William A. Orme

WORKING PAPER SERIES

The Cross-autocorrelations of Returns: Evidence from the Seven Asian Equity Markets

Jeffrey E. Jarrett, Zhenzhen Sun

2010/2011 No. 13
The Cross-autocorrelations of Returns: Evidence from Seven Asian Equity Markets

(May, 2010)

Jeffrey E. Jarrett, Ph.D. *
University of Rhode Island
(jejarrett.mail.uri.edu)

Zhenzhen (Tina) Sun, Ph.D.
Siena College
(zsun@siena.edu)

*Corresponding Author
Abstract

We explore, explain and extend previous research on the relations between large and small stock returns in Asian (Pacific-Basin) nations with a new analysis of the Chinese equity markets. The association among seven Asian equity markets is the focus of this study. We provide evidence of the cross-autocorrelation of equity returns in a more recent time period than analyzed before by others. Evidence is brought to bear as to the theoretical explanations for stock market behavior of Pacific-Basin nations including those with large large markets, i.e., China, Japan and Hong Kong, and those with smaller equity markets. We indicate the validity of the conclusion made on studies of earlier time periods which conflict with various explanations of stock market behaviors. Relations between large and small size firms’ stock returns as well as the influence of lagged returns provide the subject matter of this study.
Key Words
Asian Equity Markets
Autocorrelation
Cross-Autocorrelation
Lagged Returns
Heretics
Large vs. Small Stock Returns
Loyalists
Revisionists
Introduction

Associative relationships between the returns to large and small stocks in the U.S. Market (Lo and MacKinlay, 1990a) and from the cross-autocorrelations of the returns from Asian Equity Markets and the U.S. Market (Chang, McQueen and Pinegar, 1999), hereafter CMP, indicated the need for additional study of association between factors affecting the returns for firms listed on Asian stock exchanges. In addition, there are more recent studies by Jarrett and Sun (2009A and 2009B), hereafter JS. They examined and confirmed some of the conclusion of CMP but for a much larger analysis of a larger data base and over a more recent and lengthier period of time. Explanations for this cross-autocorrelation are categorized into three views by Boudoukh, Richardson and Whitelaw (1994), Loyalist explanations attempting to reaffirm market efficiency, attributing the predictability to data or market imperfections such as asynchronous trading. Revisionists label the predictable component in small stock returns as time-varying risk premiums. Last, Heretics explain the cross-autocorrelation as market fads, bubbles, overreaction, and other unusual behaviors.

None of the views are completely successful in explaining the cross-autocorrelations and its meaning. Boudoukh, Richardson and Whitelaw (1994) extend Lo and MacKinlay's (1990b) asynchronous trading explanation, Loyalist, and show how it could explain an important amount of cross-autocorrelation. However, their explanation alone is inadequate because Mech's (1993) synchronized portfolios exhibit important and sizable cross-autocorrelation. Mech's (1993) transaction cost explanation Loyalist is not supported by his own time-series analysis or by McQueen, Pinegar and Thorley (1996), hereafter MPT, cross-sectional tests. Mech (1993) and MPT also dispute Revisionist explanations by pointing out that we must accept frequent and significantly negative small stock risk premiums if we are Revisionists. MPT shows further that cross-autocorrelation is present upon correcting for the predictability associated with time varying risk premiums. Last, we document some directional asymmetry, that is, after good news, small stock lag large stocks. Our aim is to add to the knowledge on the directional asymmetry for a more recent time period and for a larger and more recent sample than studied before and for the largest nation’s equity markets in the region, China.

We extend and attempt to validate earlier studies for the cross-autocorrelation in seven Asian markets. This is especially important since three of these markets are better developed than were for nations of Asia studied by CMP and JS. We will verify that cross-autocorrelation is present in the data for all Pacific Basin markets and attempt to explain some of the apparent cross-autocorrelation. The seven markets are Pacific Basin markets of China, Hong Kong, Japan, Malaysia, South Korea, Taiwan, and Thailand. Our findings will include observations for both synchronized and unsynchronized portfolios, the regression of
one nation’s small stock portfolio with contemporaneous and lagged large stock portfolio returns of other nations, directionally asymmetric analysis of small and large stock portfolios and asymmetric regressions of small versus large stock returns after accounting for small stock autocorrelation and sub period regressions of small versus large stock contemporaneous and lagged portfolio returns. These additional tests often yield results that are problematic for existing Loyalist, Revisionist, and Heretic explanations.

We organize this study with the following sections which contain tables to describe the graphical and data analysis and reports which contain summary statistics, box plots and institutional characteristics (potentially related to market inefficiencies) of the seven Asian markets. In turn, additional sections contain analyses of those factors designed to lead to new conclusions concerning the explanation of the stock market behavior of the seven Asian (Pacific-Basin) nations. Finally, we summarize and draw conclusions concerning the operation and characteristics of the seven markets studied.

The Data Base

Data for the seven Pacific-Basin financial markets, China, Hong Kong, Japan, Taiwan, Thailand, South Korea, and Malaysia are selected from the Pacific-Basin Capital Markets Research Center (PACAP) and the PACAP-CCER China database. The center tabulates and stores data originating from these capital markets. Data for all the capital markets start from January 1998 and extend through December 2008 for China A-share, December 2004 for Hong Kong, December 2006 for Japan, December 2004 for Taiwan, December 2003 for Thailand, and December 2001 for South Korea and Malaysia. These data were the most recent data available at the commencement of this study. The returns are denominated in local currencies and include dividends as well as closing prices. For each nation, we sorted the firms into five portfolios (quintiles) each year based on the market value of the security at the termination of the previous year.

Table 1 reports summary descriptive statistics on firm size, number of firms, number of firms trading for both the smallest and largest quintile. These data for the purpose of comparison purpose indicate relative differences in the size of the financial markets in each nation studied. Further, for purposes of brevity, we do not include data expressing the differences in the market sizes. Although expressed in local currencies, all returns examined throughout the study are for the purposes of comparison and analysis, but we do express market capitalizations in US dollars. Hence, following CMP and JS, we formed equally weighted portfolios to be considered and compared. Because we ranked the portfolios on the basis of the firms’ market capitalizations equally weighted portfolios make more sense. By The mean firm size in Quintile 5 (the large firm size portfolio) is only $239.8MM for Taiwan, $49.45MM for Thailand, $842.81MM for South Korea and $608.43MM for Malaysia. The large size portfolio for China, Japan and Hong Kong are
$584.76MM, $6725.28MM and $3422.23MM respectively indicating that the definitions of large size portfolios vary from equity market to equity market. Hence, comparisons of the large size portfolios of these Pacific-Basin nations will vary because of the definitions of large size do vary for each nation.

Insert Table 1

Comparisons among the firm size by quintiles and the nations’ equity markets are additionally explained by the box plots in Figures 1-7. Figure 1 containing the box plot of quintile 1 (smallest) and quintile 5 (largest) indicate some telling results for the Chinese equity markets. The variation in size for the smallest firms is not large and includes firms in the $30MM and $65MM interval with one firm in that interval is much greater in size than the remaining firms. For the largest firms (quintile 5) in China we note the very small variation in the size of firms with again one very large outlier. We examine the remaining box plots in Figures 2 -7 and observe relatively small variation in size for most of the box plots. The principal exceptions are South Korea largest firms and the smallest firms for Taiwan and perhaps Malaysia. The Inter-Quartile Ranges (IQR) would only be relatively large in these last instances. Hence, the quintile for all other nations’ equity markets demonstrate relative uniformity with a small number of outliers.

Insert Figures 1-7

Table 2 reports summary statistics on monthly returns for the smallest and largest quintile portfolios of firms in China, Hong Kong, Japan, Taiwan, Thailand, South Korea and Malaysia. All returns are denominated in local currencies and include dividends to yield returns rather than only closing prices. The mean (average) returns for the smallest firms (Quintile 1) tend to greater for each nation than the mean returns for Quintile 5 (largest firms) in the same nation. This observation corroborates JS. Note also that the standard deviations of returns are larger for Quintile 1 than for Quintile 5. Furthermore, the Ljung-Box Q-statistics are significant at the .01 level or less. For China (largest firms) the statistic is significant at .05. For Thailand, largest and smallest firms are significant at .05. MPT note when small firms’ stocks react slowly to macroeconomic news, the small stock portfolio should be autocorrelated as well as cross-autocorrelated with the portfolio of large firm’s stocks. We cannot support this hypothesis.

Insert Table 2

We did not report new information on volume, transaction costs, and the number of analysts since previous studies Harrison (1994) Chan et al. (1998), and CMP indicated that Japan and China are by far the largest Pacific-Basin markets in terms of market capitalization and number of firms listed. Japan is smaller than China. A simple observation of the financial information of the seven markets studied indicated that the situation did not change remarkably. All this is important because many of the Loyalist explanations are based on these factors of volume, transaction costs and number of analysts. Only Hong Kong among the others can be considered a major market and it is still small in all the factors in

**The Analysis of Cross-Autocorrelation**

Campbell, Lo and MacKinlay (1997, pp. 74-78) noted that that individual security returns exhibit weak negative autocorrelation. On the other hand, portfolio returns which are averages of individual returns show largely positive autocorrelation. One very plausible explanation of this is the notion of “large positive cross-autocorrelations across individual securities across time.”

Table 3 documents the cross-autocorrelation discovered by Lo and MacKinlay (1990a) using monthly returns and Asian markets with the following specification (JS utilized the same method):

$$ R_{1,t} = \alpha + \beta_0 R_{5,t} + \beta_1 R_{5,t-1} + \epsilon_t. \quad (1) $$

Within each country, the small stock portfolio monthly return, $R_{1,t}$, is regressed on the concurrent, $R_{5,t}$, and lagged, $R_{5,t-1}$, large stock portfolio returns. Because of the lack of homoscedasticity of the error terms in specification (1), we correct all of the standard errors in this article using the methods outlined in Newey and West (1987), allowing for autocorrelation up to three lags. The table is divided into two Panels; A for unsynchronized portfolios and B for synchronized portfolios. In Panel A, note the $\beta_1$ coefficient is positive and significant at small levels of the significance probability (.10, .05 or .01) with the exception of Malaysia where the $\beta_1$ estimate is close to zero. This observation corroborates the earlier observations by JS. Hence, for small stocks, there is a slow response to common news in comparison to the response found for larger firms. [In Table 5, we observe that $\beta_1$ for Malaysia is still not significant.] Hence, the Pacific-Basin nations’ evidence of small stock predictability occurs when we use lags of a full month.

Insert Table 3

A problem exists for small firms when news occurs at the end of a month. Small firms tend not to be active and this reflects itself when small do not react to news quickly. Hence, at the end of a month, news will not affect trading in small firms until later than for active large firms. A small inactive firm initial post-news event will often occur in the next month. Hence, monthly cross-autocorrelation may be the result of non-synchronous trading. Therefore, in Panel B the portfolio returns reflect only actions taken on the last trading day of the month. We do not find in Panel B any case where the $\beta_1$ coefficient is not significant (at .01 level) and in that case the coefficient estimate is either positive or negative. Upon creating these synchronous portfolios, we find little evidence of cross-autocorrelation. Unlike the study of CMP, we conclude that non-synchronous trading may explain a portion of the cross-autocorrelation and this is consistent with JS. None of the $\beta_1$ coefficients changed sign and both are significant. With a
synchronized portfolio, the coefficients indicate even more strikingly that non-synchronous trading explains an important portion of the cross-autocorrelation.

The size and significance for the $\beta_1$ coefficients for China, Hong Kong, Japan, Taiwan, Thailand and South Korea suggest differences between them and the small markets of Malaysia. Furthermore, the size of these coefficients does not invalidate Loyalists’ theories. CMP previously noted that Loyalist explanations rely on differences in market frictions and not on the market frictions themselves. Unlike CMP, we did not find the persistence of cross-autocorrelation in the synchronized portfolios and we cannot raise serious questions about Loyalist explanations of this phenomenon.

**Regressions with Higher Lags**

Another question arises as to the number of lags to incorporate into model equation (1). Would higher order lags ($t-2$ or $t-3$) for explanatory variable $R_5$ also explain a portion of the variation on small stock portfolio returns? In this respect, we modeled equation (2) as follows:

$$ R_{1,t} = \beta_0 + \beta_1 R_{5,t} + \beta_2 R_{5,t-1} + \beta_3 R_{5,t-2} + \beta_4 R_{5,t-3} + \epsilon_t \quad (2) $$

Table 4 contains the results of the higher order regressions of small stock portfolio monthly returns on contemporaneous and lagged own-country large stock portfolio returns. For Panel A (unsynchronized portfolios), the estimated coefficients for $\beta_1$ are similar to that for Table 3. For the estimated coefficients of $\beta_2$ and $\beta_3$ in Table 4, Panel A, all were found significant at probability .01 and this is similar to the results of JS. Considering how many regressions were run for unsynchronized portfolios this is not unexpected and provides little assurance that lags of greater than one for any regression are worthwhile investigating.

Panel B (synchronized portfolios); the authors observed similar results as noted for Panel A, except for Malaysia. Estimates for $\beta_1$ coefficients are nearly identical to that same panel in Table 3, that is, most coefficients are significant. Estimates of higher order coefficients in Panel B were generally significant. For the four largest equity markets showed significance at the .01 level (usually) and were not significant for the smaller four nations’ equity markets. Considering the large number of regressions and significance tests performed, the results are not unexpected and do resemble some pattern. In summary, the regressions run in the next sections of the study will not contain those of higher order lag coefficients.

_Insert Table 4_

**Cross-Autocorrelation in Asian Markets**

Previous studies noted before indicate that cross-autocorrelation between small and large firms within a country is prevalent; however, little is known about whether small stock returns in one country
lag large stock returns in another country. In Table 5, we estimate the cross-autocorrelation to ascertain whether small Asian stock returns are correlated with lagged large stock returns of other nations. For example, whether small stock returns in China correlate respectively with lagged large stock returns in Japan, Hong Kong, Taiwan, South Korea, Thailand and Malaysia, and whether small stock returns in Hong Kong correlate respectively with large stock returns in China and so forth. Specifically, Table 5 reports results from the following regressions (which is the same regression employed by CMP and JS):

\[ R_{i,t} = \alpha + \beta_{i,j} R_{j,t} + \beta_{i,j} R_{j,t-1} + \epsilon_t, \]  

(3)

where \( R_{i,t} \) is the small stock (quintile 1) portfolio return for month \( t \) in country \( i \), and \( R_{j,t} \) and \( R_{j,t-1} \) are the contemporaneous and lagged large stock (quintile 5) portfolio return in country \( j \). Table 5 reports the \( \beta_{i,j} \) coefficients from specification (2). The coefficients on the diagonal of Table 5 are for own-country cross-autocorrelation, \( i = j \). Thus, they repeat results found in Tables 3 and 4. The off-diagonal results capture relationships among the seven Pacific-Basin nations. \( R_{i,t} \) and \( R_{j,t} \) are the monthly small- and large-cap quintile portfolio returns in countries \( i \) and \( j \), respectively, in month \( t \). Then entries in the table report \( \beta_{i,j} \) coefficients that estimate the response of small stocks in country \( i \) to lagged large stocks in country \( j \). \( t \)-statistics are in parentheses. *, **, and *** indicate significance at the 10, 5, 1 percent level. All returns are in local currencies which is both consistent with CMP and JS, and the data base (PACAP) utilized. As is well known, variation across currencies is the nature of this study.

For China, the \( \beta_{i,j} \) coefficients are positive and not significant with all other nations’ markets. For Hong Kong, the \( \beta_{i,j} \) coefficients are except for South Korea where it is also positive. In the case of Japan, the \( \beta_{i,j} \) coefficients have mixed signs, are small and not significant with any of the other Pacific Basin nations. Taiwan, the results are positive and significant for Hong Kong and South Korea. The coefficients are not significant with the other nations of the area and their estimates are very small. Thailand, the relationships are similar to that of Taiwan. South Korea, the \( \beta_{i,j} \) coefficients are significant in the case of Malaysia.

Finally for Malaysia, the \( \beta_{i,j} \) coefficient is negative and significant only for Japan.

The off-diagonal coefficients in Table 5 provide a mixed message that does not entirely corroborate the study of CMP but are not dissimilar to that of JS. However, in many cases they do not dispute entirely the results of CMP. The diagonal relationships tend to be the same as CMP but the off-diagonal differ to some degree are not and not fully consistent with JS. Generally, small stock returns tend not to react slowly the variation in stock returns of other nations large stocks. However, this is not universally true.
since we found a number of exceptions to this noted in Table 5. Stock returns for small firms are not necessarily more likely to react to the stock returns of large firms in their own nations. Cross-autocorrelation among the seven nations tends not to be a pervasive within nation phenomenon. The results are mixed for between nations and the new analysis is for a more recent time period and therefore, exogenous factors may also play a role in the behaviors studied.

In addition, the authors explored cross-autocorrelations at lags two, three and a larger number of months. None of the higher order cross-autocorrelation coefficients were significant (at reasonable levels of .01 or less). This is consistent with the earlier study of JS.

Directionally Asymmetric Regressions

MPT and CMP noted that cross-autocorrelation is often directly asymmetric with small stock responding to good news but not responding to bad news. Their earlier discussion and those of others [Mech (1993), Chan (1993), Grinblatt et al. (1995), Keim and Madhaven (1995) and Lamoureux and Pannikath (1994)] inspired this study to see if the small stock returns on contemporaneous and lagged own-country large stock portfolio returns. In Table 6, we estimate the regression as:

\[ R_{1,t} = \alpha + \beta_0^{UP} \cdot \delta_0 \cdot R_{5,t} + \beta_0^{dn} \cdot (1-\delta_0) \cdot R_{5,t} + \beta_1^{UP} \cdot \delta_1 \cdot R_{5,t-1} + \beta_1^{dn} \cdot (1-\delta_1) \cdot R_{5,t-1} + \epsilon_t, \]

(4)

where \( \delta_0 \) and \( \delta_1 \) are dummy variables indicate respectively that \( R_{5,t} \) and \( R_{5,t-1} \) are positive, \( \beta_0^{UP} \) and \( \beta_0^{dn} \) measures the small stock response to contemporaneous upward and downward movements in large stock returns. \( \beta_1^{UP} \) and \( \beta_1^{dn} \) measure the small stock response to lagged upward and downward movements in large stock returns. For all equity markets, observe the coefficients \( \beta_0^{UP} \), \( \beta_0^{dn} \), and \( \beta_1^{UP} \) are significant at reasonable levels (.10, .05 or .01 or less). \( \beta_1^{dn} \) is not significant for any of the nations’ equity markets.

In addition we tested for directionally equal lagged responses, \( \beta_0^{UP} = \beta_0^{dn} \), \( \beta_1^{UP} = \beta_1^{dn} \) and \( \beta_0^{UP} + \beta_1^{UP} = \beta_0^{dn} + \beta_1^{dn} \). Noting from Table 6 (last three columns), we reject all \( \beta_0^{UP} = \beta_0^{dn} \) hypotheses of no differences at the significance level of .05 or less. This is not indicated for most other hypotheses. Hence, we do find directional symmetry in all cases which confirms the earlier findings of CMP but not perhaps JS. Hence, future research should determine if the directional symmetry is a universal phenomenon and not only with these seven Asian nations.

Autocorrelation and Cross-Autocorrelation

Previously, Boudoukh, Richardson and Whitelaw (1994) claimed and CMP investigated whether cross-autocorrelation is mislabeled and show that small stock autocorrelation is a better explanation for the anomaly. MPT counter that if some small stocks respond slowly to news, then returns for a portfolio of
small stocks will be correlated with its own past returns and with lagged large stock returns and both labels are appropriate. Following Richardson and Peterson (1999), Hameed’s (1997) and Fargher and Weigand’s (1998) Granger (1969) causality tests, we examine whether some cross-autocorrelation is present even after controlling for small stock autocorrelation. We test for this possibility in Table 7 and employ CMP’s a two step process. In the first step, we estimate the relationship between small stocks return and their prior return in the previous period. This is an autoregression and not simply a regression as specified by CMP. JS did specify an autoregression having one lag. In the second step, we estimate the relationship between the errors from the previous autoregression on contemporaneous large stock returns.

Step 1: \( R_{1,t} = \alpha + \beta_0 R_{1,t-1} + \varepsilon_t \)

Step 2: \( \varepsilon_t = \alpha + \beta_{0UP} \delta_0 R_{5,t} + \beta_{0dn} (1-\delta_0) R_{5,t} + \beta_{1UP} \delta_1 R_{5,t-1} + \beta_{1dn} (1-\delta_1) R_{5,t-1} + \eta_t, \quad (5) \)

where \( \beta_{1UP} \) and \( \beta_{1dn} \) measure the response of small stock portfolio residuals to positive (\( \delta_i = 1 \) when \( R_{5,i,t} \) is positive and zero otherwise) and negative lagged large stock portfolio returns after accounting for small stock autocorrelation.

From Table 7, we observe that coefficients \( \beta_{0UP} \) and \( \beta_{0dn} \) of the seven regressions are significant at levels of .01 or less or in two cases at .05. In addition, for \( \beta_{0UP} \) only South Korea and for \( \beta_{1dn} \) are not significant. Only for the regression for South Korea do we find a significant \( \beta_{1UP} \) coefficient. For \( \beta_{1dn} \), China has a significant coefficient. Hence, we obtained data that indicate a small stock autocorrelation residual response to contemporaneous upward and downward movements in large stock returns. On the other hand, we do not find universally that small stock autocorrelation residuals respond to lagged upward and downward movements in large stock returns. No regressions indicate the response to both upward and downward movements of large stock returns. South Korea indicates only responses to lagged upward movements by small stock autocorrelation residuals. China does indicate responses to lagged downward movements. Our analysis differs from CMP who found inconsistencies across the six Pacific-Basin nations’ equity markets. However, the analysis is more closely approximates the JS results of the six nations. The current analysis indicates a great deal of consistency with only a sparse number of exceptions.

In this paper, we will not try to define whether the Loyalists or Revisionists are correct or to produce evidence that indicates that one should be a Heretic. We believe, like Shefrin and Statman (1994), which models of behavior, should be examined and tested to determine their validity. Behavioral investors should understand that all Pacific-Basin nations do not behave in the same manner. Note also, because our time frame differs from CMP, we should further surmise that behavior changes over time and no one
period studied can realistically predict behavior perfectly in another time period. However, the results are mixed for between nations. Loyalist explanations are not fully supported at this point.

Insert Table 7

Summary, Conclusion and Limitations

The above results indicates that there is no one explanation to the behavior of markets in the seven nations of the Pacific basin of Asia. The nations differ in size, market structure, types of of government and maturity of their equity markets. Whether one follows the loyalist, heretics or revisionists explanations of equity market behavior, there is no one explanation that covers all the phenomena analyzed in this study. The authors did extend the research on cross-autocorrelation of seven Asian nations in the Pacific Basin. First, we examined the principle equity markets to indicate that cross-autocorrelation is present in the data of these seven markets. Within each nation, monthly returns on a portfolio of small stock correlate with the lagged returns of on portfolios of large stocks. The evidence is strong in all seven nations studied and is not inconsistent with Loyalist explanations since smaller and emerging markets may possess heterogeneous microstructure within their own market. Note also that the nature of cross-autocorrelation may cause one not to believe Loyalist explanations based on market friction unique to a single nation. We documented the evidence on cross-autocorrelation of the seven nations and then continued to provide some additional examination to identify some empirical characterizes of the cross auto-autocorrelation. We found evidence of the relationships between small stock monthly returns on contemporaneous and lagged own-nation large stock portfolio returns for unsynchronized portfolios. In the case of Japan, we estimated the relationship for the synchronized portfolio. In turn, we found mixed evidence on the relationship of one nation’s small stock portfolio on contemporaneous and lagged large stock portfolio returns of the other nations. Broadly statistically significant results were not the finding of this study. Although the debate will continue in the future, we observe that one needs lengthier time periods to study and answer these questions.

Asymmetric regressions of small stock monthly portfolio returns on contemporaneous same nation large stock returns after accounting for small stock autocorrelation were entirely significant. Conversely, we found largely non-significant coefficients in the asymmetric regression on lagged stock returns in Table 7. Only Malaysia reported significant coefficients for all four terms in the asymmetric regressions. The last analysis studied the sub period regressions of small stock monthly returns on contemporaneous and lagged same nation large stock portfolio returns. Only Japan indicated significant coefficients for all regression parameters estimated. Also, only the coefficient for the early period contemporaneous same nation large stock portfolio was universally significant for all nations.
Much of our evidence is both inconsistent with a similar earlier study (CMP) and again inconsistent with traditional Loyalist and Revisionist explanation of stock portfolio behavior. Our conclusions are not heretical as thought by others McQueen et al. (1996) but indicate that our finding are true for only those nations studied and for the time periods studied. We must continue to study the stock markets behaviors to understand the nature of investment and why market differ but also have similar properties. In discussing, the effects of risk in our models, there are needed to regress against a measure of risk (i.e. Beta). However, this will not reflect on the choice of explanations of stock portfolio behavior and is not part of this study we leave this point to future research. Moreover, the data base (PACAP) does not include Beta as a variable for study; we leave the choice of measuring Beta to others. Also, our results do not differ greatly from that of Azman-Saini et al. (2002) who for a shorter time period (1988-1999) indicated that only Singapore differed from the other Asian financial markets studied.

We do not discuss common risk factors in “abnormal returns” for Asian markets. The application of Fama-French (1993) is fully explored by Shum and Tang (2005). They contend that the model explains much of the variation in mean returns but do not explain association of Asian market returns. Kim and Shamsuddin (2008) also studied the efficiency of Asian stock markets by another procedure and found that four of these markets are efficient and Indonesia and Malaya are not. Lin (2008) studied the interrelationship of the U.S. markets with some Asian markets and agreed generally with the findings of CMP as well. The authors of this study felt no passion to find new data to dispute the earlier findings. Another hypothesis explores by Bhar and Hamori (2006) concerned the stock return characteristics to capture the changes in the mean-variance for Japanese and emerging Asian markets. The authors of this study limited themselves studies not involving Markovian processes derived from advanced statistical techniques explored by Cheung and Ng (1996 and 2005) and Harding and Pagan (2002). Future studies of this type and others may yield more evidence concerning the Loyalists explanation of stock market behavior. Last, the stability in cross-autocorrelation studied by others Fargher and Weigand, 1998) need additional examination. Rather than studying sub periods chosen by the researchers a better analysis would be to model lengthy data of these nations with ARIMA-Intervention analysis which have the ability to determine when systemic changes in markets occur. We leave that for the future.
References


Founded in 1892, the University of Rhode Island is one of eight land, urban, and sea grant universities in the United States. The 1,200-acre rural campus is less than ten miles from Narragansett Bay and highlights its traditions of natural resource, marine and urban related research. There are over 14,000 undergraduate and graduate students enrolled in seven degree-granting colleges representing 48 states and the District of Columbia. More than 500 international students represent 59 different countries. Eighteen percent of the freshman class graduated in the top ten percent of their high school classes. The teaching and research faculty numbers over 600 and the University offers 101 undergraduate programs and 86 advanced degree programs. URI students have received Rhodes, Fulbright, Truman, Goldwater, and Udall scholarships. There are over 80,000 active alumnae.

The University of Rhode Island started to offer undergraduate business administration courses in 1923. In 1962, the MBA program was introduced and the PhD program began in the mid 1980s. The College of Business Administration is accredited by The AACSB International - The Association to Advance Collegiate Schools of Business in 1969. The College of Business enrolls over 1400 undergraduate students and more than 300 graduate students.

**Mission**

Our responsibility is to provide strong academic programs that instill excellence, confidence and strong leadership skills in our graduates. Our aim is to (1) promote critical and independent thinking, (2) foster personal responsibility and (3) develop students whose performance and commitment mark them as leaders contributing to the business community and society. The College will serve as a center for business scholarship, creative research and outreach activities to the citizens and institutions of the State of Rhode Island as well as the regional, national and international communities.

The creation of this working paper series has been funded by an endowment established by William A. Orme, URI College of Business Administration, Class of 1949 and former head of the General Electric Foundation. This working paper series is intended to permit faculty members to obtain feedback on research activities before the research is submitted to academic and professional journals and professional associations for presentations.

An award is presented annually for the most outstanding paper submitted.