The Philippine Statistician, 2006
Vol. 55, Nos. 1-2, pp. 65-83

The Identification of Long Memory Process in the Asean-Four Stock Markets by Fractional and Multifractional Brownian Motion

Rolando Navarro Jr., Ronald Tamangan, Niya Guba-Natan,
Eleonore Ramos, and Adolfo de Guzman[1]

Received: November, 2005; Revised: June, 2006

ABSTRACT

This research identifies the presence of long memory given return series of the stock markets in the ASEAN-4 countries, namely, Indonesia, Malaysia, the Philippines and Thailand. Daily stock prices from 1994 to 2004, which were neither adjusted for dividends nor inflation, were employed in the study. The Global Hurst Parameter is estimated to provide an indication of long memory. The sliding window method, quarterly, and annual estimations of the Hurst parameter were also undertaken to explore further on the behavior of the financial time series in question. The computed Hurst parameters across the windowed data, quarterly, and annual data has been shown to be time-varying. Stock prices behavior in this region is mildly persistent indicated by the following Global Hurst Parameters: Indonesia, 0.61, Malaysia, 0.58, the Philippines, 0.59, Thailand, 0.59.

KEYWORDS: Long Memory Processes, Multifractional Brownian Motion, Fractional Brownian Motion, Asian Stock Markets.

I. INTRODUCTION

This research is an undertaking of indication for long memory process of a financial time series of stock prices. When the innovations of the time series of the rates of return are independent, the time series can be modeled as a Brownian motion (Bm) also known as the Wiener process. A series with long memory may be better modeled as a fractional Brownian motion (fBm). However, since markets such as stock prices experience some "quiet" periods which correspond to a high Hölder exponent and some "erratic" periods which corresponds to a low Hölder exponent. Thus, financial time series may be better modeled as a generalized fBm with time-varying Hölder exponent known as the Multifractional Brownian Motion (mBm) (Ayache, Peltier, Vehel, 2000).

The authors are interested in estimating the Hurst parameter which indicates the presence or absence of Long Range Dependence (LRD) or Long Memory in a given process (Beran, 1994; Ayache, Peltier, and Vehel, 2000). Explaining reasons behind the presence or absence of LRD and the contextual discussion of structures, development levels and issues attendant to each stock market are beyond the purview of this research.

[1] First four authors are MS Statistics candidates at the School of Statistics, University of the Philippines, Diliman, Quezon City with respective email addresses: rnavarro@ieee.org , s235-stochastic@yahoogroups.com; rjtamangan@yahoo.com; niyaguba@yahoo.com; qt_ellie20@yahoo.com; The last author is a professor in the same institution, e-mail address: amdg@stat.upd.edu.ph.

The financial literature is replete with technical and practical discussions about the Hurst parameter, which is an indicator of Long Range Dependence (LRD). The interest on this parameter has largely been motivated by the aim to understand the behavior of financial time series, particularly its predictability. Where security prices, for instance, become predictable, knowledgeable investors could be able to make substantial above average profits on this basis, and, thus, knowing the behavioral component of the financial time series may have its benefits in terms of optimizing asset returns. Interestingly, the question of predictability is also part of the greater question of efficiency and accordingly the validity of the efficient market hypothesis (EMH), and the competitiveness of the stock market (Fama and French, 1988).

This research endeavors to identify or provide an indication of the presence of long memory in the stock market of four emerging ASEAN countries, namely, Indonesia, Malaysia, the Philippines, and Thailand collectively known as the ASEAN-4 countries. These countries were chosen on the basis of a very comparative level of economic structure and development with the Philippines.

Aside from financial time series data, there are physical phenomena that exhibit LRD in such as the annual minimum level of the Nile River and Data Communications Traffic (Beran, 1994). In addition, there is active research in the area of Image Analysis focuses on multidimensional extensions LRD in describing image textures (Pesquet-Popescu and Vehel, 2002).

II. THEORETICAL FRAMEWORK

A. Multifractional Brownian Motion: A Generalization of the Fractional Brownian Motion[2]

The mBm denoted as $\{B_{H(t)}(t), t \in \Re\}$ is a stochastic fractal process (Pelier and Vehel, 1995) that generalizes the fBm (Mandelbrot and Van Ness, 1968) with a time-varying Hurst Parameter $H(t) \in (0,1)$, $t \in R$. The mBm is represented as an integral form given as

$$B_{H(t)}(t) = \frac{\sigma}{\Gamma\left(H(t)+\frac{1}{2}\right)}\left\{\int_{-\infty}^{0}\left[(t-s)^{H(t)-\frac{1}{2}} - (-s)^{H(t)-\frac{1}{2}}\right]dB(s) + \int_{0}^{t}\left[(t-s)^{H(t)-\frac{1}{2}}\right]dB(s)\right\} \tag{1}$$

where $B(s)$ is the standard Bm, that is, a Bm that has a zero mean and unit variance and $\sigma^2 = \text{var}\left(B_{H(t)}(t)\right)\big|_{t=1}$ and the stochastic integral is taken in the mean-square sense (Peltier and Vehel, 1995). The fBm is a special case of the mBm with a fixed Hurst Parameter $H(t) = H$ and finally, the Bm is a special case of the fBm with a Hurst Parameter $H(t) = \frac{1}{2}$.

---

[2] This is taken largely from Ayache, Peltier, and Vehel (2000).

The mBm is a non-stationary Gaussian process and in general neither possesses independent nor stationary increments. In contrast, the fBm has stationary increments and in general not have independent increments except for the special case of the Bm.

The mBm has a Hölder exponent $\alpha(t)$ given as

$$\alpha(t) = \sup\left\{ \lim_{t \to 0} \frac{B_{H(t+\Delta t)}(t+\Delta t) - B_{H(t)}(t)}{|\Delta t|^{\alpha}} = 0 \right\} \stackrel{a.s.}{=} H(t). \tag{2}$$

In the case of the fBm, Hölder exponent

$$\alpha(t) \stackrel{a.s.}{=} H \tag{3}$$

The Hölder exponent can be interpreted as follows: "large" $\alpha(t)$ indicates a "smooth" trajectory of $B_{H(t)}(t)$ at time t while a "small" $\alpha(t)$ indicates a "rough" trajectory of $B_{H(t)}(t)$ at time t.

In addition, the following statistical characterizations are given as follows mBm are given as follows:

$$E\left[B_{H(t)}(t)\right] = 0 \tag{4}$$

$$\operatorname{cov}\left[B_{H(t)}(t), B_{H(s)}(s)\right] = \frac{\sigma^2}{2} \frac{\sqrt{\Gamma(2H(t)+1)\Gamma(2H(s)+1)\sin\left(\frac{\pi H(t)}{2}\right)\sin\left(\frac{\pi H(s)}{2}\right)}}{\Gamma(H(t)+H(s)+1)\sin\left(\frac{\pi(H(t)+H(s))}{2}\right)} \left(|t|^{H(t)+H(s)} + |s|^{H(t)+H(s)} - |t-s|^{H(t)+H(s)}\right) \tag{5}$$

$$\operatorname{var}\left[B_{H(t)}(t)\right] = \frac{\sigma^2}{2}|t|^{2H(t)} \tag{6}$$

Hence, form (4) to (6) following statistical characterizations of the fBm as a special case of the mBm are given as follows (Manolakis, Ingle, and Kogon, 2000):

$$E\left[B_H(t)\right] = 0 \tag{7}$$

$$\operatorname{cov}\left[B_H(t), B_H(s)\right] = \frac{\sigma^2}{2}\left(|t|^{2H} + |s|^{2H} - |t-s|^{2H}\right) \tag{8}$$

$$\operatorname{var}\left[B_H(t)\right] = \frac{\sigma^2}{2}|t|^{2H} \tag{9}$$

The computed variances in (6) and (9) are well-known as the power law.

B. Long Range Dependence[3]

Let $\{X(k), k \in Z\}$ be at least a weakly stationary or wide sense stationary process (WSS), and then its auto-covariance is given as

$$\gamma_{X,X}(k) = \text{cov}\left[X(n), X(n-k)\right] \quad k,n \in Z \tag{10}$$

and its normalized auto-covariance function is given as

$$\rho_{X,X}(k) = \frac{\gamma_{X,X}(k)}{\gamma_{X,X}(0)} = corr\left[X(n), X(n-k)\right] \quad k,n \in Z \tag{11}$$

which is also referred to as the autocorrelation function (ACF). The stochastic process has long range dependence (LRD) also known as persistence if $\rho_{X,X}(k)$ is infinitely absolutely summable, that is,

$$\sum_{k=-\infty}^{\infty} \left|\rho_{X,X}(k)\right| = \infty \tag{12}$$

which is manifested it when $\rho_{X,X}(k)$ slowly decays to zero as $k \to \infty$. On the other hand, short (intermediate) range dependence (SRD) also known as anti-persistence if $\rho_{X,X}(k)$ is absolutely summable, that is,

$$\sum_{k=-\infty}^{\infty} \left|\rho_{X,X}(k)\right| < \infty \tag{13}$$

which is manifested it when $\rho_{X,X}(k)$ rapidly decays to zero as $k \to \infty$.

C. First Order Increments[4]

The Fractional Gaussian Noise (fGn) denoted as $\{G_H(k), k \in Z\}$ is defined as the first ordered sampled increment of the fBm given as

$$G_H(k) = B_H(k) - B_H(k-1) \quad k \in Z \tag{14}$$

The fGn has the following statistics given as follows:

$$E\left[G_H(k)\right] = 0 \tag{15}$$

$$\gamma_{G_H,G_H}(k) = \text{cov}\left[G_H(n), G_H(n-k)\right] = \frac{\sigma^2}{2}\left(|k+1|^{2H} + |k-1|^{2H} - 2|k|^{2H}\right) \tag{16}$$

[3] This is taken largely from Brockwell and Davis (1987).

[4] This is taken largely from Manolakis, Ingle, and Kogon, (2000).

$$\rho_{G_H,G_H}(k) = corr\left[G_H(n), G_H(n-k)\right] = \frac{1}{2}\left(|k+1|^{2H} + |k-1|^{2H} - 2|k|^{2H}\right). \tag{17}$$

The fGn is a WSS process manifested from its mean and the covariance statistics. Thus, the characterization of the non-stationary fBm can be conveniently obtained from the fGn. By examining the asymptotic behavior of (17), for $H = \frac{1}{2}$, $\rho_{G_H,G_H}(k) = \delta_k$ where δ_k is the Kronecker Delta Function. On the other hand, for $H \neq \frac{1}{2}$, $\rho_{G_H,G_H}(k) = O\left(k^{2H-2}\right)$. Hence, from (12) and (13), the fBm has a SRD if $0 < H \leq \frac{1}{2}$ and it has a LRD if $\frac{1}{2} < H < 1$.

The mBm analogy of the fGn which we call as Multifractional Gaussian Noise (mGn) denoted as $\left\{G_{H(k),H(k-1)}(k), k \in Z\right\}$ is defined as the first ordered sampled increment of the mBm given as

$$G_{H(k),H(k-1)}(k) = B_{H(k)}(k) - B_{H(k-1)}(k-1) \quad k \in Z. \tag{18}$$

Since the mGn in general does not have stationary increments, then the mGn is not a stationary process. Some characterization of this process is given in the paper of Ayahe, Cohen, and Vehel, (2000).

III. METHODOLOGICAL FRAMEWORK

This research identifies the Hurst parameter by modeling the time series as the fBm and mBm.

A. Sliding and Growing Windows

The sliding window consists of a fixed number of samples denoted by N such that the number of samples between adjacent windows is fixed denoted by M. Let $W_i(k)$ be the i^{th} sliding window derived from the return series $X(k)$, then,

$$W_i(k) = X\left((i-1)M + k\right), \quad 1 \leq k \leq n \tag{19}$$

and the window derived from the last $r < N$ samples of $X(k)$ is discarded. If $M < N$, then the windows are intersecting on the other hand, if $M \geq N$ then windows are non-intersecting. There are trade-offs in the selection of the pairs (M, N)

$\frac{M}{N}$ - "small": ***Tightly Intersecting Windows.***

Larger number of windows hence increases computational time in computing $H(t)$ throughout the time series. The resulting trajectory of $H(t)$ is smooth.

$\frac{M}{N}$ - "large": ***Loosely Intersecting Windows.***

Smaller number of windows hence computational time in computing $H(t)$ throughout the time series. The resulting trajectory of $H(t)$ is discretized.

N - "small": ***Small Data Window.***

There may be not enough points to reliably estimate the Hurst Parameter in the range $H(t) \in (0,1)$.

N - "large": ***Large Data Window.***

Hurst Parameter estimation may be flattened out; the Hurst Parameter may vary throughout time.

Given the potential tradeoffs, the choice of pairs M and N in this study is given as $M = 16$ and $N = 128$.

On the other hand, the increasing or growing window is a data window that consists of data points gathered from some reference or base time t_0 interval up to some present time interval t. As time progresses, the number of points in the data window increases for which the nomenclature is drawn.

A. fBm Modeling

The Hurst parameter is estimated using a growing window in a Sliding Window Increments (from the Sliding Window), Quarterly, and Annualized basis to examine the convergence of Global Hurst Parameter. The downside to this approach is the computational complexity involved in the estimation process.

B. mBm Modeling

The Hurst Parameters of the following windowed time series are estimated using the Sliding Window Data, Quarterly Data, and Annual Data. To simplify the analysis, it is assumed that the Hurst Parameter throughout a fixed window is constant or at most slowly varying, hence we can model the windowed data as an fBm. Since the Hurst Parameters across different windows vary, we can regard this model as a discretized mBm model across the time series.

C. Pre-processing

For this paper, the rate of return is the first difference of the natural log of the index series to remove the market trend from the return calculation:

$$Y(k) = \log\left[\frac{X(k)}{X(k-1)}\right] \tag{20}$$

where, $X(k-1)$ is the index at time k and $X(k-1)$ is the index at time $k-1$.

D. Hurst Parameter Estimation[5]

Let $\{X(t), t \in \Re\}$ be an fBm with Hurst Parameter, H then by self-similarity of $X(t)$ we obtain

$$E\left[\left|X(k+\Delta k)-X(k)\right|^2\right]=c_1(\Delta k)^{2H} \tag{22}$$

where $c_1 = E\left[\left|\Delta X(1)\right|^2\right]$ and $\Delta n, k \in Z$. Taking the logarithm gives us

$$\log E\left[\left|X(k+\Delta k)-X(k)\right|^2\right]=\log c_1 + 2\log \Delta k \cdot H \tag{23}$$

From (23), H can be estimated using linear regression. However, this estimator can be prone to outliers. As an alternative, by the self-similarity of $X(t)$

$$E\left[\left|X(k+\Delta k)-X(k)\right|\right]=c_2(\Delta k)^{H} \tag{24}$$

where $c_2 = E\left[\left|\Delta X(1)\right|\right]$ and $\Delta k, k \in Z$. Taking the logarithm gives us

$$\log E\left[\left|X(k+\Delta k)-X(k)\right|\right]=\log c_2 + \log \Delta k \cdot H \tag{25}$$

From (25), H can be estimated using linear regression.

E. Triangulation

A triangulation will de done to understand further and validate some claims regarding and surrounding the Hurst parameter. First, the ACF for the sliding windows, quarterly, and annual windows will be presented to show and provide evidence that the return series exhibit long memory. Then, the sliding window, quarterly, and annual Hurst parameter estimates validate the claim that the Hurst parameter is time varying. Thirdly, the Global Hurst parameter is estimated using an increasing window to see the process of convergence to the value of the Global Hurst parameter and, again, to provide a more compelling evidence that the series in question do exhibit long memory.

IV. DATA

This research makes use of daily observations of nominal stock market closing for the period 1994 to 2004 for the four ASEAN stock markets, namely, the Philippine Stock Exchange (PSE), the Jakarta Stock Exchange (JSE), the Kuala Lumpur Stock Exchange (KLSE), and the Stock Exchange of Thailand (SET). The PSE Composite Index, the JSE Composite Index, the KLSE Composite Index and the SET Composite Index are all expressed in local currencies and neither adjusted for dividends nor inflation. Throughout the rest of this paper, the source of the computed figures were computed by the authors. In addition, computed quarterly and annual figures are given in the Appendix. Figure 1 below reveals some trend about the return series of the four stock exchanges. The return series of

[5] This is taken largely from Manolakis, Ingle, and Kogon, (2000).

the four exchanges exhibit volatile returns in the short term and an evident trend in the long run. All, except for Indonesia, exhibit decreasing trends in varying extent considering the period. On the other hand, Table 1 features descriptive statistics for the return series $X(k)$.

Figure 1: Stock Index Returns, 1994 to 2004.

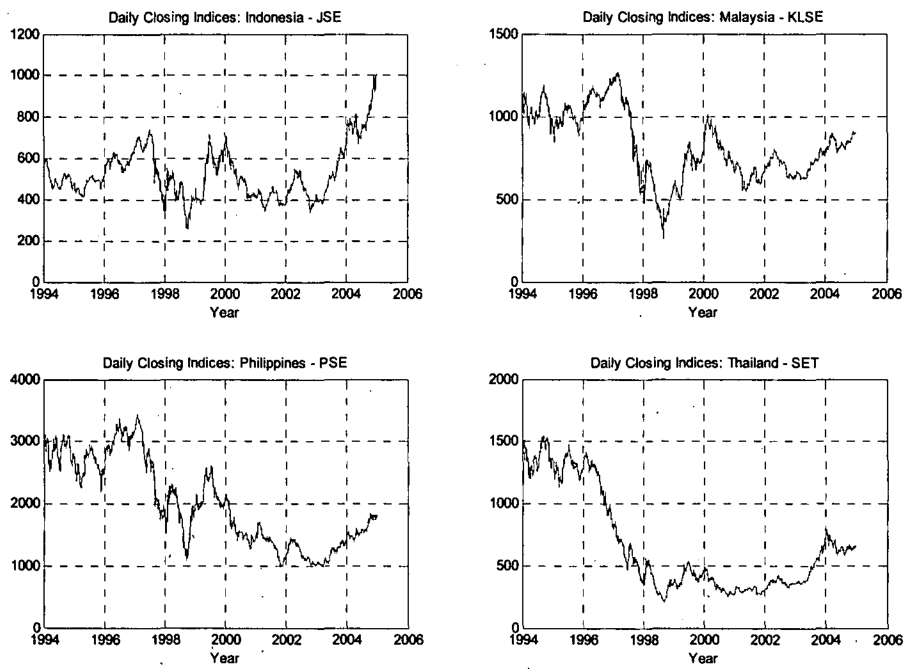


Table 1. Four Moments for the ASEAN-4

Country	Mean	Variance	Normalized Skewness	Normalized Kurtosis -3
Indonesia	526.93	15759.25	0.9249	0.8954
Malaysia	828.26	43552.07	0.0766	-0.6930
Philippines	2006.62	489394.54	0.3168	-1.2525
Thailand	670.97	162953.84	0.8620	-0.8056

All series means are positive, and all return series exhibited non-zero excess normalized skewness. The normalized kurtosis coefficients are all different from 3 (the value for a Gaussian Distribution). Any formal Gaussianity test result is not reported since, the series is clearly non-Gaussian. One can also immediately posit that all return series are non-Gaussian based from the normalized kurtoses and the non-zero normalized skewnesses. The robustness of the Hurst Parameter estimation in the midst of non-Gaussianity of the time series will be assessed in the later part of the paper.

V. EMPIRICAL RESULTS AND DISCUSSION

A. Long Range Dependence Examination via the Autocorrelation Function Plots

The ACF across discrete time can be visually represented in a 3D plot or perhaps using Hinton graph which borrowed from Artificial Neural Networks (Bishop, 1995) where the neuron is replaced by ACF lags and the network layers can be replaced by time. On the other hand, although the ACF is discrete-space process by presenting it in a contour plot has several advantages over the previous two methods discussed. First, it is more convenient means of visualizing the behavior of the ACF as both lags and time progresses and second, it uses less space.

The contour of the ACF plots presented below (Figures 2a to 2c) and difference of ACF level in each succeeding contour line is 0.10. The contour plots show a rapidly ACF as lags progresses. In general, the most ACF values are positive with a few patches of the contour which located at later lags that have negative ACF. We suspect that a mildly persistent financial time series behavior

Figure 2a: ACF (Sliding Window): 1994 to 2004

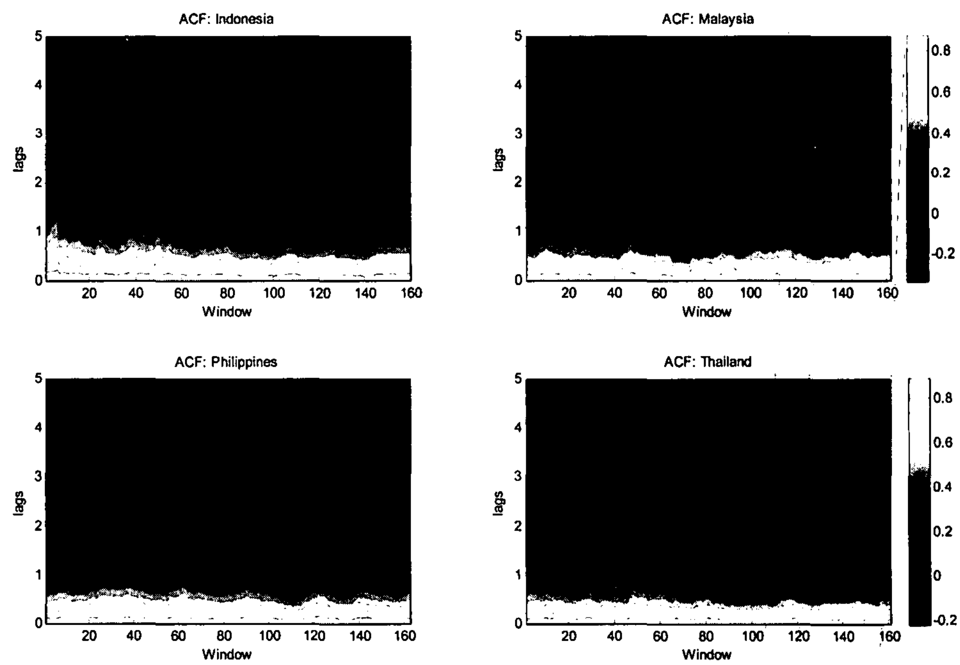


Figure 2b: ACF (Sliding Window): Quarterly

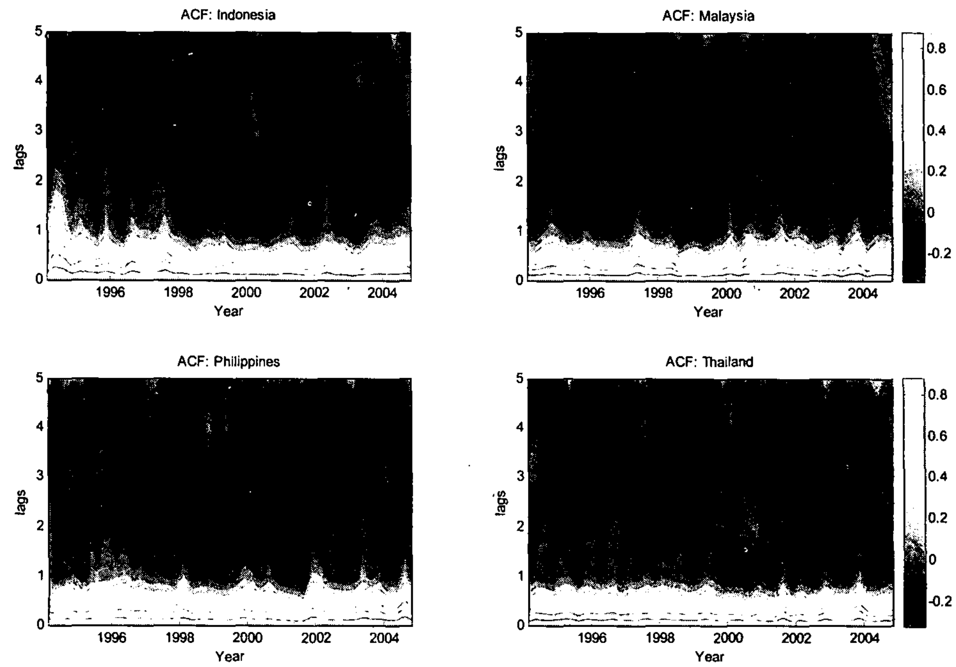
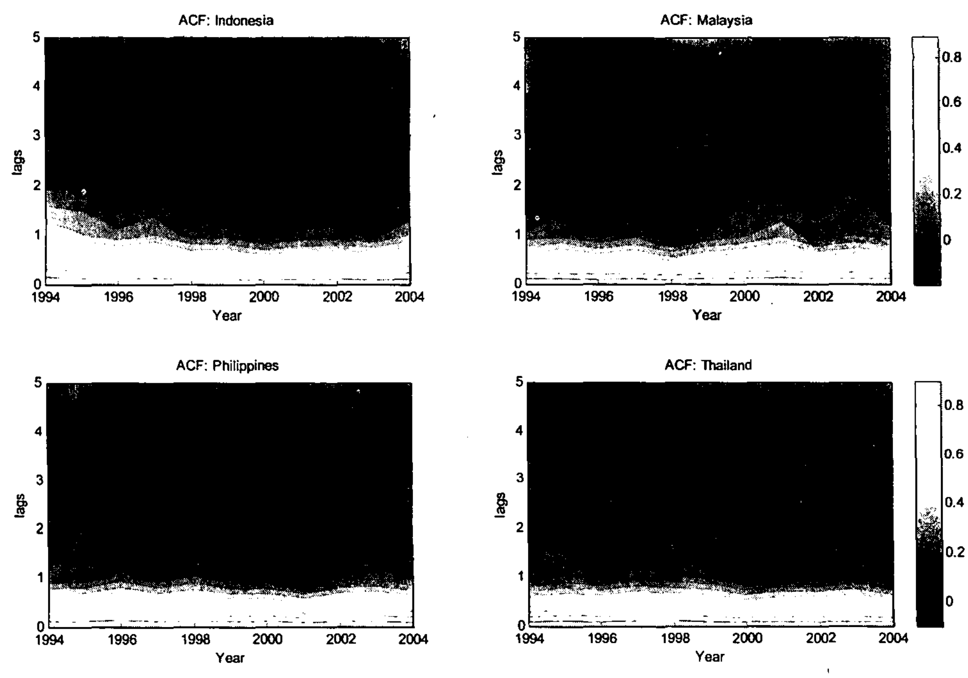


Figure 2c: ACF (Sliding Window): Annual



B. Time Varying Hurst Parameter Estimation

The claim that the long memory is time varying is investigated by estimating the Hurst parameter using the sliding window approach and having quarterly and yearly estimates. This allows the researchers to see the rather volatile behavior of the parameter as we move from quarterly to annual estimations. Somehow, the rather volatile character of the financial time series given the sliding-window and quarterly outcomes eases when one deals with the yearly characterization (Figures 3a to 3c).

Figure 3a: Hurst Parameter: Sliding Window

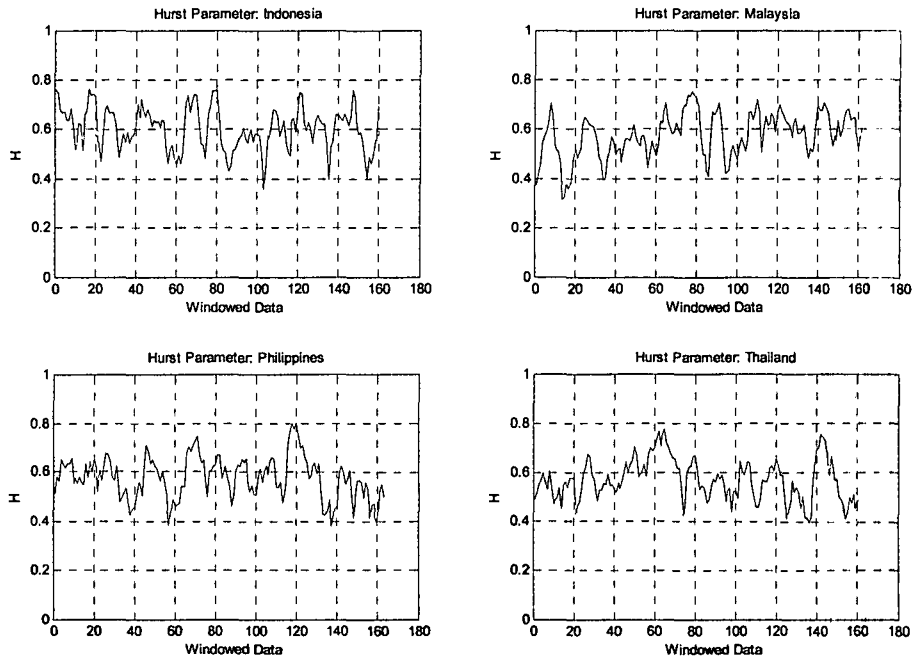
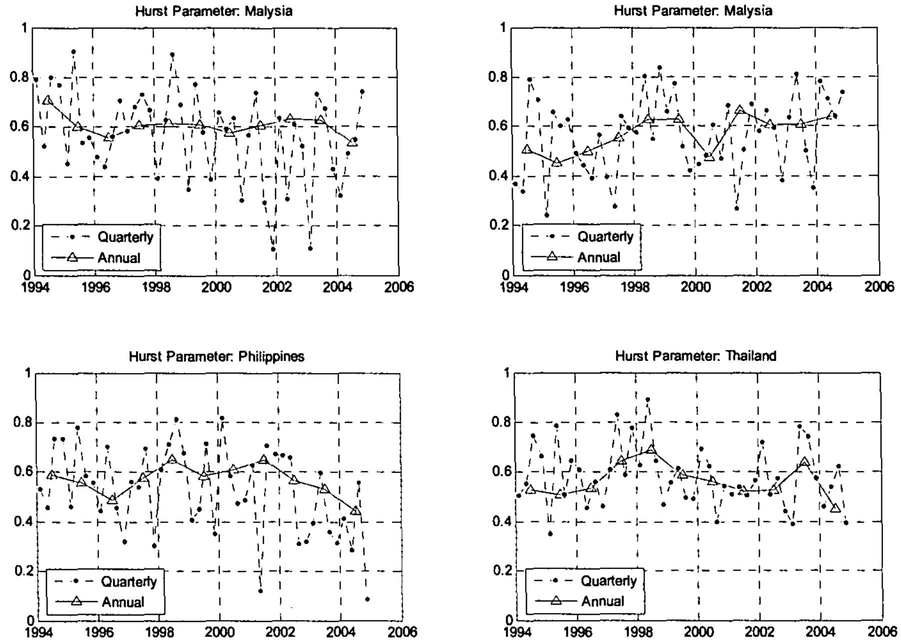


Figure 3b: Hurst Parameter: Quarterly and Annual Basis



C. Global Hurst Parameter Estimation and Convergence

The identified Global Hurst parameter characterizes the entire financial in terms of long memory process. Figures 4a to 4c shows that each financial time series converges to the values of the Global Hurst parameter from a growing window with a base year 1994. Table 2 reveals the estimated Global Hurst parameter that characterizes each financial time series. Indonesia has the highest at 0.61, while Malaysia, the Philippines, Thailand have 0.58, 0.59, and 0.59 respectively.

The estimated Global Hurst parameters ASEAN-4 countries are all above 0.50 and around 0.60 suggests that the financial time series of in these countries have rather weakly to mildly persistent behavior.

Table 2. Identified Global Hurst Parameter: 1994-2004

Country	Global Hurst Parameter
Indonesia	0.61
Malaysia	0.58
Philippines	0.59
Thailand	0.59

Figure 4a: Growing Window: Sliding Window

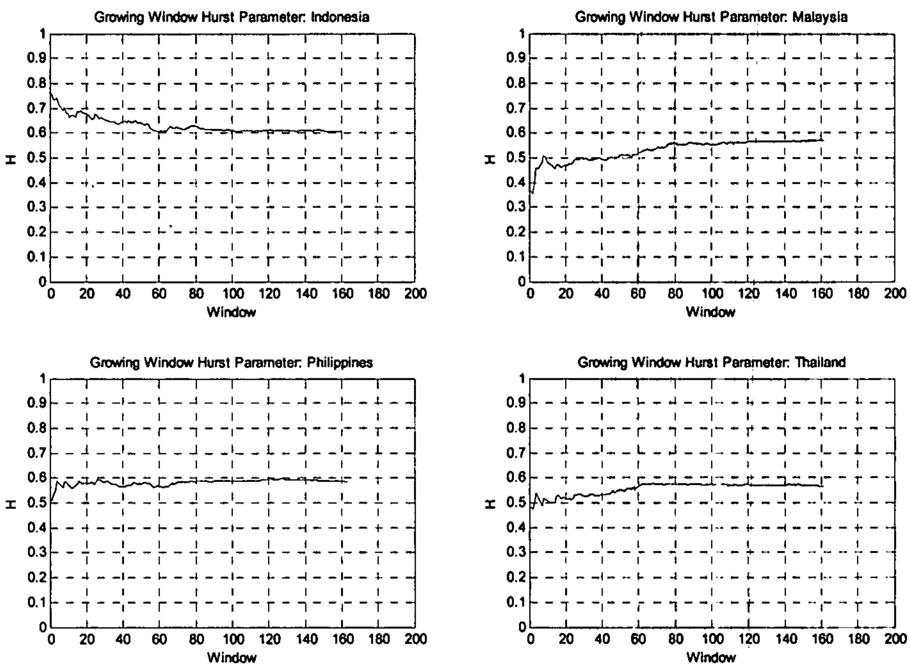
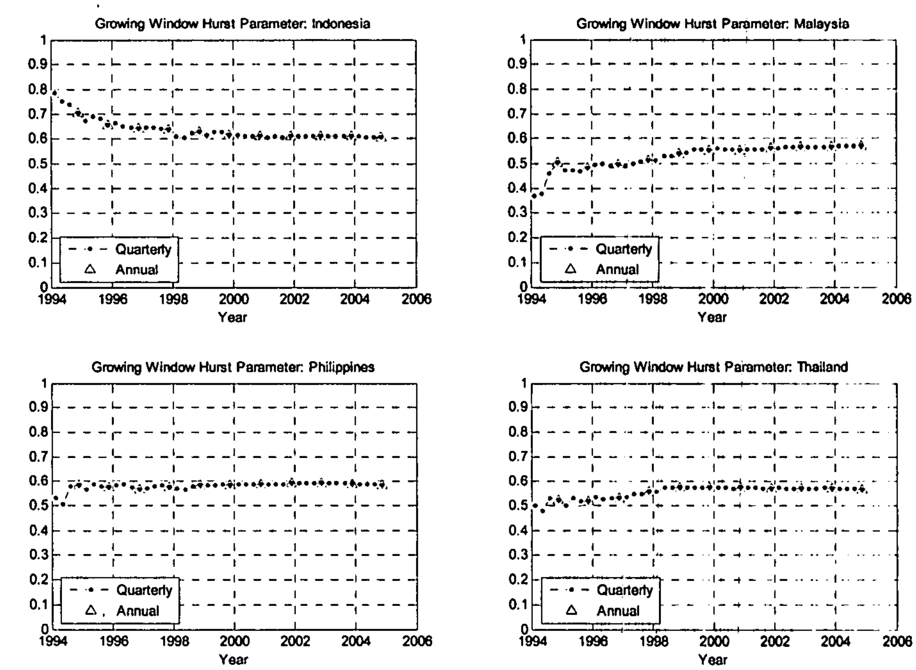


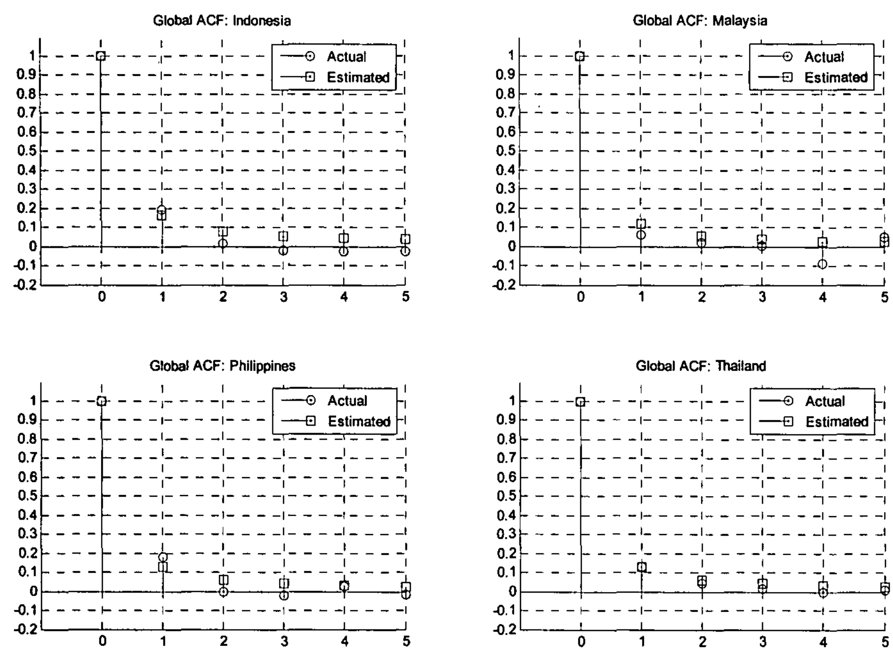
Figure 4b: Growing Window: Quarterly and Annual Data



D. Global ACF and Performance Assessment

From the estimated Hurst parameters, one can estimate the ACF using (17) for a given data window. As the data window increases, discrepancy between the actual ACF and the estimated ACF subsides. Figure 5 shows the plot of the actual Global ACF from the estimated ACF which are relatively close to each other. This suggests robustness of the estimated Hurst parameter despite the non-Gaussianity of the time series.

Figure 5: Global ACF Comparison



VI. CONCLUSION

The estimated Global Hurst parameters of the four ASEAN-4 countries provide an indication of weakly to mildly persistent stock prices, considering the return series. Since the four estimated Global Hurst Parameters are close to each other, hence the degree of persistence of stock prices in these countries are comparable to each other by viewing the entire time series. In addition, in the presence time variations in the Hurst Parameters, there are variations in the degree of persistence (or anti-persistence) by considering of the local portion of the time series when we examine the ACF and the Hurst Parameters in Figures 2 and 3 respectively.

It should come to bear that this is an identification exercise and not an exploration of reasons behind the outcome, and, in addition, that the Hurst Parameter only measures the degree of dependence, but still fails to reflect how market prices adjust to shocks. Thus, caution is needed in interpreting the values of the reported Global Hurst Parameter. Moreover, the fact that persistence can be time varying casts a cloud of caution with regard to the findings. One cannot posit whether the above results are temporary phenomena or whether they apply universally. Unfortunately, available data do not allow for such an investigation, as they do not reach far back enough.

ACKNOWLEDGEMENTS

The authors would like to thank the anonymous reviewers for their constructive comments and suggestions.

References

AYACHE, A., PELTIER, R. AND VEHEL, J.V. (2000) "The Covariance Structure of the Multifractional Brownian Motion, with Applications to Long Range Dependence," *Proceedings of International Conference on Acoustics, Speech and Signal Processing.* 6, 3810-3813.

BERAN, J. (1994). *Statistics for Long Memory Processes.* Chapman & Hall, New York.

BISHOP, C. M. (1995). *Neural Networks for Pattern Recognition.* Oxford University Press, New York.

BROCKWELL, P. AND DAVIS, R. (1987). *Time Series: Theory and Methods,* Springer Verlag, New York.

FAMA, E. AND FRENCH, K. (1988). "Permanent and Temporary Components of Stock Prices", *The Journal of Political Economy,* 96, 246-273.

MANDELBROT, B.B., AND VAN NESS., J.W. (1968). "Fractional Brownian motion, Fractional Noises and Applications," *SIAM Review.* 10, 422-437.

MANOLAKIS D. G., INGLE V. K., AND KOGON S.M. (2000). *Statistical and Adaptive Signal Processing: Spectral Estimation, Signal Modeling, Adaptive Filtering, and Array Processing.* McGraw-Hill, Boston, MA.

PELTIER, R. AND VEHEL, J. L. (1995). "Multifractional Brownian motion: Definition and Preliminary Results," *INRIA Research Report 2645.* INRIA Rocqeuncourt, France.

PESQUET-POPESCU, B. AND VEHEL, J. L. (2002). "Stochastic Fractal Models for Image Processing," *IEEE Signal Processing Magazine.* 19(5), 48-62.

APPENDIX
Computed Quarterly and Annual Data

INDONESIA (JCI)

INDONESIA			Hurst	Autocorrelation Lags								Moments	
				0	1	2	3	4	5	Mean	Variance	Skewness	Kurtosis-3
Overall			0.6086	1.0000	0.1928	0.0176	-0.0185	-0.0245	-0.0233	526.93	15759.25	0.9249	0.8954
Quarterly	1994	Q1	0.7917	1.0000	0.3038	-0.1551	-0.1553	-0.0966	-0.1488	559.62	1552.61	-0.6320	-1.0178
	1994	Q2	0.5234	1.0000	0.5755	0.2500	0.0246	-0.1161	-0.1009	473.87	194.94	0.6467	-0.4974
	1994	Q3	0.7982	1.0000	0.5086	0.1987	-0.0218	-0.0259	0.0399	485.82	758.33	0.1803	-1.5020
	1994	Q4	0.7677	1.0000	0.2315	0.0652	0.1159	0.0164	0.0482	494.24	586.96	-0.4877	-1.2848
	1995	Q1	0.4524	1.0000	0.3802	0.0940	-0.0214	-0.1612	-0.2190	445.77	233.41	0.3713	-0.5998
	1995	Q2	0.9052	1.0000	0.2784	0.0894	-0.0697	-0.1844	0.0931	455.85	979.19	-0.0768	-1.7396
	1995	Q3	0.5348	1.0000	0.1265	-0.0963	0.1529	-0.1383	-0.0349	502.58	75.37	-0.0640	-1.2408
	1995	Q4	0.5588	1.0000	0.3618	0.2722	0.1320	0.1152	-0.0101	488.84	220.19	-0.7669	0.1129
	1996	Q1	0.4784	1.0000	0.2011	-0.0089	-0.1423	-0.2305	-0.0389	571.49	471.93	-1.0302	0.1118
	1996	Q2	0.4371	1.0000	0.0846	-0.1140	-0.0566	0.1143	0.0104	609.59	230.59	-0.6903	-0.7191
	1996	Q3	0.5597	1.0000	0.4055	0.1063	-0.1910	-0.1965	-0.1100	559.08	292.38	0.3165	-1.0307
	1996	Q4	0.7091	1.0000	0.3051	-0.1641	-0.4062	-0.1859	0.1389	600.37	613.84	-0.0413	-1.5783
	1997	Q1	0.5837	1.0000	0.3087	-0.0076	-0.0340	-0.0721	-0.1500	678.93	352.33	-0.1562	-1.1083
	1997	Q2	0.6826	1.0000	0.2800	0.2307	0.0115	-0.1922	-0.1570	671.25	759.60	0.3128	-1.2818
	1997	Q3	0.7299	1.0000	0.4156	0.1177	-0.2023	-0.1147	-0.2154	630.70	7310.04	-0.0911	-1.5881
	1997	Q4	0.6676	1.0000	0.2243	-0.0875	-0.0999	-0.1574	-0.1860	450.35	3243.19	0.0155	-1.3915
	1998	Q1	0.3883	1.0000	0.1620	-0.0842	-0.0750	-0.0806	0.0044	476.22	2632.38	-0.9835	0.2202
	1998	Q2	0.6264	1.0000	-0.0083	-0.0581	-0.1164	0.0804	0.0917	447.62	1945.37	0.7111	-0.9698
	1998	Q3	0.8921	1.0000	0.0435	0.2273	-0.0187	0.0681	-0.0477	391.75	6187.12	-0.2531	-1.4164
	1998	Q4	0.6876	1.0000	0.2157	-0.0097	-0.1705	-0.2154	-0.1487	356.40	2226.10	-0.4617	-1.0437
	1999	Q1	0.3454	1.0000	0.1495	0.0260	0.0678	-0.2319	-0.1721	400.50	258.49	1.2029	2.4571
	1999	Q2	0.7752	1.0000	0.2498	-0.0681	-0.0444	-0.0558	-0.1106	565.72	9246.61	-0.2609	-1.0650
	1999	Q3	0.5776	1.0000	0.0551	-0.1263	-0.1607	0.0580	-0.2259	590.53	2240.86	0.4250	-1.0335
	1999	Q4	0.3854	1.0000	0.0065	0.0699	-0.0012	-0.0740	-0.1875	614.06	1079.67	0.1448	-0.8756
	2000	Q1	0.6578	1.0000	0.0703	-0.2986	0.1473	0.1937	-0.0630	617.89	1863.18	0.4483	-0.9262
	2000	Q2	0.5942	1.0000	0.0392	0.1043	0.2184	-0.0734	0.1248	512.30	1150.14	-0.0403	-0.7855
	2000	Q3	0.6370	1.0000	-0.0329	0.0988	-0.0683	0.0522	0.0169	479.93	1071.23	-1.1135	-0.0518
	2000	Q4	0.3004	1.0000	0.0817	0.0551	-0.0886	-0.0102	-0.1487	420.75	62.81	-0.0413	-0.7755
	2001	Q1	0.5657	1.0000	0.1805	0.1446	-0.0495	-0.0858	-0.0452	414.21	555.21	-0.6637	-0.2502
	2001	Q2	0.7363	1.0000	0.2324	0.0895	-0.0341	-0.0873	-0.1289	385.98	790.40	0.5034	-0.9789
	2001	Q3	0.2938	1.0000	0.0064	-0.0652	0.0883	-0.0250	-0.0263	435.62	216.17	-0.8088	1.3512
	2001	Q4	0.1048	1.0000	0.0322	-0.2387	0.0316	0.1226	0.0446	379.41	34.27	0.1270	-0.1415
	2002	Q1	0.6353	1.0000	0.0999	0.0057	0.0004	-0.1589	-0.0480	445.48	776.41	-0.7551	-0.1427
	2002	Q2	0.3040	1.0000	0.2633	0.1936	0.0097	-0.0240	-0.0809	526.47	249.61	-0.6041	-0.3076
	2002	Q3	0.6112	1.0000	0.0879	-0.1482	-0.1758	-0.0165	-0.1434	449.76	597.40	-0.0109	-0.9995
	2002	Q4	0.5238	1.0000	0.0874	-0.0496	0.2016	-0.2318	0.0110	380.33	448.33	0.3518	-0.4983
	2003	Q1	0.1081	1.0000	-0.0999	-0.0137	-0.0649	0.1365	-0.1078	396.40	48.28	-0.3419	-0.3992
	2003	Q2	0.7335	1.0000	-0.0353	0.0164	-0.0845	0.2748	-0.0089	470.73	1115.54	-0.2530	-1.0022
	2003	Q3	0.6741	1.0000	0.2318	-0.1406	-0.0088	0.0220	-0.0789	536.61	1124.35	0.7565	-0.9116
	2003	Q4	0.4279	1.0000	0.2347	0.0163	0.0643	0.1172	0.0684	637.09	449.01	0.6093	0.0809
	2004	Q1	0.3213	1.0000	0.1799	-0.1426	0.0862	0.0157	-0.1291	754.65	543.03	-0.3406	-1.0489
	2004	Q2	0.4909	1.0000	0.2353	-0.2032	-0.2440	-0.0923	0.3791	740.08	1618.32	0.4829	-0.8392
	2004	Q3	0.5504	1.0000	0.2116	-0.0930	-0.0553	0.0868	-0.0296	770.18	681.14	0.8032	-0.6112
	2004	Q4	0.7438	1.0000	0.1733	-0.0214	0.0670	0.1184	-0.1073	916.58	3313.84	0.0404	-1.5934
Annual	1994		0.7062	1.0000	0.4023	0.0911	0.0114	-0.0175	0.0254	501.71	1790.87	0.9592	0.0479
	1995		0.6012	1.0000	0.3228	0.1196	0.0507	-0.0553	0.0076	473.63	911.44	-0.4990	-1.0950
	1996		0.5578	1.0000	0.2559	-0.0247	-0.1734	-0.1335	-0.0052	585.15	828.65	-0.1060	-0.8595
	1997		0.6065	1.0000	0.3212	0.0406	-0.1133	-0.1123	-0.1686	606.67	11596.54	-0.8077	-0.6366
	1998		0.6148	1.0000	0.1667	0.0273	-0.0548	-0.0202	0.0232	416.82	5433.93	-0.3206	-0.7498
	1999		0.6123	1.0000	0.1766	-0.0010	0.0289	-0.0236	-0.1140	547.32	9854.57	-0.4415	-1.1490
	2000		0.5749	1.0000	0.0407	-0.0302	0.0745	0.0602	0.0181	507.37	6114.27	0.6178	-0.4601
	2001		0.6038	1.0000	0.1353	0.0403	0.0292	-0.0110	-0.0287	404.43	909.31	0.0246	-1.3005
	2002		0.6340	1.0000	0.1392	0.0110	0.0878	-0.1056	0.0178	452.90	3153.37	-0.0029	-0.9939
	2003		0.6289	1.0000	0.0935	-0.0249	-0.0393	0.1285	-0.0054	508.60	8339.34	0.2273	-1.2166
	2004		0.5339	1.0000	0.2233	-0.1268	-0.0697	-0.0012	0.1321	794.66	6459.36	1.1508	0.4226

MALAYSIA (KLSE)

MALAYSIA			Hurst	Autocorrelation Lags								Moments	
				0	1	2	3	4	5	Mean	Variance	Skewness	Kurtosis-3
Overall			0.5794	1.0000	0.0629	0.0229	0.0050	-0.0901	0.0506	828.26	43552.07	0.0766	-0.6930
Quarterly	1994	Q1	0.3694	1.0000	0.0515	-0.1544	-0.0166	0.1316	-0.1218	1084.98	6908.73	0.7701	0.9416
	1994	Q2	0.3364	1.0000	0.0177	-0.1282	0.1321	0.1390	0.0828	1006.31	880.96	-0.3398	-0.2683
	1994	Q3	0.7920	1.0000	0.2089	-0.0637	0.0464	0.0282	-0.0446	1094.00	5018.83	-0.2854	-1.4603
	1994	Q4	0.7087	1.0000	0.2917	-0.0864	-0.0483	-0.0051	0.0738	1039.60	5111.05	-0.1985	-1.1951
	1995	Q1	0.2383	1.0000	0.2270	-0.0204	-0.0005	0.0314	-0.2385	945.22	1260.84	-1.0720	0.6885
	1995	Q2	0.6572	1.0000	0.0930	0.0510	-0.1835	-0.0748	0.0324	1010.36	1986.72	-0.0471	-1.5123
	1995	Q3	0.6002	1.0000	0.0855	0.1770	0.1561	-0.1030	-0.0330	1031.21	823.08	-0.1451	-1.3244
	1995	Q4	0.6274	1.0000	0.2310	-0.1353	0.0086	0.2477	0.0953	955.15	1102.13	-0.6025	-0.7574
	1996	Q1	0.4928	1.0000	0.0595	0.1018	-0.2605	-0.2817	-0.0838	1084.89	1425.23	0.3710	-0.3593
	1996	Q2	0.4413	1.0000	0.0382	-0.1689	-0.1217	0.0625	-0.1484	1149.53	280.32	0.2463	-0.6753
	1996	Q3	0.3879	1.0000	0.0430	-0.0894	-0.0129	-0.0534	0.0824	1114.60	310.79	-0.8306	1.0216
	1996	Q4	0.5675	1.0000	-0.0040	-0.1116	0.1091	0.0823	-0.0269	1186.70	775.27	-0.0872	-0.9162
	1997	Q1	0.3922	1.0000	0.0537	-0.0503	-0.0241	-0.1627	-0.0603	1237.65	296.93	0.1054	-0.9178
	1997	Q2	0.2772	1.0000	0.3654	-0.0917	-0.1912	-0.2878	-0.2385	1099.70	984.04	0.6810	0.5511
	1997	Q3	0.6415	1.0000	0.2211	-0.1468	-0.1628	-0.0299	0.0913	918.54	10313.74	0.0088	-1.2973
	1997	Q4	0.5924	1.0000	0.1033	0.1696	-0.0664	-0.0527	-0.2276	661.33	9851.40	0.3094	-1.2690
	1998	Q1	0.5737	1.0000	0.0960	-0.0411	0.0005	-0.0734	-0.0691	664.69	6948.17	-0.9540	-0.6978
	1998	Q2	0.8041	1.0000	0.1741	-0.3323	-0.1118	0.1972	-0.1302	562.35	5834.17	-0.0631	-1.2029
	1998	Q3	0.5483	1.0000	-0.1995	0.0290	0.0101	-0.3450	0.2404	382.54	2417.69	-0.0775	-0.5544
	1998	Q4	0.8398	1.0000	-0.0020	0.0585	-0.1071	-0.0908	-0.0116	467.89	4141.58	-0.0238	-1.2402
	1999	Q1	0.6603	1.0000	0.0526	0.0180	0.1753	-0.2055	-0.0003	552.19	1350.79	0.1170	-1.2849
	1999	Q2	0.7750	1.0000	-0.1201	0.0100	-0.0019	0.0252	0.1637	706.45	7255.65	-0.6688	-0.8253
	1999	Q3	0.5156	1.0000	0.0741	0.0617	0.0086	-0.2323	0.1867	763.51	2957.41	0.2093	-1.0045
	1999	Q4	0.4204	1.0000	0.1204	0.0426	0.0489	-0.0338	-0.0341	742.36	708.26	0.6459	0.5023
	2000	Q1	0.4464	1.0000	0.2828	0.2214	0.0509	0.0970	-0.1554	949.38	2316.78	-1.1464	1.1224
	2000	Q2	0.4807	1.0000	0.0439	-0.1307	-0.2243	-0.0887	0.0919	892.01	1748.93	-0.4514	-0.6712
	2000	Q3	0.6062	1.0000	0.3324	-0.0586	0.0325	0.0370	0.1915	792.21	1585.88	-0.3620	-1.0596
	2000	Q4	0.4677	1.0000	0.2177	0.1392	-0.0419	-0.0716	-0.0534	736.09	719.23	0.3280	-0.6355
	2001	Q1	0.6845	1.0000	0.1831	0.1678	0.1467	0.1003	0.1605	694.42	583.62	-0.0883	-1.2276
	2001	Q2	0.2670	1.0000	0.2517	-0.0726	0.1505	-0.0516	-0.1365	579.08	309.89	1.5600	3.8525
	2001	Q3	0.5034	1.0000	0.3982	-0.0610	-0.1033	-0.1005	-0.0728	646.69	846.54	-0.0511	-0.7896
	2001	Q4	0.6877	1.0000	0.2163	0.1285	-0.1456	0.1809	-0.0650	629.88	772.29	0.6385	-0.6314
	2002	Q1	0.5773	1.0000	0.2403	0.0795	-0.0228	0.0110	-0.2878	719.78	574.04	0.3568	-1.2377
	2002	Q2	0.6635	1.0000	0.1338	0.0090	-0.0262	-0.1238	0.0605	767.92	589.49	-0.4617	-0.3863
	2002	Q3	0.5921	1.0000	-0.0365	0.0104	0.1793	-0.0984	0.1914	712.81	784.32	-1.2738	0.7893
	2002	Q4	0.3792	1.0000	0.0579	-0.0439	-0.0312	-0.0559	-0.1096	642.84	113.05	-0.2114	-0.4424
	2003	Q1	0.6352	1.0000	0.1743	0.2589	-0.0417	0.0652	-0.0289	647.57	280.96	-0.0097	-1.4601
	2003	Q2	0.8123	1.0000	-0.0617	0.0200	0.0597	0.0001	-0.0065	652.21	598.98	0.4173	-1.5836
	2003	Q3	0.4987	1.0000	0.2211	-0.0053	-0.1865	0.0022	0.0344	730.34	171.11	-0.3360	-0.3810
	2003	Q4	0.3522	1.0000	0.3454	0.0352	-0.0303	0.0363	0.0000	786.01	342.86	-0.8352	0.8278
	2004	Q1	0.7833	1.0000	-0.0574	0.0191	0.0630	-0.0275	0.0457	852.28	1394.05	-0.0560	-1.5550
	2004	Q2	0.7095	1.0000	0.1575	-0.1060	0.0498	0.0887	0.1604	833.00	996.24	0.3740	-1.1266
	2004	Q3	0.6426	1.0000	0.2034	0.0332	0.1305	0.2089	0.0061	836.74	268.27	-0.3275	-0.9602
	2004	Q4	0.7364	1.0000	0.1490	-0.1904	0.1118	0.0710	-0.1363	884.94	615.78	-0.2065	-1.6184
Annual	1994		0.5050	1.0000	0.1121	-0.0934	0.0356	0.1167	-0.0208	1055.83	5643.04	0.5481	0.1561
	1995		0.4509	1.0000	0.1722	-0.0135	-0.0172	0.0231	-0.0609	986.17	2588.16	-0.1037	-0.4739
	1996		0.4958	1.0000	0.0550	-0.0022	-0.1080	-0.1059	-0.0356	1134.85	2119.08	-0.1211	-0.1903
	1997		0.5515	1.0000	0.1601	0.0569	-0.0941	-0.0578	-0.1254	972.64	52084.08	-0.4594	-1.0629
	1998		0.6269	1.0000	-0.0597	0.0186	0.0154	-0.2030	0.1392	515.86	15674.93	0.2820	-1.0018
	1999		0.6281	1.0000	0.0900	0.0867	0.1213	-0.0530	0.1406	696.32	9500.47	-0.5913	-0.8176
	2000		0.4737	1.0000	0.1800	0.0628	-0.0646	-0.0043	0.0314	841.36	8419.94	0.1369	-1.2472
	2001		0.6610	1.0000	0.2899	-0.0199	0.0473	-0.0069	-0.0633	636.68	2307.49	0.1371	-1.0469
	2002		0.6073	1.0000	0.1053	0.0785	0.0747	-0.0822	-0.0069	710.72	2510.66	-0.1201	-1.0394
	2003		0.6055	1.0000	0.1925	0.0873	-0.0336	0.0337	0.0225	704.94	3633.50	0.2023	-1.3134
	2004		0.6412	1.0000	0.1227	-0.0139	0.1008	0.0763	0.0660	851.47	1218.82	0.1693	-1.0106

PHILIPPINES (PSE)

PHILIPPINES			Hurst	Autocorrelation Lags								Moments	
				0	1	2	3	4	5	Mean	Variance	Skewness	Kurtosis-3
Overall			0.5877	1.0000	0.1822	-0.0028	-0.0186	0.0264	-0.0113	2006.62	489394.54	0.3168	-1.2575
Quarterly	1994	Q1	0.5320	1.0000	0.1414	0.1523	0.1211	-0.0755	-0.1438	2889.10	47094.62	0.0510	-0.8391
	1994	Q2	0.4558	1.0000	0.0656	0.0233	-0.1031	0.0929	-0.0533	2865.86	14395.98	-0.2533	-0.5134
	1994	Q3	0.7317	1.0000	0.1761	0.0347	0.0536	-0.0495	0.1486	2879.55	30845.75	-0.5315	-0.8401
	1994	Q4	0.7316	1.0000	0.2198	0.0161	0.2309	-0.0006	0.0998	2873.09	27266.34	-0.1796	-1.3644
	1995	Q1	0.4598	1.0000	0.0738	0.0679	-0.0365	-0.0184	0.1158	2490.13	21154.84	0.2192	-0.7212
	1995	Q2	0.7793	1.0000	0.2222	0.2005	0.0815	-0.0643	0.0633	2658.05	23908.00	-0.3931	-1.5426
	1995	Q3	0.5844	1.0000	0.2415	0.0035	0.1712	-0.0123	-0.0971	2807.40	6792.89	-0.3491	-0.9920
	1995	Q4	0.5555	1.0000	0.2542	0.2451	0.0497	0.1708	0.0604	2496.22	12562.02	-0.8296	-0.1085
	1996	Q1	0.4438	1.0000	0.2949	-0.0615	-0.2945	-0.2574	-0.0115	2844.91	7828.44	-1.0956	0.4263
	1996	Q2	0.7014	1.0000	0.3556	0.1000	-0.0789	-0.1228	-0.2315	3116.34	14251.53	-0.1670	-1.4906
	1996	Q3	0.4545	1.0000	0.2503	-0.1256	-0.1279	0.0359	-0.0650	3184.27	6038.25	-0.1486	-0.1187
	1996	Q4	0.3192	1.0000	0.2870	-0.1126	-0.0308	0.0207	-0.1295	3073.11	5571.21	-0.8412	0.2282
	1997	Q1	0.5601	1.0000	0.1896	0.0644	0.0555	0.1688	0.2134	3292.78	4424.10	0.0363	-0.5905
	1997	Q2	0.5386	1.0000	0.2169	-0.0265	-0.0722	-0.1329	0.1348	2805.43	21673.32	0.2039	0.1444
	1997	Q3	0.6949	1.0000	0.1657	-0.0983	0.0396	0.0355	-0.0702	2402.10	73446.02	-0.2438	-1.5352
	1997	Q4	0.2999	1.0000	0.1415	0.0580	0.0566	-0.1995	-0.2177	1889.63	8045.04	0.6329	-0.6851
	1998	Q1	0.6090	1.0000	0.3479	-0.0310	-0.1647	-0.1059	-0.0699	2031.23	53923.01	-0.6275	-0.9407
	1998	Q2	0.7106	1.0000	0.0972	-0.1861	-0.0824	0.0522	-0.0587	2042.43	31284.68	-0.8510	-0.7216
	1998	Q3	0.8147	1.0000	0.1489	-0.0280	-0.1595	-0.0383	0.0112	1437.21	65910.54	0.3715	-1.3725
	1998	Q4	0.6772	1.0000	0.1612	-0.2809	0.0431	0.3948	-0.0994	1685.02	57549.63	-0.8529	-0.5392
	1999	Q1	0.4067	1.0000	0.0863	-0.1376	-0.0215	-0.0223	-0.2236	2003.15	4798.58	0.8065	-0.0782
	1999	Q2	0.4514	1.0000	0.0732	-0.0003	-0.0171	0.3013	-0.0117	2385.90	15037.53	-1.3235	1.3594
	1999	Q3	0.7157	1.0000	0.1433	-0.0135	-0.0392	0.0374	-0.2110	2284.27	36421.78	0.6153	-1.1215
	1999	Q4	0.3502	1.0000	0.2830	-0.1207	-0.1760	-0.0363	0.1316	2004.53	3229.71	0.3848	-0.5928
	2000	Q1	0.8164	1.0000	0.2432	-0.1509	-0.0971	-0.0124	-0.0268	1875.00	34627.05	-0.0849	-1.6207
	2000	Q2	0.5819	1.0000	0.1119	0.0120	-0.0605	0.0471	-0.1778	1568.07	8368.10	0.5510	-0.2643
	2000	Q3	0.4714	1.0000	0.2489	0.1727	0.1887	-0.0269	0.1247	1486.82	2015.76	0.0040	-1.2271
	2000	Q4	0.4867	1.0000	0.0801	-0.1052	0.0532	0.0104	-0.0215	1394.22	5384.52	-0.4409	-0.9258
	2001	Q1	0.6264	1.0000	-0.0257	-0.1073	-0.2010	0.1076	0.0331	1579.80	8768.76	-0.1922	-1.4772
	2001	Q2	0.1222	1.0000	-0.0516	0.1423	-0.2712	-0.0887	-0.0116	1435.38	589.66	-0.3147	-0.4066
	2001	Q3	0.7073	1.0000	-0.2216	0.0669	0.1138	-0.2196	0.1526	1302.76	5961.86	-0.6026	-0.4830
	2001	Q4	0.6730	1.0000	0.3587	-0.0267	-0.0699	0.0306	-0.0006	1060.59	3411.27	0.1248	-1.5222
	2002	Q1	0.6672	1.0000	0.3315	-0.0227	-0.1447	-0.1625	-0.1267	1344.25	7927.99	-0.8380	-0.6964
	2002	Q2	0.6603	1.0000	0.1063	0.0420	-0.1613	-0.0637	0.1267	1328.41	4800.78	-0.7686	0.0586
	2002	Q3	0.3107	1.0000	0.0896	0.1826	0.0113	-0.0631	-0.3261	1130.45	604.35	0.2478	-0.2800
	2002	Q4	0.3174	1.0000	0.0471	-0.0477	-0.0959	-0.0536	0.0756	1045.64	757.24	0.6906	0.1060
	2003	Q1	0.3927	1.0000	0.0696	0.1571	-0.1100	-0.1120	0.2158	1032.70	404.99	0.2764	-0.4726
	2003	Q2	0.5978	1.0000	0.2640	0.1638	-0.0788	0.0640	-0.1105	1113.93	4692.00	0.8272	-0.6588
	2003	Q3	0.3575	1.0000	0.1606	-0.0345	-0.0331	-0.0742	-0.0404	1263.89	1187.77	-0.1445	-0.9537
	2003	Q4	0.3138	1.0000	0.2406	-0.0945	0.0254	0.1196	-0.0308	1364.34	1593.24	0.1521	-0.7367
	2004	Q1	0.4128	1.0000	0.0110	0.0501	0.1835	-0.3616	-0.0452	1475.35	2127.79	0.0623	-0.5818
	2004	Q2	0.2833	1.0000	0.0040	0.0552	-0.0665	0.0303	0.0269	1529.27	1460.71	-0.1351	-0.4454
	2004	Q3	0.5566	1.0000	0.3723	-0.0580	-0.0377	0.0214	0.0118	1618.06	5206.52	0.9281	-0.6890
	2004	Q4	0.0858	1.0000	-0.0045	0.0150	-0.1932	-0.1328	0.0518	1798.94	661.03	-0.3029	-0.3003
Annual	1994		0.5877	1.0000	0.1599	0.0911	0.0836	-0.0055	-0.0021	2876.91	29579.81	-0.1229	-0.5892
	1995		0.5588	1.0000	0.1765	0.1521	0.0523	0.0626	0.1046	2614.40	33363.55	-0.1346	-1.0101
	1996		0.4853	1.0000	0.2959	-0.0505	-0.1086	-0.0630	-0.0910	3053.54	24922.77	-0.5077	-0.3668
	1997		0.5746	1.0000	0.1741	-0.0172	0.0347	-0.0684	-0.0512	2589.77	293846.91	-0.0632	-1.3757
	1998		0.6492	1.0000	0.2585	-0.0498	-0.0478	0.0990	-0.0080	1792.05	117966.12	-0.4166	-0.8980
	1999		0.5833	1.0000	0.1582	-0.0297	-0.0221	0.0897	-0.0869	2170.83	43608.93	0.6239	-0.9708
	2000		0.6102	1.0000	0.1465	-0.0548	0.0097	0.0164	-0.0367	1583.79	45542.85	1.1414	0.5266
	2001		0.6518	1.0000	0.0177	-0.0271	-0.1340	0.0396	0.0475	1348.38	40902.61	-0.2152	-0.8522
	2002		0.5654	1.0000	0.1863	0.0278	-0.0867	-0.0717	0.0123	1212.15	19582.67	0.2015	-1.4386
	2003		0.5321	1.0000	0.2085	0.0489	-0.0556	0.0208	-0.0349	1194.85	18484.09	0.0401	-1.4568
	2004		0.4435	1.0000	0.1139	0.0499	0.0033	-0.1069	0.0122	1602.79	16980.38	0.5086	-1.0916

THAILAND (SET)

THAILAND			Hurst	Autocorrelation Lags								Moments	
				0	1	2	3	4	5	Mean	Variance	Skewness	Kurtosis-3
Overall			0.5861	1.0000	0.1314	0.0418	0.0128	-0.0038	0.0062	670.97	162953.84	0.8620	-0.8056
Quarterly	1994	Q1	0.5038	1.0000	-0.0066	-0.2695	0.1801	-0.0616	0.0264	1407.49	12862.75	0.6670	0.8363
	1994	Q2	0.5527	1.0000	0.1738	-0.0448	0.1919	0.1521	-0.1078	1302.65	3154.09	-0.0250	-1.2817
	1994	Q3	0.7455	1.0000	0.1410	0.1440	-0.0766	-0.2641	-0.1393	1435.79	7201.67	-0.4615	-1.0998
	1994	Q4	0.6650	1.0000	0.0797	0.0708	0.1378	-0.0881	-0.2540	1427.69	6276.45	-0.2505	-1.4910
	1995	Q1	0.3502	1.0000	0.2216	0.0094	-0.0333	-0.1247	-0.0600	1254.75	3209.72	0.1027	-0.7311
	1995	Q2	0.7872	1.0000	0.2257	0.0880	-0.1740	-0.0141	0.2040	1313.53	8356.65	-0.6481	-1.2889
	1995	Q3	0.5067	1.0000	-0.0352	0.1254	0.0272	0.0913	-0.1243	1351.62	2804.41	0.7320	-0.4615
	1995	Q4	0.6468	1.0000	0.2159	0.0892	0.0160	-0.1159	-0.0627	1257.89	1764.53	-0.2230	-0.9180
	1996	Q1	0.6102	1.0000	0.0988	0.1230	-0.2109	0.0331	-0.0919	1346.73	2089.62	-0.4686	-0.9789
	1996	Q2	0.4542	1.0000	0.0928	-0.0506	-0.1590	-0.0403	0.0123	1293.45	1137.34	-0.4845	-0.7328
	1996	Q3	0.5620	1.0000	0.2047	0.2310	-0.0257	-0.1009	-0.1804	1109.63	5293.86	0.5435	-0.4452
	1996	Q4	0.4590	1.0000	0.0580	0.1230	0.0932	-0.0717	0.1389	924.95	3146.53	0.1116	0.3591
	1997	Q1	0.6097	1.0000	0.1427	0.0856	0.0770	-0.2688	-0.1585	756.11	3248.08	0.4678	-1.3050
	1997	Q2	0.8292	1.0000	0.1364	-0.0901	0.0183	0.0824	0.0591	598.60	6183.59	0.1988	-1.3415
	1997	Q3	0.5901	1.0000	0.2140	-0.2121	-0.0160	0.1953	0.0479	590.58	3173.73	-0.0411	-1.4641
	1997	Q4	0.7782	1.0000	0.1416	0.0123	-0.1188	-0.1462	-0.1346	445.12	4047.21	0.1827	-1.4002
	1998	Q1	0.6267	1.0000	0.2166	-0.0419	0.0021	-0.0267	-0.0250	473.20	3682.61	-0.8397	-0.5702
	1998	Q2	0.8918	1.0000	0.1619	-0.2336	-0.1290	-0.0761	-0.2580	356.39	4126.70	-0.0007	-1.3898
	1998	Q3	0.6466	1.0000	0.1316	0.1083	0.0555	-0.0159	0.0581	245.80	649.89	0.1381	-1.1672
	1998	Q4	0.4683	1.0000	0.0573	0.0210	-0.0181	-0.2320	-0.0764	334.83	1180.01	-0.9961	0.6140
	1999	Q1	0.5568	1.0000	0.0909	0.0636	-0.2067	-0.0241	0.0105	356.95	517.22	0.3191	-0.7434
	1999	Q2	0.6144	1.0000	0.2342	-0.1703	0.0015	0.0752	-0.0744	465.20	3039.45	-0.5777	-0.6810
	1999	Q3	0.4954	1.0000	0.1248	0.1118	-0.0879	0.0582	-0.1491	449.36	1403.84	0.4262	-0.3550
	1999	Q4	0.4917	1.0000	0.0060	0.1807	0.1204	-0.1774	0.2060	414.98	745.02	0.4841	-0.1649
	2000	Q1	0.6945	1.0000	0.0008	0.0027	-0.2164	0.2201	0.0869	430.93	1481.13	0.0773	-1.5933
	2000	Q2	0.6215	1.0000	0.0164	0.1413	0.1520	-0.2175	-0.0666	355.60	900.35	0.3606	-1.2114
	2000	Q3	0.3980	1.0000	-0.1364	0.1965	-0.0697	0.0283	0.1198	304.04	209.52	-0.2844	-1.0675
	2000	Q4	0.5456	1.0000	0.0912	0.2821	-0.0769	0.0175	-0.0212	275.39	117.17	0.0926	-0.4578
	2001	Q1	0.5100	1.0000	-0.0097	0.0707	-0.0136	0.0115	0.0350	309.23	247.25	-0.1352	-0.8860
	2001	Q2	0.5387	1.0000	-0.1250	0.0534	0.0084	-0.0727	-0.3270	305.71	162.38	-0.5066	-0.6568
	2001	Q3	0.5032	1.0000	0.2826	0.0454	0.0539	-0.0334	-0.0412	312.84	389.74	-0.6344	-0.4219
	2001	Q4	0.5641	1.0000	-0.0669	0.1295	0.0851	-0.0124	0.0608	286.28	134.57	-0.0123	-1.2038
	2002	Q1	0.7196	1.0000	0.1357	-0.0197	0.0435	-0.1618	-0.3009	354.68	727.57	-0.2111	-1.4101
	2002	Q2	0.5097	1.0000	-0.0137	0.1637	0.1305	-0.0208	0.0661	390.33	308.75	0.5508	-0.8848
	2002	Q3	0.5766	1.0000	-0.0383	-0.0497	0.0025	0.0155	-0.1636	369.59	346.34	0.2132	-0.6750
	2002	Q4	0.4439	1.0000	0.1949	-0.0413	-0.0759	-0.0560	0.3280	350.96	117.42	-0.6086	-0.5065
	2003	Q1	0.3899	1.0000	-0.0028	-0.1112	-0.0565	-0.0300	0.0800	365.90	58.51	-0.0663	-0.8845
	2003	Q2	0.7813	1.0000	-0.0269	0.1348	0.0580	-0.0381	-0.0906	400.80	883.32	0.7579	-0.7226
	2003	Q3	0.7440	1.0000	-0.0041	-0.1523	-0.1536	-0.1335	0.0957	522.69	1177.04	0.1995	-1.3889
	2003	Q4	0.5749	1.0000	0.2888	0.0890	-0.0775	-0.0384	0.0980	641.98	2990.74	0.2828	-0.4631
	2004	Q1	0.4604	1.0000	-0.0876	0.0304	-0.2227	0.0994	0.0210	721.98	1580.39	0.0428	-0.8745
	2004	Q2	0.5412	1.0000	-0.0537	-0.0589	0.0634	-0.1656	0.3289	642.73	1257.61	0.5857	-0.7458
	2004	Q3	0.6229	1.0000	0.0511	0.1176	0.0292	-0.0050	0.0953	635.34	489.97	-0.3381	-0.9727
	2004	Q4	0.3925	1.0000	-0.0708	-0.0173	-0.1195	0.0840	-0.2928	652.39	220.65	-0.1549	-0.7939
Annual	1994		0.5264	1.0000	0.0875	-0.0929	0.1732	-0.0287	-0.0269	1395.06	10119.75	0.2661	-0.2214
	1995		0.5088	1.0000	0.1732	0.0826	-0.0222	-0.0416	0.0012	1294.21	5575.53	0.0651	-0.7280
	1996		0.5359	1.0000	0.1167	0.1339	-0.0335	-0.0778	-0.0852	1165.67	30648.82	-0.3715	-1.2655
	1997		0.6472	1.0000	0.2207	-0.0208	0.0104	0.0571	0.0263	596.94	16382.05	0.0410	-0.7644
	1998		0.6876	1.0000	0.1682	0.0196	0.0283	-0.0548	-0.0267	351.56	9030.43	0.4284	-0.8609
	1999		0.5870	1.0000	0.1490	0.0521	-0.0294	0.0367	0.0037	421.02	3105.83	0.2447	-0.7359
	2000		0.5638	1.0000	-0.0062	0.1185	-0.0475	0.0170	0.0354	341.53	4224.29	0.7220	-0.5952
	2001		0.5232	1.0000	0.0850	0.0792	0.0301	0.0035	-0.0368	303.49	338.51	-0.0497	-0.8166
	2002		0.5282	1.0000	0.0849	0.0542	0.0714	-0.0452	-0.0417	366.17	607.71	0.0413	-0.2501
	2003		0.6407	1.0000	0.1435	0.0245	-0.0473	-0.0308	0.0187	484.64	13222.94	0.5262	-0.9523
	2004		0.4495	1.0000	-0.0079	0.0295	-0.1064	-0.0283	0.0781	663.33	2076.23	0.9317	0.4425