Momentum Anomaly: Research In Bıst 100 Index[*]

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ABSTRACT

Stock market anomalies are mispricings based on irrational investor behaviours. Investors can obtain abnormal return based on certain investment strategies in anomaly observed markets. The purpose of this study is to investigate the existence of momentum anomaly in BIST 100 index during the period July 2008 to June 2015. Jegadeesh and Titman (1993) J month / K month method were used. Findings reveal the existence of momentum anomaly in 9-month portfolio and 9-12-month investment strategies, in 12-month portfolio and 6- 9-12-month investment strategies when there is no time between formation period and investment period in BIST 100 Index. Results are significant in 9-12-month momentum investment and 3-6-9-12-month investment strategies when 1-week lag between the formation period and investment period and these strategies produce more abnormal return.

Keywords: *Anomaly, Momentum Anomaly, BIST 100 Index.*

Jel Classification*: G11, G12, G14.*

Momentum Anomalisi: BİST 100 Endeksine Yönelik Araştırma

ÖZET

Hisse senedi piyasalarındaki anomaliler irrasyonel yatırımcı davranışlarından kaynaklanan yanlış fiyatlamalardır. Anomalilerin gözlendiği piyasalarda yatırımcılar belirli işlem stratejileri ile anormal getiri elde edebilmektedir. Çalışmanın amacı Temmuz 2008 – Haziran 2015 döneminde BIST 100 endeksi kapsamında momentum anomalisinin geçerliliğini araştırmaktır. Çalışmada Jegadeesh ve Titman (1993)'ın J ay / K ay yöntemi kullanılmıştır. Bulgular, portföy oluşturma ve yatırım dönemi arasında bekleme süresi bulunmayan yöntemde BIST 100 endeksi kapsamında momentum anomalisinin 9 aylık portföy stratejisini içeren 9 ve 12 aylık yatırım sürelerinde, 12 aylık portföy stratejisini içeren 6, 9 ve 12 aylık yatırım sürelerinde geçerli olduğunu ortaya koymuştur. Portföy oluşturma ve yatırım dönemi arasında bir haftalık bekleme süresi bulunan yöntemde sonuçlar 9 ve 12 aylık portföy stratejilerini içeren 3, 6, 9, 12 aylık sürelerinde anlamlıdır ve bu stratejiler daha fazla anormal getiri üretmiştir.

Anahtar Kelimeler: *Anomaly, Momentum Anomaly, BIST 100 Index*

JEL Sınıflandırması: *G11, G12, G14.*

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1. INTRODUCTION

Investment professionals, academics, novice traders spend a great deal of time and effort to discover anomalies. Because the phenomenon of anomaly has a significant return potential for investors (Singal, 2006:8). Anomalies clasified in various ways like as calender (seasonal) anomalies, cross sectional anomalies and price anomalies. Calender anomalies point out abnormal returns in spesific time. January, turn of the year, turn of the month and day of the week anomaly are calender anomalies. Cross sectional anomalies arise from value effect refers to the positive or negative relation stock return and accounting based measures like as book to market ratio, price-earning ratio and firm size. Price anomalies result from investor's under or over-reaction to information. Price anomalies are overreatcion and momentum anomaly.

The study investigated existence of momentum anomaly during the period July 2008 - June 2015 in Bist 100 Index. In this context, "Is momentum anomaly valid in BIST 100 Index?" The answer was searched. Study sample consists of stocks be traded regularly In BIST 100 Index during the reseacrh period.

Study employed Jegadeesh and Titman (1993) J month / K month method. In this context, firstly winner and loser portfolios formed then the sucsess of the momentum investment strategies tested for different investment periods.

Significant results are 9-month portfolio and 9-12-month investment strategies, 12-month portfolio and 6- 9-12-month investment strategies when there is no time lag between formation period and investment period. Also, results are significant for 9-12-month portfolio and 3-6-9-12-month investment strategies when there is 1-week lag between the formation period and investment period and this strategies produce more abnormal return.

2. LITERATUR REVIEW

Traditional finance theories states that investors are rational and consider all probabilities of investment outcome, emotions or psychologic factors do not influence investment decisions. Efficient Market Hypothesis (EMH) is one of the main theory of traditional finance. Fama (1965) defined efficient market as " where there are large number of rational, profit-maximisers actively competing, with each trying to predict future market values of individual securities and where important current information is almost freely available to all participants (Fama,1965:56). According to hypothesis; security prices reflect all available information at any time in an efficient market and investors can not beat the market depending on informational superiority in the long term.(Fama, 1970:383).

Researches to estimate share prices and returns revealed contradicting results with EMH. These events called as anomaly. In anomaly observed markets can be obtained abnormal return based on certain investment strategies. The continuity of the anomalies can make systematic abnormal returns. Behavioral finance is a young field emerged results of Kahneman and Tversky's studies and tries to explain anomalies' reasons and research effects of heuristics and bias on investment decisions. In this

contexts, Behavioral finance aims to improve understanding investors and financial markets by applying behavioral sciences like as psychology and sociology (Baltussen, 2011:2). While EMH assumes that investors rational, according to behavioral finance investors are normal (Statman, 1999:26). Irrational investor behaviour cause mispricing of stocks.

Momentum anomaly refers that momentum effect is existed on stock returns and abnormal return is possible by using momentum investment strategy, which involves buying stocks that have performed well in the past 3-12 months (winner), short selling those that peform poor in the same period (loser). Altough the first study was made by Levy (1967) about momentum effect, reference study belongs to Jegadeesh and Titman (1993). Jegadeesh and Titman (1993) concludes that momentum investment strategies generate return between 8-18 % 3-12 months investment period. Chan, Jegadeesh and Lakonishok (1996) find that winner portfolio generates 8,8 % return more than loser portfolio, Rouwenhorst (1998) winner portfolio which formed with international diversification have performed better 1% than loser portfolio. Conrad and Caul (1998) point out momentum investment strategies are profitable 3-12 months period, Rouwenhorst (1999) find existence of momentum anomaly in 7 out of 20 emerging stock Exchange altough evidences refer to momentum anomaly, Stock Exchange results are not significant in Istanbul Stock Exchange. O'Neal (2000) concludes that momentum investment strategies generate abnormal returns. Moskowitz and Grinblatt (1999) find existence of industry momentum and industry momentum strategies are more profitable than momentum strategies including individual stocks. Jegadeesh and Titman (2001) find that momentum returns persist in 90's year, too. Hon and Tonks (2002) in UK, Cleary, Doucette ve Schmitz (2005) in Canada, provide evidence in momentum anomaly. Griffin Ji and Martin (2005) conclude that momentum investment strategies generate positive return as global except that Turkey. Wang (2008) finds momentum existed in Uk, Germany, China except that Japan. Fama and French (2015) show that momentum anomaly findings in some North America, Europe, and Asia Pasific countries. Foltice and Langer (2015) document individual investors can obtain abnormal return by using momentum investment strategies.

Studies on the Istanbul Stock Exchange, Bildik and Gülay (2002) concludes that momentum anomaly not existed. Barak (2006) find positive autocorelation on stock returns before some spesific corporate news like as merger, dividend and capital increase. Balı (2010) concludes that momentum investment strategies succsessful just in 60 months invesment periods and volume is important for predictibility of stock return. Kandır and İnan (2011) point out that abnormal return can be obtained 12 months investment period. Ersoy and Ünlü (2013) document positive momentum return in 6 months portfolio and 6 months investment strategy. Arslantürk Çöllü (2015) categorised stocks micro, small and big, results show momentum anomaly is strong for all levels in 12-month investment strategy.

3. METHODOLOGY

The existence of the momentum anomaly in the BIST 100 Index was investigated on the study. In this context, is the momentum anomaly valid with in the scope of the BIST 100 Index in July 2008 - June 2015 period? The answer is searched. Unlike other studies, the existence of momentum anomaly was investigated in very

short investment periods such as 1 and 2 months. It is expected that the results of the study will be useful for stock investors in shaping investment strategies.

The sample of the study is stocks traded regularly in BIST 100 Index for period July 2008-June 2015. There are 46 stocks traded regularly in this period. The dataset used in the research is daily opening and closing prices of the stocks during Jully 2006 - June 2015.[1] Data was obtained from the Istanbul Stock Exchange Data Platform.

Study employed Jegadeesh and Titman (1993) J / K month method. Reseacrh carried out two ways. First, stocks ranked in the descending order according to the cumulative returns of J=3, 6, 9, 12-month period called "formation period" at the end of each "t" month and immedietaly winner and loser portfolios are formed, then the abnormal returns of winner and loser portfolios are computed by using Jensen's measure at the following K=1, 2, 3, 6, 9, 12-month periods called "investment period". Second, investment period started 1 week after winner and loser portfolios formed, similar to Jegadeesh and Titman (1993).

First, the monthly returns of the stocks were computed by Equation 1 to create portfolios. Returns computed logarithmically to recover negative effect of extreme values.

$$r_{i,t} = ln(P_{it} / P_{i,t-1}) \qquad (1)$$

$r_{i,t}$ *The rate of return on stock i in month of t*

P_{it} *The closing price of stock i in month of t*

$P_{i,t-1}$ *The closing price of stock i in month of t-1*

Second, J-month cumulative returns of stocks were computed by Equation 2.

$$R_{i,J} = \left(\prod_{t=-j}^{-1} (1 + r_{i,t}) - 1 \right) \qquad (2)$$

$R_{i,,j}$ *J-month cumulative return of stock i*

J *Portfolio period*

Stocks ranked by J-month cumulative return in the descending order. According to ranking top 30% stocks constituted portfolio P_1 (winner), bottom 30% constituted P5 (loser portfolio).

The abnormal returns of P_1 and P_5 portfolios were computed during the investment period. Jensen's measure used for abnormal return calculations and return of

[1] Beta coefficients were computed using 2 years data. Fort his reason, the data set covers the previous 2 years.

BIST 100 Index used as market return. Return of the market was computed by Equation 3. Abnormal return of stocks were computed by Equation 4.

$$r_{mt} = ln(E_t / E_{t-1}) \quad (3)$$

$r_{m,t}$ *The return of BIST 100 Intex in month of t*

E_t *The Closing value of BIST 100 Intex in month of t*

E_{t-1} *The Closing value of BIST 100 Intex in month of t-1*

$$ar_{i,t} = r_{i,t} - r_{fit} - (\beta_{i,t} (r_{mt} - r_{fit})) \quad (4)$$

$ar_{i,t}$ *The abnormal return of stock i in month of t*

$r_{i,t}$ *The expected return of stock i in month of t*

$r_{m,t}$ *The return of market in month of t*

$\beta_{i,t}$ *Beta Coefficient*

r_{fit} *Risk free interest rate*[2]

Stock's K=1,2,3,4,6,9,12-month cumulative abnormal returns computed by Equation 5.

$$CAR_{i,K} = \left(\prod_{t=1}^{K} (1 + ar_{i,t}) - 1 \right) \quad (5)$$

K *Investment period*

$CAR_{i,K}$ *The cumulative return of stock i in K-month investment period*

Cumulative abnormal return of portfolio P_1 and P_5 were computed by Equation 6.

$$CAR_{P,K} = \sum_{I=1}^{n} CAR_i / n \quad (6)$$

n *Number of Stock*

Portfolios monthly average cumulative abnormal returns were computed by Equation 7.

[2] Risk free interest rate is computed by converting the annual compound interet rate of treasury bond into monthly values. ((1+annual compound interet rate)^$^{1/12}$-1)

$$ACAR_{P,K} = \sum_{I=1}^{n} CAR_P/K \qquad (7)$$

$ACAR_{P,K}$ Average cumulative abnormal return of portfolio

4. FINDINGS

Momentum investment strategies generate abnormal return in market existed momentum effect. Table 1 shows results of momentum investment strategies when there is no lag between formation period and investment period. Figure 1 shows cumulative abnormal return of P_1 and P_5.

Table 1. Average Cumulative Abnormal Returns (%)

The values of J and K represent different portfolio and investment periods. The average cumulative abnormal returns are presented in this table when there is no time lag between formation period and investment period. The *t* statistics are reported in the parantheses.						
			(P_1-P_5)			
	K=1	**K=2**	**K=3**	**K=6**	**K=9**	**K=12**
J= 3	0,45	0,31	0,03	-0,12	-0,01	0,01
	(0,82)	(0,87)	(0,09)	(-0,55)	(-0,06)	(0,09)
J=6	-0,35	-0,13	0,00	0,14	0,07	0,05
	(-0,68)	(-0,35)	(0,01)	(0,66)	(0,43)	(0,32)
J=9	0,01	0,28	0,4	0,33*	0,30***	0,28***
	(0,03)	(0,74)	(1,34)	(1,67)	(2,10)	(2,41)
J=12	0,45	0,38	0,45	0,41**	0,48***	0,5***
	(0,84)	(1,05)	(1,63)	(2,19)	(3,37)	(4,25)
			***%1, **%5, *%10 Significant			

According the findings presented Table 1 shows 24 different momentum investment strategies; in 3-month portfolio strategy including 6- 9-month investment periodss, in 6-month portfolio strategy including 1-2-month investment periods P_5 portfolio yielded more abnormal return and momentum investment strategy generated negative abnormal return. All investment strategies in 9 and 12-month portfolio periods generated positive abnormal return.

Findings revealed significant results are 9-month portfolio strategy in 9-12-month investment periods and 12-month portfolio strategy in 6- 9-12-month investment periods. It is observed that as the investment period increases the abnormal returns inrease in the 12-month portfolio strategy. Because momentum effect increases and P5 portfolio show poor performance when the investment period lenght as seen in the figure 1. The highest abnormal return is in the 12-month investment period including 12-month portfolio strategy among the results confirming the existence of the momentum anomaly.

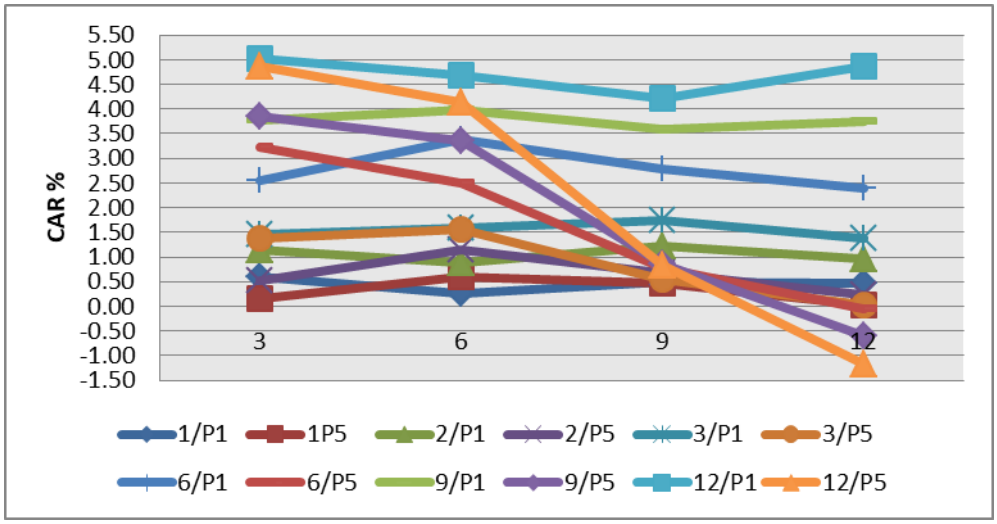

Figure 1. Cumulative Abnormal Return of P_1 and P_5 Portfolios

Table 2 shows results of momentum investment strategies including 1-week lag between formation period and investment period. Figure 2 shows cumulative abnormal return of P_1 and P_5 portfolios.

Table 2. Average Cumulative Abnormal Returns (%)

The values of J and K represent different portfolio and investment periods. The average cumulative abnormal returns are presented in this table when There is 1-week lag between formation and investment periods . The *t* statistics are reported in the parantheses.						
			(P_1-P_5)			
	K=1	**K=2**	**K=3**	**K=6**	**K=9**	**K=12**
J= 3	0,49	0,26	0,00	-0,10	0,05	0,01
	(1,01)	(0,78)	(0,01)	(-0,44)	(0,27)	(0,04)
J=6	0,25	0,02	0,16	0,31	0,20	0,13
	(0,48)	(0,06)	(0,49)	(1,47)	(1,26)	(0,94)
J=9	0,38	0,50	0,64**	0,48**	0,42***	0,37***
	(0,74)	(1,38)	(2,14)	(2,50)	(3,08)	(3,27)
J=12	0,96*	0,54	0,60**	0,51***	0,59***	0,55***
	(1,85)	(1,52)	(2,09)	(2,75)	(4,22)	(4,64)
			***%1, **%5, *%10 Significant			

According the findings presented Table 2 just 6-month investment period in 3-month portfolio strategy P_5 portfolio yielded more abnormal return and momentum investment strategies generated negative abnormal return. All investment strategies in 6-9-12-month portfolio periods generated positive abnormal return. Significant results are 9 and 12-month portfolio strategy in 3- 6- 9-12-month investment periods.

Results are significant in 9-month portfolio strategy including 3, 6-month investment periods and in 12-month portfolio strategy including 3-month investment period, too when there is 1-week lag between formation period and investment period. 12-month investment strategy is the most succsessful strategy when there is no lag time. 3-month investment strategy is the most succsessful strategy when there is lag time.

Also findings show momentum investment strategies including 1-week lag between formation period and investment period produce more abnormal return.

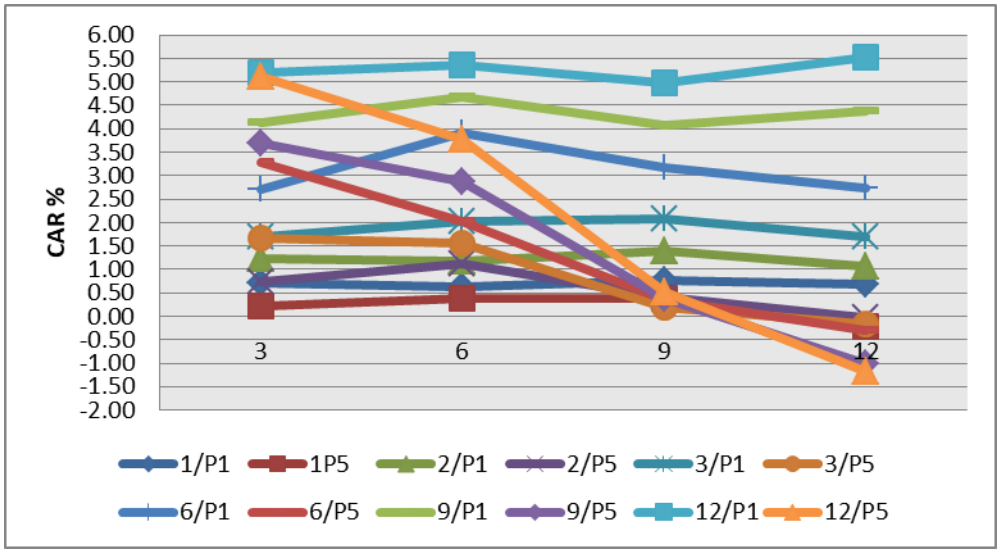

Figure 2. Cumulative Abnormal Return of P_1 and P_5 Portfolios When There is 1-Week Lag Between Formation Period and Investment Period

5. CONCLUSION

Studies document that momentum anomaly is valid for 3-12-month investment period in international markets. The findings of the study tested 24 different momentum investment strategies revealed existence of momentum anomaly for 9 month portfolio strategy in 9-12-month investment periods when there is no time lag between formation period and investment period, for 12-month portfolio strategy in 6-9-12-months investment periods in BIST 100 Index. Also, Momentum anomaly exists in 9-12-month portfolio strategy including 3- 6- 9-12-month investment periods when there is 1-week lag between formation period and investment period. Momentum investment strategies when 1-week lag produce more abnormal return.

Findings show momentum investment strategy is beneficial in the short and medium term in the BIST 100 Index and investors can obtain abnormal return with investment strategies that take into account momentum effect.

The sample of the study is stocks traded regularly in BIST 100 Index in the research period. Stocks traded in BIST 100 Index are updated four times in a year. The number of stocks traded regularly decrease as result of merger, withdrawal of index as the research period lengthens. The research period and number of stocks are among the limitations of the research.

In the future studies can be investigated short term existence of momentum anomaly by using weekley returns, sector momentum and the momentum anomaly in future and option markets.

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