

Explication of momentum strategy in Tehran's market for bonds and equities from risk and output perspective

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Abstract: Momentum strategy is a fundamental and highly applicable strategy implemented by analysts, portfolio managers and investors in capital markets. Being inspired by physics and Newton's first law, momentum strategy involves following market trends. As opposed to the efficient market hypothesis, momentum investment strategy claims that common stock output varies in different time periods. In this regard, using appropriate investment strategies in each situation, investors might achieve an output larger than market output. Assimilation of portfolios in time period and comparing their outputs is an efficient method of testing and assessing strategies outputs. Most studies conducted in Iranian capital market have aimed at assessing momentum strategy in light of portfolio outputs. This study is innovative in that it simultaneously investigates momentum strategy output and assesses the risk of this strategy in the Iranian market for bonds and equities. Momentum strategy portfolio's risk and output are compared with the average risk and output of Iranian market. In this regard, the financial data of 189 firms involved in the Iranian market for bonds and equities from 1996 to 2000 have been investigated in 3-month, 6-month, 9-month and 12-month time periods. This research finding reveals that the average of monthly risk and output obtained from implementing momentum strategy in 3-month, 6-month, 9-month and 12-month formation and maintenance time periods is significantly higher than the average monthly risk and output of the market portfolios.

[Kohandel Z, Zanjirdar M, Mousavi R. **Explication of momentum strategy in Tehran's market for bonds and equities from risk and output perspective.** *Life Sci J* 2013;10(3s):146-151] (ISSN:1097-8135).
<http://www.lifesciencesite.com>. 20

Key words: risk, output, momentum strategy, the efficient market hypothesis

1. Introduction

Recent studies in the last few years have challenged most presuppositions of the new financial theory. One of the most challenging evidences observed in financial markets is that, as opposed to the efficient market hypothesis underlying modern financial theory, stock output varies in different time periods and that individual investors can achieve outputs higher than market output without much risk, using appropriate output strategies. Nowadays, two main strategies-namely momentum strategy and reverse strategy- are widely implemented in world capital markets. Numerous researches have proved applicability of the two above-mentioned strategies in producing additional output. These two strategies oppose the efficient market hypothesis. So, proving the efficiency of these strategies and investigating their related variables would challenge the new financial theory and the market efficiency assumptions.

2. Behavioral finance paradigm and equity output trends

Behavioral finance paradigm is a new financial paradigm aiming at completing the standard theory through introducing the behavioral aspects of the decision-making process. Contradicting Markoites and Sharp perspective, behavioral finance

paradigm deals with individuals and methods of collecting and implementing data. Furthermore, this paradigm aims at realizing and predicting the effects of decision-making psychological processes in systematic financial markets. On the other hand, behavioral finance paradigm is implementing psychological and economic principles to improve financial decision-making processes and challenge that notion of market efficiency in which market price reflects fundamental characteristics of market and additional output is largely modifies in long term. Many research findings regarding market irregularities might not be explained by the standard financial theory (Johnson etc, 2002).

3. Market efficiency rejection evidences

To realize and explain financial markets unprofitability evidences more comprehensively, researchers should study emotional effects and psychological errors and focus on behavioral finance concepts as fundamental considerations. Furthermore, numerous researchers have come up with empirical evidences proving market unprofitability; such as market price reactions to new information, different outputs of small and large firms, different stock outputs in specific months or on specific days and investment strategy's profits. Having observed these empirical evidences,

numerous researchers have questioned the investors' logical behavior and have rejected the validity of the efficient market hypothesis. Fama brings forth two main assumptions: 1- investors' decision-making behaviors in the market are logical; and, 2) investors' transactions are based on the latest released data and news and they can judge if bonds price is fair or not (Abde Tabrizi and Gonbadi, 1375).

4. Momentum strategy

Following market trends for investment, momentum strategy claims that past positive or negative outputs will remain for a specific period in the future. Levy's study (1967) is a pioneer study on momentum strategy. Conflicts between reverse strategy and relative power strategy encouraged Jegadeesh and Titman to conduct a more comprehensive study on momentum effect. Jegadeesh and Titman are pioneers in proving momentum strategy's effect in creating significant abnormal economic-statistic results. Their research instigated more studies in this regard. Numerous researches have been conducted on the subject since 1990 and momentum strategy, as an investment strategy, has been widely implemented by institutional investors. In the literature, momentum effect has been defined as "the periodical covariance of the stock sample consequent outputs. Generally, momentum effect is defined as the direct relationship between stock outputs in specific periods and its deferred output. Individual share momentum is defined is:

$$E \left\{ \frac{1}{N} \sum_{i=1}^N (r_{i,t-1} - \bar{r}_{t-1})(r_{i,t} - \bar{r}_t) \right\} > 0.$$

In which r_{it} is the i share output in the t period; \bar{r} is the share output average in the t period; and, N is the shares number (Jegadeesh and Titman, 1993).

5. Reverse strategy

The other prevalent transaction strategy widely implemented in financial markets is the reverse strategy. This strategy recommends investors buy market non favorite shares and sell market favorite ones. Implemented by a wide range of investors, this strategy was first introduced by Dreeman in his prominent textbook (Dreeman, 1982).

6. Review of literature

Fama and French (1996) claim that firms with high BTM rate are value-based firms. Holding mere value, these firms are more profitable than low

BTM firms (Fm & French, 1996). Conrad & Cole have confirmed reverse strategy's success in long term and momentum strategy's success in middle term. They consider momentum portfolio's profitability to be the result of the expected output time period. They claimed momentum profit to be due to the fact that some shares turn more risky, as a result of unknown risk factors. So, the current additional output is the result of an unknown systematic risk. In this regard, Conrad & Cole have found no opposition between middle-term profit continuance and efficient market hypothesis (Conrad & Cole, 1998). Jegadeesh & Titman have criticized the obtained results of Conrad & Cole for being based on a small sample and claimed that the expected outputs time period cannot completely explain momentum profits. McKnight & Hou (2006) have assessed momentum profits using book value-market value ratio, size and analyst following and used these variables as characteristics of momentum profit. They concluded that momentum profit has indirect relationship with the three above-mentioned variables and, so, book value-market value ratio, size and analyst following are crucial variables.

Research conceptual model

Momentum strategy	Market portfolio risk and output
3-month momentum portfolio's risk and output	3-month market portfolio's risk and output
6-month momentum portfolio's risk and output	6-month market portfolio's risk and output
9-month momentum portfolio's risk and output	9-month market portfolio's risk and output
12-month momentum portfolio's risk and output	12-month market portfolio's risk and output

7. Research hypotheses

H₁: momentum strategy profit average is higher than market portfolio output average.

First subordinate hypotheses of the first main hypothesis:

H 1-1: momentum strategy monthly output average in three-month formation and maintenance periods is higher than the market portfolio monthly output average.

H 1-2: momentum strategy monthly output average in six-month formation and maintenance periods is higher than the market portfolio monthly output average.

H 1-3: momentum strategy monthly output average in nine-month formation and maintenance periods is

higher than the market portfolio monthly output average.

H 1-4: momentum strategy monthly output average in twelve-month formation and maintenance periods is higher than the market portfolio monthly output average.

H₂: momentum strategy risk average is higher than market portfolio risk average.

Subordinate hypotheses of the second main hypothesis are as follows:

H 2-1: momentum strategy monthly risk average in three-month formation and maintenance periods is higher than the market portfolio monthly risk average.

H 2-2: momentum strategy monthly risk average in six-month formation and maintenance periods is higher than the market portfolio monthly risk average.

H 2-3: momentum strategy monthly risk average in nine-month formation and maintenance periods is higher than the market portfolio monthly risk average.

H 2-4: momentum strategy monthly risk average in twelve-month formation and maintenance periods is higher than the market portfolio monthly risk average.

8. Research population and sample

Research population consists of all firms participating in Tehran market for bonds and equities from 1996 to 2000 which hold the following characteristics:

- 1- The study firms' data is available;
- 2- The firms' financial years remain constant during the study;
- 3- Are not banks or financial or credit institutes;
- 4- Firms have no operational gap longer than six months during study period;
- 5- Sample firms stakeholders have no negative rights during study period;
- 6- Sample firms financial year ends in March 30s.
- 7- Sample firms' symbols have not been suspended for long time;
- 8- Firms continue to exist and are not deleted during study period, from the beginning to the end. That is why deletion sampling method has been selected for this study. All firms lacking the above-mentioned characteristics have been deleted from research population. Finally, 189 firms which held the required characteristics were included in the research population.

9. Specific terms' operational definitions and variables measurement method

Output: all forms of capital revenues such as cash profit, share price increase, premium share-

expressed as percent of the initial capital (Rai & Talangi, 2004). Winning share: the share which yields higher output in specific periods, compared to other shares (Jegadeesh & Titman, 1993). Losing share: the share which yields lower output in specific period, compared to other shares (Jegadeesh & Titman, 1993). Risk: probability of deviation from the expected output (Jegadeesh & Titman, 1993). Systematic risk (unavoidable risk): in this case, deviation from the expected output is the result of market changes and outer-firm variables. Systematic risk is measured using beta (Rahnamaye Rudposhti, 2006). Unsystematic risk (inherent risk): the risk which is specific to each firm and influenced by its internal operations and might be blocked through portfolio variability. Originating from firm specific operations, this variable is called internal or inherent risk. Beta sensitivity coefficient (beta): Beta coefficient is an indicator of the systematic risk obtained through comparing one portfolio with the whole market. This variable is considered as the reaction tendency of the share output to market changes. Beta coefficient of 1 reveals that share price is following market trends (Tehrani, 2003).

Share output might be calculated through the following formula:

$$R_i = \frac{(P_{t+1} - P_t) + D + M + N}{P_t}$$

Where P_{t+1} is the $t+1$ day price;

P_t is the t day price;

D is the net profit;

M is the primacy right advantage; and,

N is the share profit advantage.

b) Market output is calculated through the following formula:

$$R_m = \frac{I_{mt} - I_{mo}}{I_{mo}}$$

Where I_{mo} is the market total indicator in the beginning of t period;

I_{mt} is the market total indicator t the end of t period;

c) Beta or risk is calculated through using the following formula:

$$\beta = \frac{\sigma_{im}}{\sigma_m^2} = \frac{E[(R_i - \mu_i)(R_m - \mu_m)]}{E(R_i - \mu_i)^2}$$

Where R_i and R_m are "firm output" and "market output", respectively. Furthermore, μ_i and μ_m are the firm output average and the market output average, respectively.

Calculation of the momentum portfolio final output: the following formula is used for calculating the momentum portfolio final output. This formula assumption is that the winning and the losing portfolios initial values equal 1 and the accumulated initial output of the first period equals 0(CRK=0). Where R_i and R_m are “firm output” and “market output”, respectively. Furthermore, u_i and u_m are the firm output average and the market output average, respectively.

Calculation of the momentum portfolio final output: the following formula is used for calculating the momentum portfolio final output. This formula assumption is that the winning and the losing portfolios initial values equal 1 and the accumulated initial output of the first period equals 0(CRK=0).

$$CR_K = CR_{K-1} + \sum_{i=1}^T (r_{iW} - r_{iL}) \quad i = 1, \dots, T; K \geq 1$$

r_{iW} and r_{iL} are the winning and the losing portfolios daily output averages during maintenance period, respectively.

To form momentum portfolio of the study, share output has been calculated and the calculated outputs have been arranged by size. Then, SPSS software has been used to calculate output portions. First and last portions have been selected s winning and losing portfolios respectively. The first and the last portions maintained for different periods form momentum portfolio. To form the momentum portfolio and test the second hypothesis, share risk was calculated and the calculated risks were arranged by size. Risk portions were calculated using SPSS software and the first and the last portions were selected s the losing and the winning portfolios, respectively. The first and the last portions maintained for different periods form momentum portfolio (Fabozzi, 2007).

9. Testing research hypotheses

First main hypothesis: momentum strategy output average is higher than market portfolio output average.

Table (1): testing the significance of the difference between the momentum strategy portfolio output average in 3, 6, 9 and 12-month time periods and the market output average

At 95% level of significance							
		t	Degree of freedom	Level of significance	Average difference	Upper limit	Lower limit
3-month	Momentum portfolio3-month output	8299	723	0	018209	0139	02252
	Market portfolio3-month output	7294	723	0	06252	00457	00794
6-month	Momentum portfolio6-month output	6701	370	0	028814	02306	03727
	Market portfolio6-month output	4101	370	0	08315	0433	01230
9-month	Momentum portfolio9-month output	6741	374	0	046978	03325	06071
	Market portfolio9-month output	8544	374	0	01988	0153	02446
12-month	Momentum portfolio12-month output	6691	384	0	067374	04751	08723
	Market portfolio12-month output	15624	384	0	03787	0331	04264

Limits, we might argue that:

- 1- When lower and upper limits re positive, average is higher than test values.
- 2- When lower and upper limits re negative, average is lower than test value.
- 2- When lower limit is negative and upper limit is positive, average value is not significantly different from test value.

That is to say that in table (1) lower and upper limits re positive for momentum strategy portfolio in3, 6, 9 and 12-month periods. So, average value is higher than test value. Consequently,

momentum portfolio output average in 3, 6, 9 and 12-month periods is higher than the market portfolio output average. This claim is proved based on the obtained level of significance.

Testing the second main hypothesis:

Second main hypothesis: momentum strategy risk average is higher than market portfolio risk average.

Based on the table (2), it might be claimed that t 95% level of significance, the momentum strategy portfolio risk in 3, 6, 9 and 12-month time periods is higher than market portfolio risk.

That is to say that in table (2) lower and upper limits re positive for momentum strategy portfolio in 3, 6, 9 and 12-month periods. So, average value is higher than test value. Consequently,

momentum portfolio average risk in 3, 6, 9 and 12-month periods is higher than the market portfolio risk. This claim is proved based on the obtained level of significance.

Table (2): testing the significance of the difference between the momentum strategy portfolio risk in 3, 6, 9 and 12-month time periods and the market risk

At 95% level of significance							
		t	Degree of freedom	Level of significance	Average difference	Upper limit	Lower limit
3-month	Momentum portfolio 3-month risk	10585	723	0009	108419	472418	255255
	Market portfolio 3-month risk	14589	3478	0002	211096	911432	03624
6-month	Momentum portfolio 6-month risk	12749	370	0001	157096	478143	233362
	Market portfolio 6-month risk	14589	3478	0002	211096	911432	03624
9-month	Momentum portfolio 9-month risk	18163	374	0001	341291	438243	243262
	Market portfolio 9-month risk	14589	3478	0002	211096	911432	03624
12-month	Momentum portfolio 12-month risk	16676	384	0	313109	498112	21114
	Market portfolio 12-month risk	14589	3478	0002	211096	911432	03624

Discussion and conclusion

Jegadeesh and Titman (1993-1995) he reported that the strategy of buying past winning shares and selling past losing shares can produce significant additional output (approximately 1% per month). Having formed portfolios based on the obtained output of 1965-1989, they came up with the above-mentioned conclusion. They classified shares in 10 portions based on their previous 3, 6, 9 and 12-month outputs and form 10 equal-weighted portfolios and selected the strategy of buying past winning shares and selling past losing shares and proved the additional output.

Having focused on the monthly outputs obtained in 16 countries from 1970 to 1995, Richard (1997) proved that momentum strategy produces n approximate additional output of 3/4% but in time periods longer than 12 month, former losers output was 5/8% more than former winners.

Roven Horst (1988) has assessed the momentum strategy profitability or middle-term outputs continuance in the international stock markets. He has focused on all twelve European countries outputs to form portfolios based on relative power criterion. Having modified the risk, it was revealed that the winning portfolios output was more than 1% higher than the losing portfolios. Roven Horst has rejected Fm claim that momentum profits re haphazard.

Chu & Liu & Fan (2008) investigated the market perspective immanence and momentum profits. they focused on the New York and NYSE-MEX stock data available t center of rte security process (CRSP).their results are based on portfolios formed on the basis of the past outputs (from January 1965 to December 1999) similar to Jegadeesh &

Titman sample. The transaction strategy proposed by Chu etc (2008) re based on the maximum output obtained during 6/6 maintenance time period holding the most profitability. They classified shares into 10 equal portions in which the most profitable portfolio is p10 (the best winner) and the least profitable portfolio is p1 (the worst loser). In this study, they implemented 50 equal share portfolios. Their findings revealed that time series and resources average and momentum profits affect each other and there is significant relationship between momentum profits and market perspective imminence.

Cheli & Signus (2007) have investigated the relationship between momentum profitability and stock market commercial mechanisms. Commercial mechanisms are influenced by new commercial system changes. In 1975, two different commercial systems- computer dealing system (SEAQ) and automatic action system (SETS) - were implemented. In this study, they utilized the monthly outputs data of all sample countries. The countries data files-collected from 1975 to 2001- are available t London share price data base. Implementing Jegadeesh & Titman proposed method (1990), they detected momentum characteristics and classified momentum profits into 10 equal portfolios using firms classifications made on the basis of the previous six-month maintenance period so that W is the best share portfolio and L is the least profitable portion. Momentum strategy profitability is calculated by extracting losing portfolio from winning portfolio (W-L). This research finding reveals the relationship between momentum profits and commercial systems structure and confirms the significant difference of momentum profits in various share structures.

Fadayinejad & Sadeghi (2006) have investigated the profitability of momentum and reverse strategies in Tehran market for bonds and equities from 2001 to 2005. The obtained results of Tehran market revealed that each of the two mentioned strategies is superior (profitable) in a specific time period. For example, momentum strategy can produce additional output in 1, 3 and 6-month period while reverse strategy is more profitable for longer periods. Considering the fact that the two mentioned strategies' additional output is obtained using past data, they reject Tehran market profitability even at a weak level (Fadayinejad & Sadeghi, 2006). Nikbakht & Moradi calculated the abnormal output average to assess the exaggerated reaction in the Tehran market for bonds and equities. Their findings revealed that momentum strategy monthly risk and profit in 3, 6, 9 and 12-month periods- with formation and maintenance periods of 3, 6, 9 and 12 months- is higher than market portfolio monthly risk and profit average. Studies on Iranian capital market have been mainly conducted to assess momentum strategy portfolio output. This study is innovative in that it simultaneously investigates momentum strategy risk and output in Tehran market for bonds and equities. Due to the fact that the data of market for bonds and equities plays a crucial role in profitability, capital market practitioners can use this strategy in their transaction decisions and achieve their goal of maximum output. To accomplish their mission of maximizing investors' capital, investment firms' managers can improve their firms' outputs through optimal decisions. Considering the fact that the market for bonds and equities is similar to an economic thermometer, market for bonds and equities managers and Iranian economic decision makers can use this pattern for detecting market trends and implementing appropriate strategies for achieving economic growth.

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1/30/2013