MOMENTUM EFFECT AND MARKET STATES: EMERGING MARKET EVIDENCE

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Introduction

Capital Assets Pricing Model (CAPM) of Sharpe (1964), Lintner (1965) and Mossin(1966) states that expected returns on securities have a positive linear relation with their betas thus beta is the sole factor that explains the cross-section of expected returns. Though early studies by Black, Jensen and Scholes (1972) and Fama and MacBeth (1973) provided evidence in favour of CAPM, subsequent empirical studies found evidence against the CAPM (see for example, Basu (1977) and Banz 1981). These findings are referred to as anomalies to the CAPM. The most important cross-sectional anomalies include size effect, the earnings-to-price (E/P) ratio, book-to-market (B/M) ratio, cash flow to price (CF/P) and contrarian effect.

But perhaps the most puzzling result is the intermediate-horizon return continuation reported by Jegadeesh and Titman (1993). Forming portfolios based on past 3 to 12 month returns they show that past winners on average continue to outperform the past losers over the next 3 to12 months.

Price momentum effect has been extensively studied in the US (Jegadeesh and Titman, 1993, 2001; Lee and Swaminathan, 2001) and in other developed markets (Rouwenhorst, 1998, 1999; Chui, Titman and Wei, 2000).

Colombo Stock Exchange (CSE) is one of the fast growing emerging markets in the world. However, the market is still inefficient and studies have shown that past returns have a significant explanatory power on future returns of stocks (see, Samarakoon, 1996 and Pathirawasam, 2010). Both authors reveal that market indices at CSE do not follow a random walk. The autocorrelation of index returns motivate us to examine the possible momentum effects at CSE. Further, the study has theoretical as well as practical values as the emerging market evidences of momentum effects are lacking in finance literature.

The main objective of this paper is to examine the medium term momentum effect at the CSE and to determine whether the momentum effect is market state dependent.

Examining momentum strategies at CSE is important in several ways. Firstly, this study is conducted based on the CSE, which is one of the rapidly developing stock markets and from its onset has held a preemption position among emerging markets. Secondly, there is lack of past research in the area of medium term return predictability in developing markets especially in South Asian countries. Finally, investors especially fund managers can make use of the findings to fomulate better investment strategies.

This study adopts a methodology similar to that used by Jegadeesh and Titman (1993) in their seminal paper on momentum effect. The study provides evidence on momentum effects at CSE during the period 1995 to 2008. Further, the study reveals that momentum effect is dependent on the states of market.

The rest of this paper is organized as follows. Section 1 reviews existing literature related to the topic while section 2 explains the data and methodology. Section 3 contains empirical results for momentum strategies while the last section concludes the paper.

1. Literature Review

The momentum effect refers to a phenomenon whereby stocks that perform well in the past tend to outperform over a certain period in future and vice versa. In other words, winners tend to remain winners and losers tend to remain losers in the subsequent period. Jegadeesh and Titman (1993) uncovered that, strategies which buy past period winner stocks and sell past period loser stocks (momentum strategy) generate significant positive returns

(about 1 % per month) for 3–12 month holding period. The extended study of Jegadeesh and Titman (2001) reconfirmed that momentum effect was not a result of data mining effort. Further, Conrad and Kaul (1998), Lee and Swaminathan (2001), Chodia and Shivakumar (2002) have found significant momentum profits in the NYSE over 3 to 12 month holding period.

Momentum strategies have also been found to work in international markets. Rouwenhorst (1998) examined twelve European markets' stock returns between 1980–1995. He found that an internationally diversified portfolio of past medium term winners outperform a portfolio of medium term losers by 1 percent per month. Similarly, Chui, Titman and Wei (2000) found that momentum profits were also obtained in some Asian markets except Japan and Korea (This study does not cover South Asian countries.).

Shen, Szakmary and Sharma (2005) examined momentum strategies in 18 developed capital markets using country indices instead of individual security returns and found momentum profits for medium time horizons. Also, Nijman, Swinkels, and Verbeek (2002) found momentum profits in 18 European countries except for Sweden and Austria. Chui, Timan and Wei (2000) examined the profitability of momentum strategies in eight different East and South East Asian Countries. They found a positive momentum profits except for two countries (Indonesia and Korea).

Bildik and Gulay (2002) discovered significant contrarian profits in the Istanbul Stock Exchange. Their analysis of contrarian strategies showed that the holding period returns of past period losers outperforme the past period winners in all 1–12 months strategies.

In most of the studies, researchers have imposed one month time lag between end of the portfolio formation period and beginning of the holding period in order to avoid the potential micro structure biases, thin trading problem and bid–ask spread (Jegadeesh and Titman, 1993; Lee and Swaminathan, 2000; Nijman, Swinkels and Verbeek, 2002, Chui, Timan and Wei, 2000). All of them discovered that momentum effect is increased when one month time lag is imposed between the formation and holding period.

Furthermore, empirical results indicate that states of the market have an impact on momentum profits. Cooper, Gutierrez and Hameed (2004) examined the overreaction theory by examining the impact of market states on momentum profits. According to them, stock market is defined as an up (down) market if the portfolio formation period market returns are positive (negative). Their findings were that average monthly momentum profits following up-market were significantly positive at 0.93 percent and the average monthly momentum profits in the down-market was negative at -0.37 percent. More recently Wang et al. (2009) examined the impact of states of market on the profitability of momentum strategies using weekly data from the Taiwan Stock Exchange over a 10-year period 1997–2006. The results indicated that market conditions in the formation period were positively associated with the profitability of the momentum strategies. Antonios and Patricia (2006) examined the profitability of momentum strategies on the bull and bear markets using data from the London Stock Exchange. According to their findings momentum profits were more pronounced in bear markets.

2. Data and Methodology

2.1 Data

The data used in the study were taken from the CSE data library. The sample period covers 14 years from January 1995 to December 2008. The sample of the study includes all the voting stocks in the main board and the second board of the CSE. In accordance with the recommendation by Bildik and Gulay (2002) stocks which had less than 12 month data are excluded from the sample. The sample of the study included even delisted stocks in order to address the problem of survivorship bias (Kothari, Shanken and Sloan (1995) show that the data selection biases including a survivor bias significantly affected on the anomalies). Therefore, the total sample was made up of 266 companies.

2.2 Methodology

Detailed steps of the method of computing momentum profits are elaborated as follows.

I. Computation of Monthly Stock Returns

The variables used in the study are mainly monthly individual stock prices. Using individual stock prices percentage monthly returns are computed as follows.

$$R_{i,t} = \frac{P_{i,t} - P_{i,0}}{P_{i,t}} \times 100 \qquad (1)$$

$R_{i,t}$ = Capital gain returns of the i^{th} share in the month *t*.

$P_{i,t}$ = Price of the i^{th} share at the end of month *t*.

$P_{i,0}$ = Price of the i^{th} share at the beginning of the month *t*.

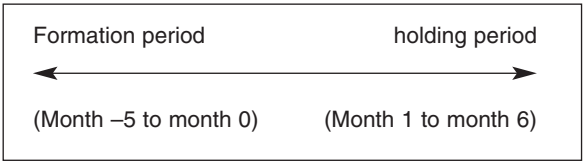
Percentage monthly returns are adjusted for dividends, right issues and bonus issues at the end of the month in which ex-date occurred.

II. Formation (J) and Holding (K) Periods

The stocks are selected for the strategies implemented in this study based on their returns over the past 3, 6, 9 and 12 months. We also consider holding periods that varied from 3, 6, 9 and 12 months. This paper presents the momentum strategies on quarterly basis because past studies recognize them as standard strategies.(see for example, Jegadeesh and Titman, 1993; Muga and Santamaría, 2009).This gives a total of 16 strategies. Computations are done in two ways. Firstly, without imposing a time lag between formation period and the holding period. Secondly, by imposing a one month time lag between end of the formation period and beginning of the holding period in order to avoid possible micro structure biases, thin trading problem and bid–ask spread.

The following time line explains the formation and holding periods for 6 month/6 month strategy.

Fig. 1: Time Line Showing Formation and Holding Periods



Source: own

III. Computation of Average Returns for J and K periods

For each J and K periods average monthly returns of individual stocks are computed as follows.

$$\overline{R}_i = \frac{1}{n}\sum_{t=1}^{n} R_{i,t} \qquad (2)$$

Where,

$\overline{R}_{i,t}$ represents the average monthly returns of individual stocks and *n* denotes the number of months in J/K period.

IV. Formation of Portfolios

At the end of each month, from January 1995 to July 2008, all eligible stocks are ranked based on their past J month returns, for example, for the month –5 to month 0, if J is defined as six, then stocks are grouped into three equally weighted portfolios based on these ranks. Portfolio P1 represents the stocks with the highest ranking period returns and Portfolio P3 represents the stocks with the lowest ranking period returns. The highest return portfolio is called the "winners" and the lowest returns portfolio is called the "losers".

V. Computation of Momentum Effects

In each month t, momentum strategy buys the winner portfolio and holds this position for K months following the ranking month, for example, month 1 to month 6, if K is defined as six (K6). The profits of the momentum strategy is computed by deducting average monthly returns of loser portfolio from average monthly returns of winner portfolio (P1-P3).

In order to increase the power of the statistical tests, momentum strategies examined include portfolios with overlapping holding periods. Therefore, in any given month t, the strategies hold a series of portfolios that are selected in the current month as well as in the previous K-1 months, where K is the holding period. For

example, the monthly return for a three-month holding period is based on an equally-weighted average of portfolio returns from this month's strategy, last month's strategy, and the strategy from two months ago.

VI. Hypotheses

If the pattern of the past period stock returns continue in the same direction over the next period, then we form momentum portfolio by deducting returns of loser portfolio (low return stocks) from returns of winner portfolio (high return stocks) in the holding period. Therefore, the null hypothesis (H_0) and the alternative hypothesis (H_1) can be developed as follows.

H0 : $E\left(R_{W,t+K} - R_{L,t+K}\right) = 0$

H1 : $E\left(R_{W,t+K} - R_{L,t+K}\right) > 0$

Where

$R_{W, t+K}$ = Winners` returns in the next period (holding period)

$R_{L, t+K}$ = Losers` returns in the next period (holding period),

t + K = Holding period (months),

K = Number of months.

The null hypothesis indicates that winners and losers have the same expected returns in the holding period while the alternative hypothesis indicates that expected returns of winners are higher than that of losers in the holding period.

VII. Test of Significance

The significance of the momentum and contrarian profits is measured using the t-statistics and the t – values are computed as follows.

$$t = \frac{E(R_{W,t} - R_{L,t})}{\sqrt{Var(W-L)_t / n}} \qquad (3)$$

3. Empirical Results

3.1 Overall Sample

Table 1 presents the result of all the portfolios for 16 strategies. Each month stocks are ranked and grouped into three portfolios on the basis of their returns over the previous 3, 6, 9 and 12 months and held for 3, 6, 9 and 12 months. Results of all the portfolios are indicated with winners (P1) and losers (P3) together with winner minus loser momentum portfolios (P1-P3). In panel A portfolios are formed immediately after the lagged returns are measured for the purpose of portfolio formation. In panel B portfolios are formed one month after the lagged returns are measured for the purpose of portfolio formation. The t-statistics are reported in parenthesis.

According to panel A of table 1, the most successful momentum strategy is the portfolio with stocks based on their returns over the formation period 9 months and the holding period 9 months. This strategy yields 0.603 percent per month and it is statistically different from zero at 1 percent level of significance (t=6.82). Except for the J=3 and K=3, J=3 and K=6, J=6 and K=3, J=9 and K=3 strategies, all the other momentum effects are positive and statistically significant.

Because bid-ask bounce and thin trading problem can intensify the continuation effect, panel B reports the average returns if the portfolio holding period is delayed relative to formation by one month. For the shorter ranking and holding intervals, delaying the portfolio formation indeed increases the difference in returns between the winners and losers. These findings are parallel with the findings of Jegadeesh and Titman (1993) and Rouwenhorst (1998). According to the table all the strategies show positive and statistically significant momentum effects. When there is a time lag between the formation period and the holding period, the most successful momentum strategy selects stocks based on their returns over the past 12 months and then holds the portfolio for next 3 months. This strategy yields 0.728 (t=3.77) percent return per month.

In addition to the momentum portfolio returns (P1-P3), table 1 presents the average monthly returns of winner (P1) as well as loser (P3) portfolios to verify whether the momentum effect is due to outperformance of winner portfolios from the loser portfolios. Both panel A and panel B show that the momentum effects are clearly due to the outperformance of winner portfolios from the loser portfolios.

Tab. 1: Momentum Effect from 1995–2008

J=Formation Period, K= Holding Period					
Panel A					
		K=3	**K=6**	**K=9**	**K=12**
	P1	0.927	0.811	0.963	1.023
J=3	P3	0.849	0.686	0.690	0.659
	P1-P3	0.078	0.125	0.273	0.364
	(0.39)	(1.03)	(2.80)***	(4.10)***	
J=6	P1	0.978	0.984	1.111	1.125
	P3	0.767	0.595	0.567	0.619
	P1-P3	0.211	0.389	0.544	0.506
		(1.12)	(3.54)***	(5.68)***	(6.54)***
J=9	P1	1.090	1.129	1.202	1.216
	P3	0.803	0.586	0.598	0.652
	P1-P3	0.287	0.543	0.603	0.563
		(1.50)	(4.91)***	(6.82)***	(8.30)***
J=12	P1	1.305	1.188	1.262	1.282
	P3	0.816	0.601	0.671	0.707
	P1-P3	0.489	0.587	0.591	0.574
		(2.46)**	(5.14)***	(6.70)***	(8.50)***
Panel B					
		K=3	**K=6**	**K=9**	**K=12**
J=3	P1	0.887	0.726	0.816	0.846
	P3	0.266	0.355	0.330	0.355
	P1-P3	0.621	0.370	0.485	0.491
		(3.02)***	(3.25)***	(4.99)***	(6.05)***
J=6	P1	0.939	0.892	0.958	0.939
	P3	0.302	0.268	0.298	0.365
	P1-P3	0.637	0.624	0.660	0.537
		(3.54)***	(5.97)***	(7.32)***	(8.19)***
J=9	P1	1.059	1.014	1.053	0.987
	P3	0.393	0.311	0.338	0.369
	P1-P3	0.665	0.702	0.715	0.617
		(3.58)***	(6.56)***	(8.42)***	(9.56)***
J=12	P1	1.177	1.047	1.049	0.990
	P3	0.448	0.353	0.344	0.350
	P1-P3	0.728	0.694	0.704	0.640
		(3.77)***	(6.26)***	(8.27)***	(9.70)***

** Significantly different from zero at the 5% level.

*** Significantly different from zero at the 1% level.

Source: own calculation

3.2 Market States and Momentum Effect

In order to identify the relation between states of the market and momentum effect, the entire sample was divided into two sub periods, January 1995 to September 2001 and October 2001 to July 2008. The separation into two sub periods coincides with the change in overall primary market trends for Sri Lankan stocks (see fig. 2). The first sub period was mainly bearish and the second sub period was mainly bullish. The trend reversion of the ASPI after October 2001 is mainly due to two reasons. One is the recovery of Asian economies from the deep East Asian crisis. The other reason is the signing of a truce agreement between the Sri Lankan government and the Liberation Tigers of Tamil Ealam (LTTE) who were fighting with the government army asking for a separate home land in the northern part of the Island.

Fig. 2: Momentum Effect in the Down-Market and Up-Market

Source: own computations

Table 2 reports momentum effects for the two sub periods. Panel A of the table shows that momentum effect in the down-market is extremely high. The momentum effects range between 1.403 percent per month for J=12 and K=3 strategy and 0.763 percent per month for J=3 and K=6 strategy. It should be noted that all the average monthly returns of the reported 16 strategies are statistically different from zero at 1percent level of significance. Further, the average monthly returns of winners and losers reveal that momentum effect is a product of positive post formation period average monthly returns of winners and the negative post formation period average monthly returns of losers. Returns on winner portfolios range between 1.093 per month for J=12 and K=3 and 0.281 per month for J=3 and K=6. At the same time return on loser portfolios range between -0.309 per month for J=12 and K=3 and -0.704 per month for J=6 and K=9.

Conversely, Panel B of the table shows that momentum effect in the up-market is relatively low. The momentum effects range between 0.304 percent per month for J=3 and K=3 and 0.039 percent per month for J=3 and K=6. It should be noted that out of all the reported 16 strategies only seven strategies show statistically significant average monthly momentum profits at least at 5 percent level. Further, the examination of average monthly returns of winner and loser portfolios is extremely important to judge whether the momentum prevails in the up market at CSE. The average monthly returns of loser (P3) portfolios in the up-market are larger and positive than that of the down-market losers. Therefore, it reveals that there is no clear momentum effect in the up market at CSE.

Tab. 2: Sub Period Returns of Momentum Portfolios

Panel A: Period from January 1995 to September 2001					
		K=3	K=6	K=9	K=12
J=3	P1	0.521	0.281	0.310	0.349
	P3	-0.405	-0.482	-0.534	-0.455
	P1-P3	0.926	0.763	0.844	0.805
		(2.77)***	(3.94)***	(4.87)***	(5.92)***
J=6	P1	0.711	0.511	0.470	0.426
	P3	-0.408	-0.701	-0.704	-0.509
	P1-P3	1.119	1.213	1.174	0.935
		(3.61)***	(6.54)***	(7.93)***	(10.54)***
J=9	P1	0.901	0.633	0.565	0.540
	P3	-0.450	-0.624	-0.609	-0.417
	P1-P3	1.351	1.258	1.175	0.957
		(4.00)***	(6.68)***	(8.01)***	(10.57)***
J=12	P1	1.093	0.720	0.642	0.633
	P3	-0.309	-0.491	-0.450	-0.355
	P1-P3	1.403	1.211	1.093	0.989
		(4.14)***	(6.56)***	(7.73)***	(9.56)***
Panel B: October 2001 to July 2008					
		K=3	**K=6**	**K=9**	**K=12**
J=3	P1	1.213	1.141	1.244	1.253
	P3	0.908	1.101	1.084	1.079
	P1-P3	0.304	0.039	0.160	0.144
		(1.195)	(0.29)	(1.36)	(1.67)*
J=6	P1	1.136	1.158	1.265	1.327
	P3	0.951	0.991	1.021	1.101
	P1-P3	0.185	0.167	0.244	0.226
		(0.79)	(1.39)	(2.17)***	(2.35)***
J=9	P1	1.047	1.122	1.284	1.290
	P3	0.945	0.857	0.928	0.270
	P1-P3	0.101	0.264	0.302	0.270
		(0.43)	(2.09)**	(2.82)***	(2.87)***
J=12	P1	0.982	1.101	1.237	1.219
	P3	0.732	0.912	0.975	0.987
	P1-P3	0.250	0.189	0.261	0.232
		(1.01)	(1.35)	(2.40)**	(2.37)**

* Significantly different from zero at the 10% level.

** Significantly different from zero at the 5% level.

*** Significantly different from zero at the 1% level.

Source: own calculation

The overall conclusion of the table 2 is that the momentum effect is stronger in the down market stance than in the up-market stance. In the up-market, virtually all the portfolios are winners since difference between return on the winner portfolios and return on the loser portfolios are negligible. By contrast, in the down-market stance, all the winner portfolios are positive while loser portfolios are negative, and the differences between returns of the winner portfolios and returns of the loser portfolios are statistically significant. Hence momentum effect is visible only in the down-market at CSE.

Conclusion

This study examines the momentum effect at CSE from 1995–2008. The study adds some important findings to existing literature as momentum anomaly is proved to a large extent in developed markets, whereas, there is little evidence in developing markets.

Researchers in finance and practitioners have recognized that average stock returns are related to past performance and cross-section of stock returns is predictable based on past returns. A number of past researchers have reported that past winners outperform past losers in subsequent period not only in the US market but also in some of the other markets. However, still there is no enough evidence in the developing markets. The findings of the study indicate that, average returns of past period winners clearly outperform the average returns of past period losers which add new evidence to the existing momentum literature.

This paper further examines the impact of the states of the market on the profitability of momentum strategies. The results indicate that states of the market in the formation period are not associated with the profitability of the momentum strategies. The momentum profits are significantly positive in the down market. In contrast, momentum profits appear to be positive but not significant in up-market. The reason for the non existence of momentum profits in the up-market is the high positive returns of the formation period losers in the holding period. This finding is contradictory with that of Cooper, Gutierrez and Hameed (2004) but confirms the findings of Antonios and Patricia (2006).

This study has not covered the present deep economic crisis period due to non availability of data. Therefore, it would be interesting and important to further research the momentum effect in the present economic crisis.

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Abstract

MOMENTUM EFFECT AND MARKET STATES: EMERGING MARKET EVIDENCE

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This paper examines the momentum effect in Colombo Stock Exchange (CSE) from January 1995 to December 2008. The sample of the study includes all the voting stocks traded at CSE. Stocks are selected for the strategies implemented in this study based on their returns over the past 3, 6, 9 and 12 months and hold the selected stocks for 3, 6, 9 and 12 months respectively. This gives a total of 16 strategies. In order to identify the relation between market states and momentum effect, the entire sample is divided into two sub periods, January 1995 to September 2001 and October 2001 to July 2008. The first sub period was mainly bearish and the second sub period was mainly bullish. For the overall sample, all the strategies show positive and statistically significant momentum effects. When there is a time lag between the formation period and the holding period, the most successful momentum strategy is the 12 months/3 months strategy where stocks are selected based on their returns over the past 12 months and then holds them for next 3 months. This strategy yields returns of 0.728 percent per month. Further, the momentum effect is stronger in the down market stance than in the up-market stance. In the up-market, virtually all the portfolios are winners since difference between return on the winner portfolios and return on the loser portfolios are negligible. By contrast, in the down-market stance, all the winner portfolios are positive while all the loser portfolios are negative. Hence the winner portfolios significantly outperform the loser portfolios.

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