Journal of Applied Finance & Banking, vol. 3, no. 1, 2013, 1-12
ISSN: 1792-6580 (print version), 1792-6599 (online)
Scienpress Ltd, 2013

Testing the Profitablitiy of a Volume-Augmented Momentum Strategy in the Philippines Equity Market

Lim Kai Jie Shawn[1], Darius Lim Dawei[2], Mak Weijie[3], Poh Zi En Benjamin[4]

Abstract

This study contributes new empirical evidence on the profitability of a momentum strategy in the Philippines equity market. The study was conducted over the time period January 2000 to June 2012. We evaluated a momentum strategy based only on past return information as well as a strategy that incorporates information on volume for 16 different time combinations with varying formation and holding periods. For the strategy based only on past return information, we find little evidence in support of the profitability of a momentum strategy with the results suggesting the presence of mean-reverting prices. When volume information is incorporated, the strategies that select stocks based on volume and return information from the past 3 months show positive average monthly returns. However, after adjusting for the risk of these strategies using a single factor model and a model with market-dependent betas we find that such a strategy does not outperform the benchmark. Hence, we conclude that there is little evidence to support the profitability of a volume-augmented momentum strategy in the Philippines equity market.

JEL classification numbers: C15, G01, G11, G17
Keywords: Momentum, Philippines Equity Market, Volume-Augmented Strategies, Trading Strategies, Market Efficiency

[1]Department of Economics, University College London.
e-mail: kai.lim.11@ucl.ac.uk
[2]Department of Economics, Univeristy of Nottingham.
e-mail: leyddl@nottingham.ac.uk
[3]Department of Economics, University of Nottingham.
e-mail: leywm@nottingham.ac.uk
[4]Department of Economics, College Universitaire, Sciences Po Paris

Article Info: *Received :* October 2, 2012. *Revised :* October 30, 2012.
Published online : January 15, 2013

1 Introduction

The ability of momentum strategies to continue to remain profitable in equity markets is an issue that has confounded academics for an extended period of time. Early writers such as DeBondt & Thaler [1] attributed the persistence of profitable medium term momentum strategies to the tendency for markets to overreact in the short term and since then a range of other behavioral explanations have been suggested [2]. The ability and continued persistence of price continuation in financial time series has also led to its inclusion as a factor in some asset pricing models, such as that in [3], which lends weight to its importance as a potential explanatory variable of stock market returns.

Jegadeesh and Titman [4 and 5] proved in 2 separate papers the presence of momentum in the time series of US stock markets using a zero-cost arbitrage strategy of buying past winners and selling past losers and since then their methodology has become the standard approach adopted in tests on the profitability of momentum strategies. In line with the approach of present literature we employ an adaptation of that methodology in this paper.

The profitability of momentum strategies has also been documented internationally in a number of markets. Rouwenhorst conducted studies on emerging market stocks and the European equity markets and found evidence for the profitability of a momentum strategy, [6]. Similar results have been reported in the Asian markets by Chui, Titman and Wei [7], in the Australian market by Aharoni, Ho and Zheng [8] and a wide range of countries around the world by Hu and Chen [9].

Beyond the profitability of a pure momentum strategy, a range of other papers have explored the ability to improve the profitability of a momentum strategy using other sources of information. Studies ranking stocks in the formation period using a reward-risk stock selection criterion, found that they result in portfolios with a lower total return but a superior risk-adjusted performance,[10, 11]. Lee and Swaminathan incorporate the use of volume information in the portfolio formation step and find that it can be useful in improving the performance of a momentum strategy, [12]. They argue that volume can serves as a proxy for investor misperception of future earnings. The importance of volume in predicting the direction and likely persistence of a trend is also a key concept within the field of technical analysis (Edwards, Maggee & Bassetti [13]).

Since then, a range of papers have tested the ability of a volume-augmented momentum strategy to deliver superior returns. Hameed & Kusnadi test the strategy for 6 Asian markets, Glaser & Weber test the strategy for the German market and Agyei-Ampomah tests the strategy for the UK market, (see [14], [15] and [16]). The results from these tests are mixed, with limited evidence found in the 6 countries that were tested in the Asian markets but significant evidence in the German and UK markets. This suggests that the profitability of a strategy enhanced with volume information is likely to be highly dependent on the market in which it is implemented.

We believe that this paper contributes to the existing literature on momentum studies by extending them in 2 different ways. Firstly, while momentum is a subject that has been debated in the academic community for a substantial period of time, most of that research work has been focused on the developed markets with limited research in some regions such as South East Asia. In this paper we test the profitability of trading strategies in the Philippines equity market that, to the best of our knowledge, has not been tested over a recent time period in any paper for both a pure momentum strategy and a volume-augmented momentum strategy. This paper thus adds to present studies by presenting new empirical results for the Philippines equity market. We conduct this study

over a fairly recent time period that spans January 2000 to June 2012.
Next, we extend the basic methodology from Jegadeesh and Titman [4, 5] by studying the impact of including volume as an additional ranking factor on the profitability of a momentum strategy in line with the approach detailed in Lee & Swaminathan [12]. This inclusion of an alternative source of information in the form of volume allows us to provide additional insights into the factors that may influence the profitability and persistence of momentum strategies in the Philippines equity market.
The rest of the paper is arranged into 3 areas. Section 2 describes the data we employ in this test and outlines the methodology used for this paper. Section 3 presents the results from our study and discusses their implications on the profitability of momentum strategies. Finally, section 4 presents an overview of our findings and concludes the paper.

2 Data and Research Methodology

2.1 Data

We use the daily stock price data for the components of the Philippines All-Share Index over the period of January 2000 to June 2012. The data was extracted from Bloomberg and was adjusted for non-trading days and to incorporate the impact of dividends on returns. In order to achieve a sample consisting only of stocks that are sufficiently liquid, stocks with an average price of less than $1.00 were removed from the sample.
The return for each period was calculated using the following equation:

$$R_t = \frac{P_t}{P_{t-1}}$$

where
R_t: Return of a stock for period *t*, where *t* represents quarters
P_t: Stock price at the end of the period
P_{t-1}: Stock price at the start of the period

We define volume as the average daily turnover in percentage terms during the portfolio formation period, where daily turnover is the ratio of the number of shares traded each day to the number of shares outstanding at the end of the day. To calculate this figure, the number of shares traded each day was also collected for each stock along with the number of shares outstanding. The volume was then calculated on a quarterly basis and normalized by dividing the number of shares traded in each quarter by the average number of shares outstanding over that quarter. Where there were missing data points for the number of shares traded, we calculated the average normalized daily volume for each stock and converted it to a figure for that period. Although this process of averaging may result in the loss of some data accuracy in the actual volume for each quarter, we believe that the impact of this loss in precision on our conclusions is not significant as we utilize the normalized volume primarily for ordinal rankings to aid the construction of portfolios which is likely to be preserved during the averaging process. The normalized volume is calculated using the following equation:

$$V_t = \frac{d_t}{n_t} \sum_{i=1}^{d_t} \frac{v_i}{S_i}$$

where
V_t: Normalized volume for period *t*
d_t: Number of trading days in period *t*
n_t: Number of days with volume data in period *t*
S_i: Number of shares outstanding on day *i*
v_i: Volume traded on day *i*, where $i = 1, \ldots, d_t$. For days where volume data was not available, $v_i = 0$

2.2 Testing the Profitability of a Momentum Strategy

In order to examine the profitability of a momentum strategy, we employ the approach described in Jagadeesh and Titman, [4, 5]. First, we sort all the stocks with data for the entire formation (*J*) and subsequent holding (*K*) period based on their return over the past *J* time periods, where *J* = 3, 6, 9, 12. We then construct winner (W) and loser (L) portfolios which are held for a subsequent *K* periods, where *K* = 3, 6, 9, 12. This yields a total of 16 portfolio combinations based on different combinations of formation and holding periods.

The W portfolios are constructed by selecting the top 10% of securities by return in the formation period and holding these securities for the holding period. The L portfolios are constructed by selecting the bottom 10% of securities by return in the formation period and holding these securities for the holding period. The portfolios are then formed on an equally weighted basis for the both the W and L portfolio. In order to avoid some of the bid-ask spread, price pressure and lagged reaction effects we skip a month between the end of the portfolio formation period and the start of the portfolio holding period.

In accordance with Jagadeesh and Titman [4, 5], we construct the portfolios on an overlapping holding period basis and employ a series of portfolios that are rebalanced monthly to maintain equal weights instead of a series of buy and hold portfolios. What this means is that at any one point in time, the portfolio will consist of securities selected based on *k* different formation periods and at the end of each month the trading strategy will revise the weights of $1/K$ of the portfolio and carry forward the rest from the previous month. For example, a strategy with *J* = 3 and *K* = 3 that starts in January, i.e. a strategy that selects portfolios based on returns in the past 3 months and holds the portfolio for 3months after, will have a third of the portfolio calculated based on the ranking in December, a third of the portfolio calculated based on the ranking in November and a third of the portfolio calculated based on the ranking in October. Thus, for this strategy, a third of the stocks will change each month, with the remainder carried forward from the last month.

We calculate the annualized return from this strategy for 3 portfolios, the W portfolio, the L portfolio and a zero-cost "Winner minus Loser" (W-L) portfolio. The W-L portfolio represents a portfolio in which the L portfolio is sold short and the proceeds are used to purchase the W portfolio. The return from these 3 strategies for all 16 possible portfolio combinations are reported in Table 1 along with the associated *t*-statistics.

2.3 Testing the Profitability of a Volume-Augmented Momentum Strategy

Having evaluated the results of a momentum strategy based on price, we proceed to investigate whether incorporating volume information can enhance the returns of a pure momentum strategy. We adapt the approach set out by Lee and Swaminthan [12] for this section of the study. We obtain W and L portfolios in a similar manner to section 3.2, but for each W and L portfolio we further divide the stocks into 3 volume portfolios (V1, V2, V3) by sorting the firms into 3 categories according to their volume over the period, with V1 representing the lowest trading volume portfolio and V3 representing the highest trading volume portfolio. These portfolios are calculated for the same 16 possible time combinations as in section 2.2. The results from these tests are reported in tables 2, 3 and 4.

2.4 Calculating Risk-Adjusted Returns

To evaluate how robust our results are, we conduct further analysis for a representative strategy that selects portfolios for both a pure and volume-augmented momentum strategy using a 6 month formation period and a subsequent 6 month holding period, in line with the common reference periods used in momentum studies. First, we calculate risk-adjusted excess returns using the Sharpe-Linter Capital Asset Pricing Model.The excess monthly returns of L, W and L-W portfolios over the risk-free rate are regressed against the excess returns of the market portfolio (all the stocks included in the ranking) over the risk free rate using the following equation:

$$R_{i,t} - r_{f,t} = \alpha + \beta\left[R_{m,t} - r_{f,t}\right] + e_{i,t}$$

where

$R_{i,t}$: Return of the strategy for at time *t*

$r_{f,t}$: Risk-free rate at time *t*

$R_{m,t}$:Return of the market at time *t*, where the market includes all stocks that had sufficient data for inclusion in the ranking process

The results from this regression are presented in table 5 and table 6.

Finally, we calculate market risk-adjusted returns to allow for market-dependent betas. This is done to decompose the returns to a momentum strategy for periods where the market as a whole is trending upwards and for periods where the market as a whole is trending downwards. We conduct this analysis by regressing the monthly returns of L, W and L-W in excess of the risk-free rate against all the market return using the following equation:

$$R_{i,t} - r_{f,t} = \alpha + \beta^{+}D_t\left[R_{m,t} - r_{f,t}\right] + \beta^{-}(1 - D_t)\left[R_{m,t} - r_{f,t}\right] + e_{i,t}$$

where

$R_{i,t}$: Return of the strategy for at time *t*

$r_{f,t}$: Risk-free rate at time *t*

$R_{m,t}$: Return of the market at time *t*, where the market includes all stocks that had sufficient data for inclusion in the ranking process

D_t: Dummy variable that takes a value of one if the market return is positive in month *t* and a value of zero if the market return is negative in month *t*.

The results from this regression are presented in table 7 and table 8.

3 Main Results

3.1 Profitability of a Momentum Strategy

Table 1: Portfolio Rankings Based on Price

		Panel A			
		Holding Period			
Formation	Portfolio	3	6	9	12
3	Winner	1.0036	1.0027	0.9993	0.9947
	Loser	1.0071	1.0008	0.9969	0.9954
	Winner –Loser	-0.0036	0.0019	0.0024	-0.0006
	(t-stat)	(-0.5035)	(0.2880)	(0.4228)	(-0.1223)
	Loser - Winner	0.0036	-0.0019	-0.0024	0.0006
	(t-stat)	(0.5035)	(-0.2880)	(-0.4228)	(0.1223)
6	Winner	1.0104	1.0072	1.0030	1.0007
	Loser	1.0202	1.0131	1.0116	1.0087
	Winner -Loser	-0.0098	-0.0059	-0.0086	-0.0080
	(t-stat)	(-0.9526)	(-0.6390)	(-1.0835)	(-1.1531)
	Loser - Winner	0.0098	0.0059	0.0086	0.0080
	(t-stat)	(0.9526)	(0.6390)	(1.0835)	(1.1531)
9	Winner	1.0095	1.0054	1.0046	1.0057
	Loser	1.0210	1.0168	1.0154	1.0142
	Winner -Loser	-0.0115	-0.0114	-0.0109	-0.0085
	(t-stat)	(-1.0579)	(-1.1400)	(-1.1945)	(-1.0852)
	Loser - Winner	0.0115	0.0114	0.0109	0.0085
	(t-stat)	(1.0579)	(1.1400)	(1.1945)	(1.0852)
12	Winner	1.0053	1.0036	1.0059	1.0059
	Loser	1.0293	1.0254	1.0225	1.0213
	Winner -Loser	-0.0240	-0.0218	-0.0166	-0.0154
	(t-stat)	(-1.9589)	(-2.0221)	(-1.8180)	(-1.8439)
	Loser - Winner	0.0240	0.0218	0.0166	0.0154
	(t-stat)	(1.9589)*	(2.0221)*	(1.8180)*	(1.8439)*
*95% Confidence level, **99% Confidence level					

Table 1 shows the results from the simulated portfolios based on a normal momentum strategy that buys past winners and sells past losers. From the results, we see that the strategy was largely not profitable with most of the different combinations of formation and holding periods for the zero-cost W-L portfolio resulting in a negative average monthly return. A few combinations exhibit a weakly positive return, but these results did not prove to be statistically significant when the t-test was applied. In addition, many of the other combinations with a negative average return did not prove to be statistically significant, with only all the combinations based on a 12 month formation period showing negative and statistically significant results.

The negative average return for our zero-cost strategy suggests that a contrarian strategy, which would involve purchasing the loser and selling the winner would have been profitable for this particular market. This is consistent with mean-reverting prices and suggests that a momentum strategy would not have been profitable for the Philippines Equity Market.

3.2 Profitability of a Volume-Augmented Momentum Strategy

Table 2: Portfolio Rankings Based on Volume (Top third for Volume, W1, L1)

		Panel A			
		Holding Period			
Ranking Period	Portfolio	3	6	9	12
3	Winner	1.0042	0.9953	0.9896	0.9818
	Loser	0.9980	0.9855	0.9787	0.9788
	Winner –Loser	0.0062	0.0098	0.0109	0.0029
	(t-stat)	(0.5554)	(1.1061)	(1.4860)	(0.4478)
	Loser – Winner	-0.0062	-0.0098	-0.0109	-0.0029
	(t-stat)	(-0.5554)	(-1.1061)	(-1.4860)	(-0.4478)
6	Winner	1.0000	0.9960	0.9914	0.9873
	Loser	1.0114	1.0037	1.0005	0.9975
	Winner –Loser	-0.0114	-0.0076	-0.0091	-0.0102
	(t-stat)	(-1.0041)	(-0.7448)	(-1.0656)	(-1.3105)
	Loser – Winner	0.0114	0.0076	0.0091	0.0102
	(t-stat)	(1.0041)	(0.7448)	(1.0656)	(1.3105)
9	Winner	1.0077	1.0054	1.0057	1.0066
	Loser	1.0138	1.0049	1.0039	1.0019
	Winner –Loser	-0.0061	0.0005	0.0018	0.0046
	(t-stat)	(-0.4844)	(0.0508)	(0.1900)	(0.5389)
	Loser – Winner	0.0061	-0.0005	-0.0018	-0.0046
	(t-stat)	(0.4844)	(-0.0508)	(-0.1900)	(-0.5389)
12	Winner	1.0036	1.0047	1.0096	1.0071
	Loser	1.0182	1.0162	1.0150	1.0139
	Winner –Loser	-0.0146	-0.0115	-0.0053	-0.0068
	(t-stat)	(-1.2153)	(-1.1549)	(-0.5829)	(-0.7635)
	Loser – Winner	0.0146	0.0115	0.0053	0.0068
	(t-stat)	(1.2153)	(1.1549)	(0.5829)	(0.7635)
*95% Confidence level, **99% Confidence level					

Table 3: Portfolio Rankings Based on Volume (Middle third for Volume, W2, L2)

		Panel A			
		Holding Period			
Ranking	Portfolio	3	6	9	12
3	Winner	0.9975	0.9991	0.9941	0.9910
	Loser	1.0064	1.0051	1.0048	1.0006
	Winner -Loser	-0.0088	-0.0060	-0.0106	-0.0097
	(t-stat)	(-0.9991)	(-0.7911)	(-1.4356)	(-1.5236)
	Loser- Winner	0.0088	0.0060	0.0106	0.0097
	(t-stat)	(0.9991)	(0.7911)	(1.4356)	(1.5236)
6	Winner	1.0053	1.0077	1.0074	1.0072
	Loser	1.0221	1.0161	1.0124	1.0098
	Winner -Loser	-0.0168	-0.0083	-0.0050	-0.0026
	(t-stat)	(-1.2434)	(-0.7590)	(-0.5454)	(-0.3455)
	Loser – Winner	0.0168	0.0083	0.0050	0.0026
	(t-stat)	(1.2434)	(0.7590)	(0.5454)	(0.3455)

9	Winner	1.0102	1.0093	1.0077	1.0082
	Loser	1.0179	1.0149	1.0147	1.0152
	Winner -Loser	-0.0077	-0.0056	-0.0069	-0.0070
	(t-stat)	(-0.6330)	(-0.5171)	(-0.7250)	(-0.9549)
	Loser-Winner	0.0077	0.0056	0.0069	0.0070
	(t-stat)	(0.6330)	(0.5171)	(0.7250)	(0.9549)
12	Winner	1.0045	1.0024	1.0039	1.0078
	Loser	1.0307	1.0251	1.0250	1.0246
	Winner -Loser	-0.0263	-0.0277	-0.0211	-0.0168
	(t-stat)	(-1.9183)	(-1.9336)	(-2.1772)	(-1.9341)
	Loser-Winner	0.0263	0.0277	0.0211	0.0168
	(t-stat)	(1.9183)*	(1.9336)*	(2.1772)*	(1.9341)*
*95% Confidence level, **99% Confidence level					

Table 4: Portfolio Rankings Based on Volume (Bottom third for Volume, W3, L3)

		Panel A			
		Holding Period			
Ranking	Portfolio	3	6	9	12
3	Winner	1.0122	1.0139	1.0140	1.0114
	Loser	1.0154	1.0097	1.0051	1.0065
	Winner -Loser	-0.0032	0.0042	0.0089	0.0049
	(t-stat)	(-0.2314)	(-0.3620)	(0.9998)	(0.5680)
	Loser – Winner	0.0032	-0.0042	-0.0089	-0.0049
	(t-stat)	(0.2314)	(0.3620)	(-0.9998)	(-0.5680)
6	Winner	1.0235	1.0161	1.0081	1.0064
	Loser	1.0275	1.0196	1.0219	1.0196
	Winner -Loser	-0.0040	-0.0034	-0.0138	-0.0132
	(t-stat)	(-0.2451)	(-0.2548)	(-1.1239)	(-1.1436)
	Loser – Winner	0.0040	0.0034	0.0138	0.0132
	(t-stat)	(0.2451)	(0.2548)	(1.1239)	(1.1436)
9	Winner	1.0095	1.0036	1.0030	1.0040
	Loser	1.0306	1.0306	1.0274	1.0250
	Winner -Loser	-0.0212	-0.0270	-0.0244	-0.0209
	(t-stat)	(-1.3431)	(-1.8166)	(-1.8275)	(-1.7105)
	Loser – Winner	0.0212	0.0270	0.0244	0.0209
	(t-stat)	(1.3431)	(1.8166)*	(1.8274)*	(1.7105)*
12	Winner	1.0078	1.0041	1.0045	1.0022
	Loser	1.0377	1.0340	1.0259	1.0234
	Winner -Loser	-0.0299	-0.0299	-0.0215	-0.0212
	(t-stat)	(-1.6084)	(-1.7748)	(-1.4332)	(-1.5979)
	Loser – Winner	0.0299	0.0299	0.0215	0.0212
	(t-stat)	(1.6084)	(1.7748)*	(1.4332)	(1.5979)
*95% Confidence level, **99% Confidence level					

When the strategy is augmented through the use of volume information (Tables 2,3,4), we see that W-L portfolios based on 3 month formation periods exhibit positive returns for

the highest volume (V1) and lowest volume (V3) combinations. The remaining time combinations show a negative average monthly return, consistent with the results from the normal momentum strategy. This suggests that the inclusion of volume information has some value in augmenting the performance of a momentum strategy, particularly for portfolios formed based on recent information. However, it should also be noted that transaction costs have not been incorporated in the evaluation of returns and the performance of these volume-augmented momentum strategies are likely to be greatly diminished once that has been explicitly modeled.

3.3 Analysis of Risk-Adjusted Returns

Table 5: Risk-Adjusted Returns (Normal)

Portfolio	α	$t(\alpha)$	β	$t(\beta)$	$P(\alpha)$	$P(\beta)$	R^2
Loser	-0.0062	-0.7119	0.8938	8.9540	0.4779	<0.0001	0.4025
Winner	-0.0120	-2.5497	0.8888	16.4328	0.0121	<0.0001	0.6941
Winner - Loser	-0.0100	-1.0549	-0.0046	-0.0420	0.2936	0.9666	<0.0001
Loser - Winner	0.0016	0.1747	0.0055	0.0508	0.8616	0.9596	<0.0001

Table 6: Risk-Adjusted Returns (Volume)

Portfolio	α	$t(\alpha)$	β	$t(\beta)$	$P(\alpha)$	$P(\beta)$	R^2
Loser V1	-0.0130	-1.5671	0.7424	7.7494	0.1197	<0.0001	0.3354
Winner V1	-0.0221	-3.3561	0.8286	10.9075	0.0011	<0.0001	0.5000
Winner V1 –	-0.0133	-1.2632	0.0867	0.7171	0.2090	0.4747	0.0043
Loser V2	-0.0056	-0.5843	1.0342	9.3663	0.5601	<0.0001	0.4244
Winner V2	-0.0128	-2.1482	0.9657	14.1083	0.0337	<0.0001	0.6258
Winner V2 –	-0.0113	-1.0095	-0.0680	-0.5267	0.3148	0.5994	0.0023
Loser V3	0.0005	0.0419	0.8781	6.0067	0.9667	<0.0001	0.2327
Winner V3	-0.0023	-0.3129	0.8410	10.0069	0.7549	<0.0001	0.4570
Winner V3 –	-0.0070	-0.5038	-0.0366	-0.2298	0.6153	0.8187	0.0004
Winner V1 –	-0.0207	-1.8391	-0.2052	-1.5836	0.0684	0.1160	0.0206
Winner V1 –	-0.0268	-1.8270	-0.0490	-0.2900	0.0702	0.7723	0.0007
Winner V2 –	-0.0039	-0.4140	0.2238	2.0690	0.6796	0.0407	0.0347
Winner V2 –	-0.0175	-1.3065	0.0881	0.5726	0.1939	0.5680	0.0027
Winner V3 –	0.0066	0.6407	0.0991	0.8356	0.5230	0.4050	0.0058
Winner V3 –	-0.0008	-0.0724	-0.1928	-1.4463	0.9424	0.1507	0.0173
Loser V3 –	0.0185	1.2632	0.0500	0.2961	0.2090	0.7677	0.0007

Table 7: Market Dependent Risk-Adjusted Returns (Normal)

Portfolio	α	$t(\alpha)$	β^+	$t(\beta^+)$	β^-	$t(\beta^-)$	$P(\alpha)$	$P(\beta^+)$	$P(\beta^-)$	R^2
Loser	0.0159	1.3099	1.4709	5.9419	0.6508	4.7574	0.1928	2.9220E-08	5.6030E-06	0.4334
Winner	-0.0009	-0.1312	1.1790	8.7571	0.7666	10.3041	0.8958	<0.0001	<0.0001	0.7077
Winner – Loser	-0.0207	-1.5269	-0.2839	-1.0304	0.1131	0.7428	0.1295	0.3049	0.4591	0.0102

Table 8: Market Dependent Risk-Adjusted Returns (Volume)

Portfolio	α	t(α)	β^+	t(β^+)	β^-	t(β^-)	P(α)	P(β^+)	P(β^-)	R^2
Loser V1	0.0159	1.3961	1.4981	6.4602	0.4240	3.3090	0.1653	<0.0001	0.0012	0.3994
Winner V1	-0.0055	-0.5962	1.2627	6.6994	0.6457	6.1992	0.5522	<0.0001	<0.0001	0.5252
Winner V1 – Loser V1	-0.0253	-1.6817	-0.2273	-0.7425	0.2189	1.2940	0.0953	0.4593	0.1982	0.0147
Loser V2	0.0150	1.1038	1.5712	5.6932	0.8080	5.2982	0.2719	<0.0001	<0.0001	0.4454
Winner V2	-0.0146	-1.7047	0.9183	5.2705	0.9856	10.2370	0.0909	<0.0001	<0.0001	0.6261
Winner V2 – Loser V2	-0.0334	-2.1013	-0.6448	-1.9915	0.1749	0.9776	0.0377	0.0487	0.3303	0.0331
Loser V3	0.0178	0.9807	1.3289	3.5964	0.6882	3.3704	0.3288	0.0005	0.0010	0.2440
Winner V3	0.0174	1.7091	1.3559	6.5282	0.6241	5.4377	0.0901	<0.0001	<0.0001	0.4885
Winner V3 – Loser V3	-0.0042	-0.2123	0.0351	0.0864	-0.0668	-0.2980	0.8323	0.9313	0.7662	0.0008
Winner V1 – Loser V2	-0.0243	-1.5032	-0.3004	-0.9110	-0.1651	-0.9057	0.1355	0.3642	0.3670	0.0215
Winner V1 – Loser V3	-0.0272	-1.2854	-0.0581	-0.1349	-0.0452	-0.1901	0.2012	0.8930	0.8496	0.0007
Winner V2 – Loser V1	-0.0344	-2.6529	-0.5717	-2.1683	0.5589	3.8358	0.0091	0.0321	0.0002	0.1155
Winner V2 – Loser V3	-0.0363	-1.8988	-0.4025	-1.0354	0.2948	1.3722	0.0600	0.3026	0.1726	0.0184
Winner V3 – Loser V1	-0.0023	-0.1578	-0.1342	-0.4457	0.1973	1.1863	0.8749	0.6566	0.2379	0.0118
Winner V3 – Loser V2	-0.0014	-0.0836	-0.2073	-0.6107	-0.1866	-0.9952	0.9335	0.5425	0.3217	0.0173

We analyse the risk-adjusted performance of the various portfolios using the single factor Capital Asset Pricing Model. Tables 5,6,7,8 report the results from this analysis and show that the W-L portfolios for the price-based momentum strategy tend to underperform their benchmark with negative alphas for most of the portfolios. When the strategy is augmented with volume information, all the reported alpha values are negative as well even for the strategies that reported positive average monthly returns. This suggests that while the addition of volume information can improve the profitability of momentum strategies in this market on an absolute basis, the strategy still underperforms the benchmark on a risk-adjusted basis.

Besides the single factor model, we also conducted the analysis using market-dependent betas. The results from this regression reveal some insights into the poor performance of momentum strategies. We see that the Loser portfolios tend to have a higher beta than the Winner portfolios when market returns are positive and a lower beta when market returns are negative, consistent with the result of negative alphas for the zero-cost portfolio.

4 Conclusion

The profitability of a momentum strategy is highly dependent upon the characteristics of a market. In this paper, we tested the profitability of a price-based momentum strategy and a volume-augmented momentum strategy for the Philippines Equity Market. For the strategy based only on past return information, we find little evidence in support of the profitability of a momentum strategy with the results suggesting the presence of mean-reverting prices. The Philippines Equity Market is a thinly traded market and hence the reasons for large moves that lead to returns falling into the top or bottom deciles in the ranking period could be due to large volumes being traded during that period that push prices in a particular direction and might not contain information on the likely future direction of the stock. This could be a possible reason that past winners tend to perform badly and past losers tend to do well for this particular market. When volume information is incorporated, the strategies that select stocks based on volume and return information from the past 3 months show positive average monthly returns. However, the returns are often not statistically significant and after the effect of transaction costs from the rebalancing of the portfolio are accounted for the positive average monthly returns quickly disappear. In addition, after adjusting for the risk of these strategies using a single factor model and a model with market-dependent betas we find that such a strategy does not outperform the benchmark. Hence, we conclude that while the use of volume information improves the performance of a momentum strategy, such a volume-augmented strategy still does not appear to be particularly profitable within this market and the evidence seems to suggest that a contrarian strategy may prove profitable instead.

References

[1] Wer ner F. M. de Bondt and Richard H. Thaler, Further Evidence on Investor Overreaction and Stock Market Seasonality, *The Journal of Finance*, **42**(3), (1986), 557 - 581.

[2] N. Barberis and A. Shleifer, Style Investing, *The Journal of Financial Economics*, **68,** (2003), 161-199.

[3] Mark M. Cahart, On Persistence in Mutual Fund Performance, *The Journal of Finance,* **52**(1), (1997), 57-82.

[4] N. Jegadeesh and S. Titman, Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency, *The Journal of Finance*, **48**(1), (1993), 65-91.

[5] N. Jegadeesh and S. Titman, Profitability of Momentum Strategies: An Evaluation of Alternate Explantations, *The Journal of Finance,* **56**(2), (2001), 699-720.

[6] K. Geert Rouwenhorst, 'International momentum Strategies', *The Journal of Finance*, **53**(1), (1998), 267-284.
[7] Andy C.W. Chui, S. Titman and K.C. John Wei, 'Individualism and Momentum around the World', *The Journal of Finance*, **65**(1), (2010), 361-392.
[8] G. Aharoni and Tuan Q. Ho and Q. Zheng, 'Testing the growtwh option theory: the profitability of enhanced momentum strategies in Australia', *Accounting and Finance Journal*, **52**, (2012), 267-290.
[9] John W.S. Hu and Y.C Chen, 'The Performance of Momentum Investment Strategies: An International Examination of Stock Markets', *International Journal Of Management*, **28**(4), (2011), 165-176.
[10] A. Biglova, S. Rachev, T. Jasic and Frank J. Fabozzi, 'Profitability of momentum strategies: application of novel risk/return ratio stock selection criteria', *Investment Management and Financial Innovations*, **4,** (2004), 48-62.
[11]] S. Rachev and T. Jasic and S. Stoyanov and Frank J. Fabozzi, 'Momentum strategies based on reward-risk stock selection criteria', *Journal of Banking & Finance*, **31**, (2007), 2325-2346.
[12] Charles M.C. Lee and B. Swaminathan, 'Price Momentum and Trading Volume', *The Journal of Finance*, **55**(5), (2000), 2017-2069.
[13] Edwards, R. D., Magee, J., & Bassetti, W. H. C, (2007). Technical analysis of stock trends. 9th ed.
[14] A. Hameed and Y. Kusnadi, 'Momentum Strategies: Evidence from Pacific Basin Stock Markets', *The Journal of Finance Research*, **25**(3), (2002), 197-383.
[15] M. Glasser and M. Webber, 'Momentum and Turnover: Evidence from the German Stock Market', *Schmalenbach Business Review*, **55**, (2003), 108-135.
[16] Sam A.Ampomah, 'On the Profitability of Volume-Augmented Momentum Trading Strategies: Evidence from the UK', *Investment Management and Financial Innovations*, **3**(3), (2006), 91-106.