b> <b>(2.15)</b>	0.143 (1.20)	<b>0.012</b> <b>(2.17)</b>
<u>25</u>	0.184 (1.31)	0.200 (1.39)	<b>0.0152</b> <b>(2.58)</b>	0.163 (1.17)	<b>0.017</b> <b>(3.12)</b>	<b>0.015</b> <b>(2.61)</b>
<u>30</u>	0.065 (1.52)	<b>0.031</b> <b>(2.32)</b>	<b>0.081</b> <b>(1.76)</b>	<b>0.0185</b> <b>(3.15)</b>	0.058 (1.37)	0.09 (1.15)
<u>35</u>	0.161 (1.30)	0.148 (1.21)	<b>0.351</b> <b>(1.81)</b>	0.131 (1.15)	<b>0.018</b> <b>(2.49)</b>	0.199 (1.53)
<u>40</u>	0.188 (1.32)	<b>0.033</b> <b>(2.49)</b>	0.114 (1.31)	<b>0.029</b> <b>(2.18)</b>	<b>0.017</b> <b>(2.29)</b>	0.137 (1.24)

Table II reports the average returns of the different buy and sell portfolios of the best performing decile

Table II

**Winner Portfolio**

	<u>15</u>	<u>20</u>	<u>25</u>	<u>30</u>	<u>35</u>	<u>40</u>
<u>15</u>	0.160 (1.005)	0.155 (1.00)	0.153 (1.00)	<b>0.154</b> <b>(1.763)</b>	0.0004 (-0.007)	0.148 (1.0135)
<u>20</u>	-0.001 (-0.178)	-0.001 (-0.248)	0.0019 (0.288)	-0.0004 (-0.060)	-0.0006 (-0.104)	0.00194 (0.250)
<u>25</u>	0.158 (1.00)	-0.002 (-0.392)	0.155 (1.009)	0.151 (1.007)	0.0049 (0.656)	0.0001 (0.0284)
<u>30</u>	0.156 (0.969)	-0.003 (-0.531)	0.1552 (0.994)	0.0014 (0.190)	0.0032 (0.398)	-0.0007 (-0.110)
<u>35</u>	-0.004 (-0.677)	-0.0008 (-0.1242)	0.0021 (0.3189)	0.0039 (0.491)	0.0042 (0.50)	0.0017 (0.25)
<u>40</u>	0.0007 (0.107)	0.0010 (0.1405)	0.0020 (0.274)	0.0030 (0.392)	0.005 (0.574)	0.00089 (0.1228)

## *Analyzing the results*

The above tables show all the possible combinations of the losers and winners portfolio and their monthly return. The columns represent the holding period and the rows represent the last 15 to 40 days on which the worst/best performing decile is chosen upon. The second data just below the monthly return is the t-statistic. Those marked with a bold font are statistically significant<sup>7</sup>. For example, the second row and the third column of the losers portfolio represents picking the worst decile over the last 20 trading days and then holding it for 30 days trading days. This yielded a monthly return of 3.1% with a 2.15 t-statistic.

What is apparent when analyzing the results is that unlike Jegadeesh & Titman's results, the winners' portfolio did not yield statistically significant results except for the combination of picking the best performing stocks over the last 15 trading days and selling it after 30 days. Perhaps looking at different time intervals would have yielded different results and perhaps not.

As noted earlier in the text, at first we simulated selling losers but when the results showed that selling losers is not a profitable strategy, we changed the course of this text and simulated buying losers as a profitable strategy. This is a sharp contrast of Jegadeesh & Titman theory but more in line with the thinking of De Bondt & Thaler but with much different time intervals. Not all the combinations are statistically significant but almost half are. These returns are high enough to be exploitable even with commissions. Of course this still does not mean that the efficient market hypothesis is not valid and we will give further in text, plausible explanations to these effects.

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<sup>7</sup> Based on a .05 alpha

## *Explaining the higher returns of the losers portfolio*

Jegadeesh (1990) observes seasonality in contrarian profits and documents a significantly different return pattern in January. Therefore, it is important to investigate whether this seasonality is specific to U.S. data, by examining the monthly pattern of short-term contrarian profits in the Israeli stock markets. In Table III, we present the results for the month of January, and for the whole period excluding the month of January. It is interesting to see that the January effect could not explain the high monthly returns. The results that were significant without neutralizing the January effect still remain significant. This means that seasonality cannot account for the higher returns.

If seasonality cannot account for the higher returns what can? We should be reminded that we picked the worst performing stocks and based on that we chose them. One of the things that can skew our results is the survivorship bias. We took into consideration only stocks that survived all the 6 years of the sample. That can cause the monthly returns appear higher than they really are.

Zarowin (1990) finds that winner and loser firms tend to differ in size. If this is the case, then profitability from the short-term contrarian strategy could be an artifact of the size effect (Keim, 1983). Could it be that we systematically chose small caps stocks in our research? As Fama & French (1992) found out, small caps stock return higher returns. We should note that we did not find any articles mimicking Fama & French 3 factor model regarding our dates and sadly, technical issues prevented us from checking ourselves neither if the small caps indeed account for higher returns nor if we picked systemically small caps at all. This question remains open.

Another interesting question would be if by chance the algorithm systematically chose stocks with higher beta and the high returns are just compensation for the higher risk we have taken upon ourselves. Sadly, this also could not be checked because of technical difficulties and thus the hypothesis of efficient market could not be rejected.

As noted earlier in text, our sample space was only 6 years and there is no guarantee that these results would be consistent over the next 6 years. As we know, arbitrage opportunities quickly disappear and there is no guarantee that this phenomenon would be consistent over time. Moreover, we did not check to see what happens to the stocks if we hold it longer than 40 days.

Table II reports the average returns of the different buy and sell portfolios of the worst performing decile **neutralizing the January effect**

Table III

	<u>15</u>	<u>20</u>	<u>25</u>	<u>30</u>	<u>35</u>	<u>40</u>
<u>15</u>	0.23 (1.36)	0.14 (1.20)	<b>0.03</b> <b>(2.22)</b>	0.21 (1.34)	<b>0.03</b> <b>(2.21)</b>	<b>0.02</b> <b>(2.00)</b>
<u>20</u>	<b>0.16</b> <b>(-2.04)</b>	<b>0.03</b> <b>(2.25)</b>	<b>0.02</b> <b>(2.05)</b>	<b>0.03</b> <b>(2.12)</b>	0.15 (1.22)	0.01 (1.51)
<u>25</u>	0.18 (1.30)	0.20 (1.40)	<b>0.01</b> <b>(1.82)</b>	0.16 (1.16)	<b>0.02</b> <b>(2.77)</b>	<b>0.01</b> <b>(1.88)</b>
<u>30</u>	0.07 (1.52)	<b>0.03</b> <b>(2.29)</b>	0.08 (1.75)	<b>0.02</b> <b>(2.58)</b>	0.06 (1.37)	0.09 (1.15)
<u>35</u>	0.16 (1.30)	0.15 (1.21)	0.31 (1.81)	0.13 (1.14)	<b>0.02</b> <b>(2.21)</b>	0.20 (1.53)
<u>40</u>	0.18 (1.30)	<b>0.03</b> <b>(2.32)</b>	0.11 (1.31)	<b>0.03</b> <b>(2.02)</b>	<b>0.02</b> <b>(1.96)</b>	0.14 (1.24)

## *Conclusions*

Although it seems that selling losers can be highly profitable, we feel that this can be attributed to either a small sample, luck, systematically higher beta or the small firm effect. We don't think we can reject EMH and we feel that more tests should be performed. Moreover, even if more tests would have been performed, we would still be skeptical to act upon the strategy because as we stressed earlier in text, there is no guarantee this phenomenon is consistent. Moreover, even if there is such an arbitrage opportunity, we are sure the players in the market would take advantage of it and make it not worthwhile to try to exploit it anymore in the future.

In a symposium, an exchange between Robert Shiller, an economist who is skeptical about the EMH, and Richard Roll, an academic financial economist who is also a fund manager was quite interesting (Roll and Shiller, 1992). When Shiller brought up the notion of inefficiencies in the market, Roll responded as follows: "I have personally tried to invest money, my client's money and my own. In every single anomaly and predictive device that academics have dreamed up... I have attempted to exploit the so called year-end anomalies and a whole variety of strategies supposedly documented by academic research. And I have yet to make a nickel on any of these supposed market inefficiencies ... a true market inefficiency out to be an exploitable opportunity. If there's nothing investors can exploit in a systematic way, time in and time out, then it's very hard to say that information is not being properly incorporated into stock prices".

The academic "battle" between proponents of EMH and those who are skeptical will continue.

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