MOMENTUM IN THE PHILIPPINE STOCK MARKET

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This paper investigates whether momentum, as described by Jegadeesh and Titman (1993), exists in the Philippine stock market. Results show that momentum did exist in the Philippine stock market prior to the Asian crisis (1991-1997). However, upon further inspection of the post-Asian crisis sample (1998-2001), the presence of momentum was not detected. Moreover, when the pre- and post-Asian crisis periods are combined, this aggregated sample gave weak evidence of momentum in the exchange.

I. INTRODUCTION

One of the most enduring anomalies that continue to perplex capital markets is the phenomenon called momentum. Observed in developed and emerging financial markets, momentum is the continuation of stock return increases (decreases) long after relevant information has been revealed. Its existence has caused wide debate in the academic sector since it has broad implications for both theoretical and empirical finance. For instance, all forms of the efficient market hypothesis (EMH) assume that past stock returns will have no bearing on future returns. Hence, if it can be shown that past returns forecast future returns then it can be used as evidence against the EMH.

Although momentum can have many forms, Jegadeesh and Titman (JT, 1993) were able to show returns momentum in the U.S. capital markets by employing a trading strategy called relative strength. In this strategy, portfolios are formed by selecting past "winner" stocks. Winners (losers) are defined as the top (lowest) decile stocks in terms of returns for a given period. Once these winner portfolios are formed, they are held for periods ranging from 3 to 12 months and are observed for their holding period returns. Furthermore, in order to side step the financing cost problem, JT implemented a zero-cost strategy; they financed their purchase of the winner's portfolio by "shorting" an equally valued loser's portfolio.

In their study of the U.S. capital market from 1965 to 1989, JT were able to show the possibility of earning positive profits while using this relative strength strategy. What makes this finding more significant was the fact that it was observed for all 16 of the medium-term strategies evaluated by JT. In a nutshell, past winners tended to be future winners as well.

Anomalies such as these are often treated with very little fanfare since they often disappear when realized by the investing public and thus removes the possibility of exploiting the anomaly as a profitable trading strategy. For instance, the once-celebrated "January effect" and "size effect" have long since vanished after it was revealed to investors. Due to this fact, many researchers treat anomalies with much cynicism. The same cannot be said of momentum.

In a subsequent study, Jegadeesh and Titman (1999) offered an out-of-sample evidence of momentum by examining the elapsed period (1990-1999) after their initial study. Following the same methodology, they presented similar findings in the average returns of their relative strength portfolios. Rouwenhorst (1997) added more evidence for momentum, by examining European capital

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markets. In his study, Rouwenhorst established that in the years 1978 to 1995, using the relative strength strategy would have yielded profitable results in 12 countries.

In the developing country context, using a similar relative strength strategy, Rouwenhorst (1998) and Hameed and Yuanto (1999) also recorded profitable results. Rouwenhorst used a sample that consisted of 20 countries spanning all continents for the time horizon ranging from 1975 to 1997. Although Rouwenhorst only used one of the strategies of JT, the relative strength strategy was, nevertheless, still a profitable strategy. In the same vein, Hameed and Yuanto (1999) used a sample that consisted of six of the tiger economies in the Asian region. Their finding indicates that the relative strength strategy would be profitable if the strategy was implemented on a country-neutral basis (i.e., all the stocks of the sample countries were aggregated together before using the relative strength strategy to select stocks). The evidence is clear: past winners tended to be future winners.

The purpose of this paper is to test whether or not the relative strength strategy used by JT would be profitable in the Philippine setting. Furthermore, this paper also tests for the presence of seasonality and examines the pre- and post-Asian crisis periods.

Section 2 describes the data used in this paper. Section 3 explains the methodology used. Section 4 presents the findings and Section 5 concludes the paper.

II. DATA

Trading activity data in the Philippine Stock Exchange was obtained from the Bloomberg database. This covers the time period from January 1991 to December 2001, involving over 200 firms that span all the sectors of the Philippine Stock Exchange. Only preferred and common stocks were used in this study, and this data was processed in the following manner:

A j-month holding period return for an individual stock was computed by taking the percentage increase in the closing prices of the first trading days of $(t-j)^{th}$ and t^{th} months. Although dividends present a complication to the computation of holding period returns, it can be easily managed by keeping a separate record of the number of shares being held for a particular stock.

For instance, in the event that cash dividends were issued during this time window, the treatment in this paper was to reinvest the cash into the same stock by purchasing additional shares of the same stock. This would then increase the outstanding holding of the stock. As for the reference price for this purchase, the closing price of the last trading day will be used. This purchase, of course, would occur in the same month that the ex-dividend date was recorded. Stock dividends are easier to handle since it would just increase the outstanding holdings of the stock by the stock dividend percentage.

The holding period return for portfolios was computed analogously. The only technical difference is that the portfolio is considered as a stock to be invested in. And whenever a stock member of the portfolio issued dividends, it is reinvested in the whole portfolio instead.
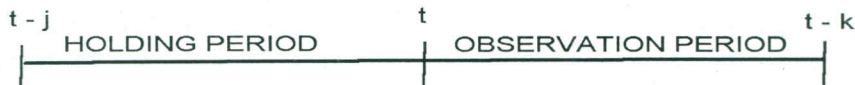
III. RELATIVE STRENGTH STRATEGIES

For purposes of implementing the relative strength strategy, j-month holding period returns were computed and observed for each individual stock. Since the momentum

anomaly recorded by JT occurred in the medium-term (i.e., 3-12 months) this study duplicates this and records the holding period returns from t = 3 to 12 months. These stocks are then ordered from highest to lowest according to their returns and are assigned to one decile group. Hence, portfolio 1 would represent an • equally weighted portfolio consisting of stocks that had the highest individual stock returns for period t-j to t and is denoted as the winners' portfolio. Conversely, portfolio 10 is the denoted as the losers' portfolio and its members have the lowest individual stock returns for the same time period t-j to t.

Having established the criteria for the formation of portfolios 1 and 10, the same portfolios are maintained at time t, and are passively held for another k months (where k ranges from 3 to 12).[1] After which, the holding period returns of portfolio 1 and 10 are again recorded at the end of the kth month.

To summarize, the steps outlined above comprise the j-k relative strength strategy (or j-k strategy) that calls for the observation of the returns of individual stocks at time t-j to t. On the basis of these returns both the winners' and losers' portfolios will be formed at time t and will be passively held until time t+k at which time the portfolio positions are closed out.

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t - j                      t                      t - k
   |   HOLDING PERIOD      |   OBSERVATION PERIOD   |
   |----------------------|------------------------|
   |                      |                        |
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Since all of the portfolios are held for at least three months, to increase the number of observations, this study used the j-k strategy every month from January 1991 and December 2001. Hence, the total number of permutations for the j-k strategies would be

exactly equal to 100. Finally, to sidestep the financing issue of the portfolios, zero-cost portfolios were formed whereby at time t the winners' portfolio is bought, and an equally valued losers' portfolio is sold.

IV. FINDINGS

Table 1 reports the 1-month mean returns (with the corresponding p-values) of the j-k strategy of the Winners' portfolio, and Table 2 presents the same information for the losers' portfolio. While Table 3 is the zero-cost j-k portfolio formed by buying the winners' portfolio and shorting the losers' portfolio. Figure 1 plots the returns for the j-k strategies (where j is 1, 2, 3, and 4 quarters).

For the zero-cost portfolio, the average monthly return is positive for all j-k strategies. And although it is not reported in this paper, this finding is inclusive of the intermediate months between quarters. The range of 1-month returns is from 0.005 percent to 13.4 percent. A caveat to this finding is the statistical insignificance of several of these

average returns. Out of the 100 strategies examined, 43 fail to reject the null hypothesis of statistical significance at the conventional 5 percent level. Furthermore, only the 9th month ranking period was consistently able to produce statistically significant returns from the 3rd to 12th month of holding of the portfolio. But due to the absence of plausible explanation why it only works for the 9th month ranking period, there is skepticism whether this strategy will work out-of-sample. Finally, it should be noted from the figure that the returns seem to be linearly declining as time passes by.

Directing the focus on the 6-month observe-6 month-hold strategy, it can be seen that this zero-cost 6-6 strategy earns a

monthly return of 3.6 percent but again is not statistically significant for $\alpha=0.05$. These results can be compared with the findings in other countries. The holding period returns documented by JT for the U.S. were 5 to 10 times smaller than its counterpart here in the Philippines. In addition, all the 16 strategies reported by JT were statistically significantly different from zero, while in contrast, the same strategies implemented for the Philippines reported a statistically significant result in 10 out of the 16 times in the sample period.

In other developed economies such as Europe, a 6-6 strategy was tested by Rouwenhorst (1998). He documented a mean return that is 3 to 10 times smaller than the same strategy employed in the Philippines. Furthermore, with the exception of one country, the average returns were all statistically significant at $\alpha=0.05$.

It would seem that the conditions of more advanced economies might not be comparable to those found in the Philippines. Hence, it was deemed that a closer match for comparison to the Philippine Stock Exchange would be other Exchanges found in other developing countries. Hameed and Yuanto (1999) examined exchanges in developing countries that are geographically close to the Philippines. For the period 1981 to 1994, they used the zero-cost 6-6 strategy for six Asian countries and found average returns of 0.02 to 0.06 percent. Again, these average returns are much smaller than the returns in the Philippines. This present study found similar results that a good part of these excess returns were not statistically significant from zero.

The high mean holding period returns paired with low statistical significance can only be reconciled by having a highly volatile holding period return for the portfolio. For completeness, Table 4 presents the one-month standard deviation of the j-k portfolios. It can be seen that the zero-cost relative strength portfolios do indeed have high variability

ranging from a low of 15 percent to a high of 63 percent.

One can make a conjecture that since the relative strength strategy selects portfolios with high mean and high standard deviations, one plausible way to improve its performance is to remove the top 5 percent and the lowest 5 percent in the sorting out process of portfolio ranking. Similar to the studies of Rouwenhorst (1998) and Hameed and Yuanto (1999), these remaining stocks will be classified into three portfolios instead of 10; thereby broadening the diversification process in each portfolio. Using 1/3 and 2/3's of the size of candidate stocks as the breakpoints of the portfolios, Portfolio 1 were the stocks with the highest return (winners') and Portfolio 3 were the stocks with the lowest return (losers'); albeit without the top and bottom 5 percent performers.

It is hoped that the larger portfolio will assuage the high variability in the portfolio series and would be better diversified than the previous portfolios formed in decile groups; and ultimately leading to less volatility in the portfolio. Table 5 presents the zero-cost returns of implementing this modified strategy.

The most glaring result is the reversal in the positive returns when the relative strength strategy is used. With negative returns as low as –6 percent per month, the relative strength strategy fails to produce a positive return higher than 2 percent per month. And although these negative returns are not statistically significant, positive returns were scarce for portfolios constructed according to the 1/3 breakpoints as tested by Rouwenhorst (1999). This study hypothesizes that because the outliers in the winners' and losers' portfolio were removed, the remaining winners' are outweighed by the losers', hence resulting in the negative returns in the zero-cost portfolios. Furthermore, despite broadening the portfolio and removing the outliers, the statistical insignificance of the returns still points to high volatility in the portfolios formed.

Seasonality

Jegadeesh and Titman (1993) noted that in their sample period, the relative strength strategy produced negative returns for the month of January and had its highest returns in the month of April. They claimed that this seasonality could probably be traced to tax considerations and window dressing by fund managers. Similarly, Hameed and Yuanto (1999), found April to be the highest performer (3.45%) in their sample. However, the lowest performer in their sample was the month of August (-1.32%).

This study found the opposite result for the Philippines. As presented in Table 6, the basic 6-6 zero cost relative strength strategy was categorized according to the month that the portfolio was formed. It was observed that the month with the highest holding period return was January (13.1%) while the month with the lowest return was April (-48.8%). Although there is some apprehension in these findings since they are again statistically insignificant. Nevertheless, these findings pose two puzzles: firstly, why are the extreme returns (albeit in opposite extremes) concentrated in April? and secondly, why is the range for the Philippine sample wider and therefore more volatile as compared to the other countries examined?

It would be premature to attribute the extremity of these results to window dressing and tax considerations. It is quite possible that these findings are not representative of the actual mechanism driving the returns. More observations are needed before seasonality can be concluded with finality.

Asian Crisis

Catastrophic events, such as the Asian crisis in 1997, might play a role on the profitability of the relative strength strategy. In a period of six months in 1997, it can be noted that the local currency experienced a devaluation of approximately 60 percent. Bautista (2002) noted that the local bourse experienced two periods of high volatility within the period under study; with the longer of the two happening in 1997. The immediate effect on the Philippine Stock Market was the thinning of trade volume and activity. For completeness, this study examined the performance of the relative strength strategy in both the pre-crisis and post-crisis time periods. Since the relative strength strategy covers a wide span of time, the study has the luxury of excluding the year 1997 from the test. Hence, the pre-crisis period will cover the years 1991-1996, while the post-crisis period will cover the years 1998-2001.

Tables 7 and 8 present the zero-cost relative strength strategies for the pre-crisis period with accompanying standard deviations while Tables 9 and 10, present the same information for the post-crisis period.

In the dichotomy of periods, it can be reported that the relative strength strategy yields positive statistically significant results in 93 out of the 100 j-k strategies examined in the pre-crisis period (although the intermediate months were not presented in the table). And even though the average returns are much higher than those reported by Jegadeesh and Titman (1993), Rouwenhorst (1997) and Hamid and Yuanto (2002) in the sample period examined (1991-1996), the relative strength strategy did work and it can partially be concluded that the stock market at that period exhibited momentum.

In contrast to this discovery, 60 percent of the j-k strategies (inclusive of intermediate months) in the post-crisis period yield negative returns. And all of these j-k strategies are statistically insignificant at $\alpha=0.05$.

To elucidate on the matter further, this study tested whether the means and volatilities of the pre-crisis and post-crisis periods were different. Using the relevant test statistics, it was found out that the majority of the returns in the pre-crisis portfolios are indeed statistically greater than the returns in the post-crisis. However, the volatility in the pre-crisis period cannot be statistically concluded to be smaller than the volatility in the post-crisis period.

V. CONCLUSION

The main finding of this paper is that the relative strength strategy would have worked in the Philippine stock market if implemented prior to the Asian crisis. However, if a more recent sample is examined (1998-2001), the relative strength strategy would have not yielded positive returns. All the same, in the time frame of 1991 to 2001, positive returns could indeed have been gained in the Philippine stock market if the relative strength strategy was used. But a caveat to this finding is the reliability of earning positive returns out-of-sample, since a majority of the relative strength strategies evaluated were not very statistically significant.

What initially was an investigation on the momentum phenomenon and the profitability of the relative strength strategy has uncovered a different facet of the Philippine stock market. Momentum did seem to exist in the pre-Asian crisis period of 1991 to 1996. By constructing portfolios conditioned on the return performance of individual stocks in the past months, it has been shown that statistically positive returns could have been earned out of these strategies. However, in succeeding years after the Asian crisis, the reliability of earning profits by using this strategy has disappeared.

Combining these two periods together, the zero-cost relative strength strategy was successful in earning positive returns, albeit some of these returns were not statistically significant. This leads to the conclusion that the relative strength strategy selects high mean, high volatility portfolios in its application to the Philippine stock market. Hence, even if transaction costs and taxes are removed, there is skepticism whether the relative strength strategy would be a successful out-of-sample trading strategy in the medium term.

How can the success of the relative strength strategy in the pre-crisis period be reconciled with the failure of the same strategy in the post-crisis period? The easiest culprit to blame would be the thinning of trade volume after the crisis happened. Foreign fund managers contributed a good portion of the volume before the Asian crisis hit. Their appetite for the Philippine (and developing country) stocks as a whole was probably tempered by the foreign exchange risk experienced by the whole region.

Going back to an earlier inference of the study, if volume and volatility can be established to be correlated, then perhaps the absence of heavy volume might be an explanation for the lackluster performance of the relative strength strategy here in the Philippines. Still, this assertion would not be altogether inconsistent with the theory put forth by researchers such as Odean (1998), who postulated that underreaction to information (leading to momentum) and excessive volatility are all by-products of the presence of overconfident traders in the market.

Finally, analyzing the data for seasonality poses more questions than solutions. Other researchers found that the relative strength strategy had its peak performance in April. But this study finds that for Philippine stocks, the relative strength strategy had its worst performance in April. Is this a coincidence? Or is there a factor that can explain this difference? This study will leave question unanswered for now. However, as hypothesized by Jegadeesh and Titman (1993), it may well be that window dressing and taxes may explain this seasonality in the data.

NOTE

[1] Although it is possible to put a time gap before portfolios 1 and 10 are formed, this study did not consider this for the relative strength strategies. Even without this time gap, the relative strength strategies that this paper uses have already yielded useful insights.

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Table 1: 1-month returns for Winners' portfolio (stocks ranked in deciles)

		Holding period of portfolio (k)			
		3	6	9	12
	3	0.063	0.063	0.059	0.071
	P-value	0.005	0.000	0.000	0.000
Ranking period of portfolio (j)	6	0.104	0.089	0.075	0.089
	P-value	0.000	0.000	0.000	0.000
	9	0.103	0.091	0.100	0.083
	P-value	0.000	0.000	0.000	0.000
	12	0.149	0.137	0.098	0.084
	P-value	0.015	0.000	0.000	0.000

Table 2: 1-month returns for Losers' portfolio (stocks ranked in deciles)

		Holding period of portfolio (k)			
		3	6	9	12
	1	0.0997	0.1806	0.2286	0.451
		0.0002	8E-05	0.0002	0.0036
	2	0.1072	0.1662	0.242	0.6359
		0.0006	0.0002	0.0003	0.008
	3	0.040	0.025	0.038	0.058
	P-value	0.001	0.000	0.025	0.010
Ranking period of portfolio (j)	6	0.030	0.053	0.045	0.045
	P-value	0.009	0.122	0.042	0.007
	9	0.026	0.023	0.035	0.043
	P-value	0.033	0.017	0.005	0.001
	12	0.018	0.021	0.034	0.065
	P-value	0.136	0.054	0.017	0.005

Table 3: 1-month returns for zero cost portfolio (stocks ranked in deciles)

		Holding period of portfolio (k)			
		3	6	9	12
	1	0.0747	0.0753	0.134	0.0749
		0.3077	0.3068	0.1258	0.6895
	2	0.023	0.1351	0.217	0.0369
		0.6781	0.0603	0.019	0.8882
	3	0.024	0.038	0.020	0.013
	P-value	0.341	0.009	0.288	0.641
Ranking period of portfolio (j)	6	0.074	0.036	0.030	0.044
	P-value	0.006	0.312	0.217	0.042
	9	0.077	0.067	0.065	0.040
	P-value	0.002	0.000	0.003	0.015
	12	0.131	0.116	0.064	0.019
	P-value	0.035	0.004	0.012	0.452

Figure 1
Computed One Month Returns

Holding period (in months)
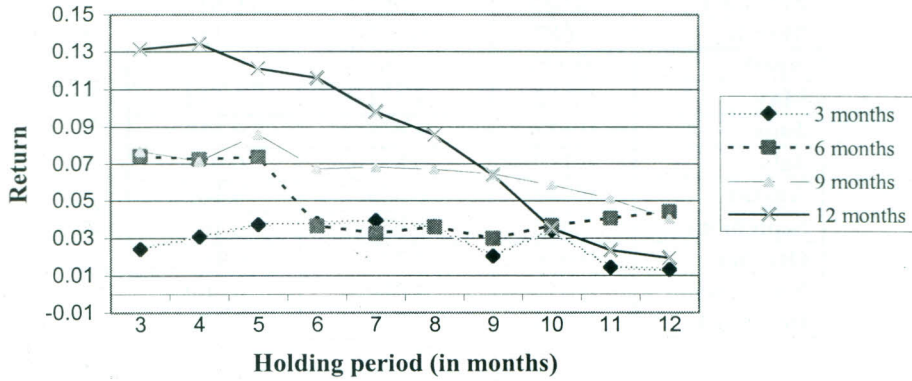
Table 4: 1-month standard deviation for the j-k portfolios

		kth month			
		3	6	9	12
jth month	3	0.261	0.149	0.197	0.291
	6	0.273	0.372	0.249	0.224
	9	0.246	0.186	0.220	0.168
	12	0.638	0.409	0.262	0.264

Table 5: 1-month returns for zero cost portfolio
(stocks ranked in 1/3 breakpoints)

		Holding period of portfolio (k)			
		3	6	9	12
Ranking period of portfolio (j)	3	-0.009	-0.008	-0.003	-0.009
	P-value	0.241	0.577	0.757	0.275
	6	0.012	0.019	-0.015	-0.035
	P-value	0.452	0.017	0.400	0.122
	9	0.012	-0.044	-0.040	-0.032
	P-value	0.482	0.235	0.138	0.071
	12	-0.025	-0.062	-0.056	-0.064
	P-value	0.274	0.128	0.039	0.009

Table 6: Returns for the 6-6 strategy for the calendar months in the year.

Month	Mean	Std. Dev	P-value
January	0.131	0.807	0.639
February	-0.035	0.998	0.838
March	0.087	0.501	0.159
April	-0.488	7.001	0.427
May	0.112	1.151	0.184
June	0.157	1.618	0.120
July	0.119	0.873	0.021
August	0.040	0.523	0.102
September	0.062	0.919	0.107
October	0.058	1.236	0.199
November	0.033	1.010	0.309
December	0.009	0.717	0.672

Table 7: Pre-crisis 1-month returns for zero cost portfolio

		Holding period of portfolio (k)			
		3	6	9	12
Ranking period of portfolio (j)	3	0.044	0.063	0.053	0.068
	P-value	0.037	0.001	0.000	0.037
	6	0.113	0.109	0.076	0.083
	P-value	0.005	0.000	0.001	0.005
	9	0.101	0.100	0.097	0.066
	P-value	0.001	0.001	0.007	0.016
	12	0.213	0.190	0.107	0.058
	P-value	0.050	0.008	0.018	0.122

Table 8: Pre-crisis 1-month standard deviation for the j-k portfolios

		kth month			
		3	6	9	12
jth month	3	0.159	0.137	0.106	0.245
	6	0.298	0.183	0.166	0.224
	9	0.229	0.215	0.268	0.205
	12	0.827	0.534	0.340	0.286

Table 9: Post-crisis 1-month returns for zero cost portfolio

		Holding period of portfolio (k)			
		3	6	9	12
Ranking period of portfolio (j)	3	-0.007	0.006	-0.041	-0.085
	P-value	0.920	0.848	0.425	0.183
	6	0.001	-0.088	-0.056	-0.024
	P-value	0.967	0.371	0.361	0.557
	9	0.028	0.019	0.012	-0.004
	P-value	0.496	0.434	0.615	0.821
	12	-0.004	0.016	-0.004	-0.053
	P-value	0.871	0.212	0.762	0.227

Table 10: Post-crisis 1-month standard deviation for the j-k portfolios

		kth month			
		3	6	9	12
jth month	3	0.399	0.181	0.304	0.376
	6	0.200	0.582	0.361	0.245
	9	0.242	0.144	0.146	0.109
	12	0.149	0.073	0.077	0.259