A TEST OF THE EFFICIENT MARKET HYPOTHESIS WITH RESPECT TO THE RECENT BEHAVIOR OF THE HONG KONG STOCK MARKET

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Introduction

IN THE recent development of the international financial system, Hong Kong has been emerging as an important center of Asia (see Jao [10] and Li [16]). However, besides some descriptive studies, not much has been done in relation to the operation and behavior of its stock market.[1] This study attempts to apply the most widely accepted analytical approach in the studying of stock markets, namely, the efficient market hypothesis (EMH), to investigate the short-term behavior of stock prices of Hong Kong.

A market that always fully reflects the available information is called "efficient" [6, p. 383]. There are two survey articles covering the theoretical and empirical literature of the efficient market model of stock markets by Fama [6] and Granger [8]. According to Fama, three forms of the model were investigated with respect to three different information subsets. In the "weak" form test, historical prices are the relevant information to be examined. In the "semi-strong" form test, the focus is on whether publicly available information, e.g., the announcement of annual earnings, stock splits, etc., adjusts efficiently. In the "strong" form test, the question is whether any investors have monopolistic access to the information relevant to the determination of stock prices. Evidence in support of the "weak" form varied across countries.[2] However, empirical tests for the "semi-strong" form and the "strong" form generally concentrated on the experience of the United States. They are inadequate in the global context.

In a perfectly competitive stock market, prices presumably equal to their

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1 Pioneer analytical studies on the stock market of Hong Kong were initiated by K. A. Wong. See K. A. Wong [24] [25] [26] and K. A. Wong and S. Dawson [27].

2 The evidence in support of the "weak" form is extensive for the capital market of the United States (see Fama [5]). However, this may not be the case even for other developed countries. For example, Kemp and Reid [13] discovered that the stock market of United Kingdom was weakly inefficient, and Jennergren and Korsvold [12] indicated the same result for Sweden. There were two studies, Wan [22] and Wong and Dawson [27], testing the WEMH of stock market of Hong Kong. Their findings supported the hypothesis.

intrinsic values—that is, gross rates of return, discounted for the risk of every individual stock, should be the same for all stocks. Hence prices that fully reflect the available information are the correct signal to guide the efficient allocation of capital. Since stock prices related information could only be generated randomly during the day-to-day operation of the economy, stock prices should also adjust randomly upwards or downwards with respect to the new information, if the market is efficient. It is the speed of these adjustments which determine how efficient a market is. If any disequilibrium exists, even for a certain short period of time, then the market is inefficient and some capital would have been misallocated as a result.

For the purpose of investors, the establishment of the EMH would imply that actively managed investment portfolios might not do better than naive buy-and-hold portfolios in terms of long-term performance. In fact, it could be worse when transaction costs are taken into account. It may be better to buy a well-diversified portfolio of stocks at a chosen risk level and hold it.

This study purports to make a comprehensive investigation of the "weak" form of the EMH (WEMH). Previous related studies on the stock market of Hong Kong are unsatisfactory for three reasons (see Wan [22] and Wong and Dawson [27]). First, researchers usually employed monthly or even annual data for examination, ignoring the available daily information on stock prices. Although their conclusion generally supported the WEMH for the stock market of Hong Kong, it is extremely doubtful whether this is contingent upon the choice of daily price information. Second, a relatively small sample of stocks was selected, generally concentrated on the stocks constituting the widely accepted Hang Seng (Stock) Index. As a result, the behavior of other stocks, of which some have become more important in recent years, was neglected. Third, the statistical tools employed for the purpose were inadequate. The present study represents an effort to improve on these shortcomings in the hope that the behavior of stock prices of Hong Kong can be better understood.

A. *The Data*

The data used in this study were collected from the standard sources. Daily closing prices were obtained from the Daily Information Sheet of the Far East Stock Exchange and the *South China Morning Post*.[3] Information about monthly transaction volumes, total market values of each stock, cash and stock dividends, and other capitalization changes were obtained from the *Hong Kong Economic Journal Monthly*. Since we are interested in common stocks, other securities, such as unit trusts, preferred stocks, bonds, and warrants were excluded accordingly.

In order to study the short-term behavior, a period of three months is selected for the purpose by the following sampling method.[4] A random draw is performed

[3] The available published data only permit us to analyze the daily closing prices of stocks. This set of data is imperfect as Alexander [1] discovered that, in his study of filters, his initial findings were affected considerably by neglecting the within-day fluctuations of share prices.

[4] See Kemp and Reid [13] for the arguments in supporting the selection of a short period for examination of speculative activities in the stock market.

upon a population of twenty-two periods of three consecutive months each, from January 1978 to December 1979. For example, the first sample is composed of January, February, and March of 1978, the second sample is composed of February, March, and April of 1978, and so forth. The period from September 1979 to November 1979, which included sixty-four transaction days, is selected by this process.

The time series chosen has often been of considerable length for this type of studies (see Fama [5] and Granger [8]). Yet studies of much shorter series have also been reported.[5] The length of our selected series may be considered as the representative of Cootner's short period [2], and be of more interest as the time horizon for the decision making of speculators.

There were 234 common stocks listed on September 1, 1979. We try to cover as many stocks as possible. A subset of 56 stocks continuous tradings of which existed throughout the period, was selected. These 56 stocks accounted for 80 per cent of the total market value of stocks.[6]

The data themselves may not be in a suitable form for the WEMH test, if they are affected by the non-random acquisition of market information, such as ex-dividend price falls and new capitalization issues. We follow the conventional adjustment practice, although it seems that our results would not be affected radically even we had not reconciled for these irregularities.[7]

5 See Cowles and Jones [3], Niederhoffer and Osborne [19], and Kemp and Reid [13]. The use of relatively short period is subject to the criticism that an "abnormal" period in the history of stock exchange might be selected. As argued correctly by Kemp and Reid [13], whether or not the market is particularly bullish or bearish should not have any bearing upon the testing of the EMH, since random walks with upward or downward trend are both consistent with the hypothesis. Our sampling procedure also strengthens the generality of our findings.

6 The percentages of the selected stocks in this study to the total number of stocks in various sectors, in terms of their closing market prices on December 31, 1979, are as follows:

Sectors	(a) (H.K.$)	(b) (%)
Banking and finance (4)	24,016,339,894	87.01
Building and real estate (31)	29,304,373,467	92.74
Hotel and tourism (3)	2,805,659,600	58.03
Conglomerate & other commercial enterprise (7)	12,933,177,303	79.76
Manufacturing (3)	2,855,554,034	42.56
Public utility (6)	10,657,309,263	86.69
Shipping and godown (2)	7,824,745,210	59.14
Total (56)	90,397,158,771	80.36

Source: Compiled from the *Honk Kong Economic Journal Monthly,* Vol. 3, No. 11 (February 1980), pp. 44–45. Using the closing price of December 31, 1979, the total market value of 234 common stocks was H.K.$112,484,990,223.
Note: (a)=The total market value of selected stocks. (b)=The percentage of the market value of selected stocks to that of all stocks in the sector. Figures within parentheses are number of stocks selected in this study.

7 There were only two cases of the problem of ex-dividend price falls in our sample. When there was a cash dividend, we deducted the same amount from all the observations before the ex-dividend date. If there was a stock dividend instead, we adjusted all prices before the free issue to make them compatible with the post-issue prices.

In the next section, we test the independence assumption of the WEMH. Both the parametric and non-parametric tests will be performed. The common parametric tests adopted are the serial correlation and the regression, and the non-parametric test adopted is the runs test.

B. *The Serial Correlation Analysis*

In order to translate the WEMH into a statistical test, various techniques were examined. Two special cases of the model are the random walk model and the submartingale model. Their mathematical formulations are stated in Fama [6] as follows:

The random walk model,

$$E(P_{t+1} \mid \phi_t) = E(P_{t+1}), \tag{1}$$

asserts that the conditional and marginal probability distribution of an independent variable, the next period's price P_{t+1}, are identical; or the entire distribution is independent of the information of the current period, ϕ_t.[8] On the other hand, the submartingale model,

$$E(P_{t+1} \mid \phi_t) \geqq P_t, \tag{2}$$

states that the expected value of the next period's price, given ϕ_t, is equal to or greater than the current price. If the equation holds at equality, the price sequence then follows a martingale.

For the WEMH, the gist of the analysis can be outlined as follows. We have a series of observations of stock prices as the basic data, represented by P_t $(t=1, \ldots, n)$. The first difference of this series gives the sequence, $P_2 - P_1$, $P_3 - P_2, \ldots, P_n - P_{n-1}$ or simply as ΔP_1, $\Delta P_2, \ldots, \Delta P_{n-1}$. If the hypothesis is valid, the sequence of ΔP_t $(t=1, \ldots, n-1)$ will be random. Statistically speaking, we accept the WEMH if we cannot show this sequence to be non-random, i.e., statistically dependent.

There is some controversy in the literature as to what is the correct probability distribution of stock prices.[9] The most currently acceptable formulation is the lognormal form. This argument is based on two reasons. First, it is observed that prices are bounded from below but unbounded from above. Second, the lognormal distribution is equivalent to the assumption that investors are interested in proportional changes in stock prices rather than in their absolute values.

Hence we can define a random variable u_t as the change of log price of period t and $t-1$, i.e.,

[8] Other mathematical formulations were used by researchers. Shelton [20, p. 255] defined the random walk model as follows:

$$E(P_{t+1} \mid P_0, \ldots, P_t) = E(P_{t+1} \mid P_t).$$

This equation states that tomorrow's expected price given today's and all previous prices is the same as the expectation of tomorrow's price given only today's price.

[9] Instead of the normal distribution, Mandelbrot [17] argued strongly for the application of the Paretian distribution to the random walk hypothesis. Also, Westerfield [23] suggested that short-term stock price changes were distributed normally only if time is defined in terms of an "operational time" of a stock's trading volume.

$$u_t = \ln P_t - \ln P_{t-1}\,. \tag{3}$$

Then its serial correlation coefficient (SCC) which measures the degree of dependence between itself and its value of nth period earlier, is defined as:

$$r_n = \frac{\text{covariance}\ (u_t, u_{t-n})}{\text{variance}\ (u_t)}\,. \tag{4}$$

If the distribution of u_t has a finite variance, the standard error of r_n, σ_{r_n}, in a large sample is given by:

$$\sigma_{r_n} = \{1/(N-n)\}^{1/2}\,, \tag{5}$$

where N is the sample size.[10]

The sample SCC for daily changes in log price is computed for $n=1$, 2, 3, 4, and 5 for each stock. Basically, the coefficient tells us whether the change of today's price can be predicted by the change of stock price of yesterday or several days ago. Out of the fifty-six stocks, thirty-nine of them are found to have at least one SCC that is significantly different from zero at the 90 per cent confidence level, within which twenty-two stocks are significant at the 95 per cent level. The magnitudes of coefficients are also quite considerable, with -0.409 as the largest.[11]

If we examine the coefficients with respect to different lag periods, we observe two phenomena. First, the percentage of the number of negative coefficients significant at the 90 per cent and 95 per cent levels is found to be declining rapidly, up to $n=3$, and then increasing very sharply. For $n=1$, 2, 3, 4, and 5, they are 55.6 per cent, 52.9 per cent, 0.0 per cent, 80.0 per cent, and 92.9 per cent, respectively. Second, the percentage of the number of coefficients significant at the 95 per cent level to the total number of coefficients significant at the 90 per cent and 95 per cent levels is found to have a moderate decline, again up to $n=3$, and then increasing. For $n=1$, 2, 3, 4, and 5, they are 44.5 per cent, 41.2 per cent, 37.5 per cent, 60.0 per cent, and 64.3 per cent, respectively. The results for the four- and five-day differences are similar to those of Cootner [2], Moore [18], and Fama [5]. They all found a preponderance of negative signs in SCCs in the log price of stocks on the New York Stock Exchange. Agreement in signs among the coefficients for different stocks may be the evidence of consistent patterns of dependence.

However, King [15] stated that price changes of different securities are related, though may not be to the same extent, to the behavior of a "market" component

10 Kendall [14, p. 412]. The same statistical test was performed by Fama [5, p. 69].

11 The corresponding findings of the maximum values of the serial correlation coefficients of Fama [5, p. 72] are presented in the following:

	Fama	Law
$n=1$	-0.123	0.334
$n=2$	-0.116	-0.328
$n=3$	0.060	0.351
$n=4$	-0.065	-0.409
$n=5$	0.086	-0.305

common to all securities. Since the market component is common to all stocks, its behavior during the sampling period may tend to produce a common sign for the SCCs of all stocks. Coupling this reasoning with the small magnitudes of coefficients discovered, Fama [5] argued that the agreement in signs of SCCs for different stocks would still be consistent with the WEMH.

As in the case of Hong Kong, the evidence produced by the serial correlation model seems to indicate that statistical dependence in successive price changes is non-negligible. This conclusion should be regarded as tentative until it is further verified by the regression model and the runs test analysis.

C. *The Regression Analysis*

The other statistical version of the WEMH, i.e., the martingale model, can be expressed directly into a regression model. The simplest formulation is:

$$\ln P_t = \alpha_1 + \alpha_2 \ln P_{t-1} + u_t , \qquad (6)$$

which requires us to test for α_2 equal to one.[12]

Findings of the last section permit us to divide the stocks into two groups according to the result whether any of the SCCs of a stock is significantly different from zero statistically at the 95 per cent level. For the twenty-two stocks which have at least one SCC to be significant at the 95 per cent level, the following regression model is applied instead,

$$\ln P_t = \beta_1 + \beta_2 \ln P_{t-1} + \beta_3 N_n + \varepsilon_t , \qquad (7)$$

where N_n is the u_{t-n} term which is found to be significant at the 95 per cent confidence level in the serial correlation analysis. With respect to this equation, we test for β_2 equal to one and β_3 equal to zero separately, as well as jointly. If more than one N_n terms are found to be significant at the 95 per cent level for any particular stock, they will be introduced into the equation together and tested accordingly. In turn, we apply the equation (6) to the other thirty-four stocks which did not have any SCC significance at the 95 per cent level.

For these thirty-four stocks, the empirical result indicates that ten stocks are having their α_2 coefficients at least significantly different from one at the 90 per cent level. Among them, one is significant at the 99 per cent level and two are significant at the 95 per cent level.

For the equation (7), the empirical result indicates that one β_2 coefficient is

[12] A more sophisticated model of this nature can be found in Forsgradh and Hertzen [7, p. 75], which is expressed as follows:

$$\Delta P_{jt} = f(\Delta E_{jt}, \Delta D_{jt}, D_{jt}, \Delta M_t, U_{jt}) ,$$

where

ΔP_{jt}=changes in the stock prices of company j during period t;

ΔE_{jt}=new earnings information about company j that becomes known during period t;

ΔD_{jt}=new dividend information about company j that become known during period t;

D_{jt}=cash dividends per share distributed to stockholders of company j during period t;

ΔM_t=changes in general market condition during period t that will affect the market valuations of all companies; and

U_{jt}=other information about company j that becomes known in period t that will affect the stock price.

found to be significantly different from one at the 95 per cent level and five others at the 90 per cent level. Also, one coefficient of the variable N_n is found to be significant at the 99 per cent level, six at the 95 per cent level, and eight at the 90 per cent level. The joint hypothesis testing further reveals that the null hypothesis is rejected at the 99 per cent level for one stock, and at the 95 per cent level for nine stocks. By examining the standardized beta coefficients, we estimate that one standard deviation variation of the N_n variable could cause, on the average, 8 per cent of one standard deviation variation of the dependent variable. This variable can provide additional information, other than the price of the previous date, for the prediction of the current price. If the data follow the log-normal distribution with finite variance, the findings unmistakenly suggest that the martingale model is invalid at the 95 per cent level for a subset of sixteen stocks.

D. *The Runs Test Analysis*

There may be other patterns of price dependence that could not be detected by parametric tests, for example, "too many" price changes of the same sign might group together. Hence, we introduce a simple type of non-parametric test, i.e., the runs test, into our analysis. A run is defined as a sequence of price changes of the same sign. For example, a plus run is a sequence of consecutive positive price changes preceded and followed by either a negative or a zero price change. For stock prices, there are three different possible types of price changes and three different types of runs.

If it is assumed that the sample proportions of positive, negative, and zero price changes are good estimates of the population, then the hypothesis of independence can be tested by computing the total expected number of runs of all signs of a stock as:

$$E=\left\{N(N+1)-\sum_{i=1}^{3} n_i^2\right\}\Big/N, \tag{8}$$

where N is the total number of price changes and n_i is the number of price changes of each sign. The standard error of the total expected number of runs is:

$$\sigma_E=\frac{\left[\sum_{i=1}^{3} n_i^2\left\{\sum_{i=1}^{3} n_i^2+N(N+1)\right\}-2N\sum_{i=1}^{3} n_i^3-N^3\right]^{1/2}}{\{N^2(N-1)\}^{1/2}}. \tag{9}$$

For a large N, the sampling distribution of E is approximately normal.[13]

For the results of daily runs of the fifty-six stocks, the actual numbers of runs which bear negative sign are thirty and two of them are significantly different from their expected value at the 99 per cent level. In addition, there are four stocks found to be significantly different from their expected value at the 95 per cent level and six stocks at the 90 per cent level. The average of percentage difference between the actual and expected number of daily runs for the fifty-six stocks is -2.09 per cent which is close to the -3.30 per cent reported by Fama [5].

[13] Wallis and Robert [21, pp. 569–72]. The same statistical test was performed by Fama [5, p. 75].

This procedure is extended to a three-day runs analysis. The sixty-four data points are divided into three subpopulations. The first subpopulation comprises the data of the following observations: 1st, 4th, 7th,. . ., 64th, totally twenty-two observations. The second comprises twenty-one observations of the following sequence: 2nd, 5th, 8th,. . ., 62nd, and the third comprises another twenty-one observations of the following sequence: 3rd, 6th, 9th,. . ., 63rd. The simple averages of percentage difference between the actual and expected number of three-day runs of the three subpopulations of the fifty-six stocks are −5.43 per cent, −8.05 per cent, and −9.81 per cent, which are much larger than the corresponding results of Fama [5]. The statistical test represented by equations (8) and (9) is not performed in this case because the sample size is too small. If we take the simple average of the percentage differences of the three subpopulations of every stock, forty-five averages of the fifty-six stocks are found to be negative. There are eight stocks whose actual number of runs are found to be at least 20 per cent less than the expected number of runs, which implies that their price changes tended to follow each other by the same sign.

Conclusion

If we consider a stock as non-random when any one of the following four criteria
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is met: (1) there is at least one SCC to be significant at the 95 per cent level; (2) in the regression analysis, the coefficient is significantly different from its hypothetical value at the 95 per cent level or the coefficients are significantly different from their joint hypothetical values at the 95 per cent level; (3) the actual number of runs is significantly different from the expected number of runs at the 95 per cent level; and (4) the average of the three percentage differences, of the three-day runs, between the actual number of runs and the expected number of runs is larger than 20 per cent, then thirty-two out of the fifty-six stocks are determined as NR, within which nineteen stocks fulfill at least two conditions (see Appendix Table I).

Although it is not the purpose of this paper to provide a detailed explanation to the different behavior of stocks, we attempt to outline several observations with respect to the thirty-three constituent stocks of the accepted Hang Seng Index, twenty-five stocks being included in this study. Thirteen of them are found to be NR. They constituted 52.2 per cent of the total market value of stocks.[14] When we include the other nineteen stocks, they accounted for approximately 65 per cent of the total market value of stocks. Even though the pattern of dependence relationships may vary over time, their presence is sufficient to refute the WEMH because a large subset of stocks behaved inefficiently during a particular period of their recent history. Perhaps this remark is of no surprise to Jao who stated that:

The third feature [of the stock market of Hong Kong] is the lack of breadth in trans-

[14] According to the market value of the stocks on December 31, 1979, these thirteen stocks valued totally H.K.$58.73 billion.

actions. It is said that in normal conditions, only about thirty stocks are reasonably marketable, and only twenty at most are regularly dealt in by institutional investors. . . . The Hong Kong market is also very small by world standards. At mid-1977, its total capitalization was only about HK$70 billion and average daliy turnover only about HK 30 million. Manipulation by big operators is therefore relatively easy. [11, p. 182]

The strongest statement about the nature of NR stocks that can be derived from this study is that the necessary condition for a stock to be non-random is either being (a) a "blue chip" stock or (b) a stock related to the property market. For the latter category, it does not only include those companies engaging directly in the property sector, but also other sectors where large tracks of land or buildings are owned, e.g., hotels, godowns, and industries. One sector of the economy that performs with remarkable efficiency is the public utilities which are regulated by the government. This indicates that the non-random behavior of stock prices, due to the market participants, are not sporadic but very selective.

The results of this study raise a number of problems concerning the Hong Kong stock market which deserve further investigation. Although certain non-random behavior of stocks are highlighted, it is doubtful whether these dependent relationships are constant over time. Therefore, the same analysis could be applied to several time periods, so as to trace the development of patterns of price changes. Attempts can also be made to identify specific phenomena of inefficiency, e.g., the discrepancy between the stock price and its warrant price, the behavior of ex-dividend prices, etc.

From the standpoint of stock price analysis, one can examine the adjustment patterns of the stock market in relation to macro-information, e.g., the government budgetary speech, trade surplus or deficit, expected and actual changes of domestic and foreign interest rates, etc. With respect to micro-information of specific individual firms, one can also investigate the reaction of stock prices to reported information in annual company statements and unreported information from rumours, as well as the possibility of insiders' trading during merger and takeover bids.

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APPENDIX TABLE I

A SUMMARY OF STATISTICAL FINDINGS FOR THE TESTING OF THE "WEAK" FORM OF THE EFFICIENT MARKET HYPOTHESIS OF THE STOCK MARKET OF HONG KONG

Name of Stock	Serial Correlation		Regression			Runs Test		Conclusion (H)
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	
Banking and finance								
(1) Hang Seng Bank	0	0	***	—	—	**	0	NR(2)
(2) H.K. Bank	1	1	I	*	**	I	0	NR(2)
(3) Jardines Sec.	0	0	*	—	—	I	0	R
(4) O. T. Bank	1	2	**	*	**	I	1	NR(2)
Building and real estate								
(1) Anderson Asia	1	0	I	—	—	I	2(a)	NR(1)
(2) Cheung Kong	1	0	I	—	—	I	1	R
(3) Chiap Luen Ent.	2	1	*	I	**	I	1	NR(2)
(4) F. E. Consortium	2	2	I	**	I	I	1	NR(2)
(5) Goodyear	1	0	*	—	—	***	0	NR(1)
(6) Great Eagle	0	1	I	**	I	I	0	NR(2)
(7) Hang Lung Dev.	1	1	I	I	I	I	2(a)	NR(2)
(8) H.K. Land	0	1	I	*	I	**	0	NR(2)
(9) H.K. Realty 'A'	1	0	I	—	—	I	0	R
(10) Hopewell	0	1	*	**	**	I	1	NR(2)
(11) Hsin Chung	0	0	I	—	—	I	2	R
(12) I.H.D.	1	4	I	*	I	I	1	NR(1)
(13) Island Pen.	1	0	I	—	—	I	1	R
(14) H.F.S.K.	1	0	I	—	—	I	0	R
(15) Lee Hing Dev.	0	0	I	—	—	***	0	NR(1)
(16) Maihon	0	1	I	I	I	I	2(a)	NR(2)
(17) Michaelson	0	1	I	**	**	I	0	NR(2)
(18) New World	0	1	*	*	**	*	0	NR(2)
(19) Paul Y.	0	0	I	—	—	I	0	R
(20) R.D.C. 'A'	0	0	I	—	—	I	0	R
(21) Siu On Realty	1	0	I	—	—	I	0	R
(22) Sun Co.	1	0	**	—	—	I	1	NR(1)
(23) Sun Hung Kai Prop.	0	0	I	—	—	I	2(a)	NR(1)
(24) Swire Pac. Prop.	0	0	*	—	—	I	1(a)	NR(1)
(25) Tai Cheung Prop.	2	0	I	—	—	I	1	R
(26) Tai Sang	0	0	I	—	—	**	0	NR(1)
(27) Tai Shing	1	0	I	—	—	I	1	R
(28) Trafalgar Hse.	1	0	I	—	—	I	0	R
(29) Wah Kwong Prop.	0	0	I	—	—	I	2	R
(30) Wing Tai	1	0	I	—	—	I	1	R
(31) W.W. Prop.	0	1	I	*	I	I	2(a)	NR(2)
Hotel and tourism								
(1) Assoc. Hotels	0	1	I	*	I	I	0	NR(1)
(2) F.E. Hotels	0	1	I	*	I	I	2(a)	NR(2)
(3) H.K. Hotels	0	2	I	**	**	I	1(a)	NR(3)
Conglomerate & other commercial enterprise								
(1) Hut. Whampoa	0	2	**	***	***	I	0	NR(2)
(2) Jardines	1	1	I	*	I	I	0	NR(1)

APPENDIX TABLE I (Continued)

Name of Stock	Serial Correlation		Regression			Runs Test		Conclusion (H)
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	
(3) Lap Heng	0	0	I	—	—	I	0	R
(4) Liu Chong Hing	1	0	I	—	—	*	0	R
(5) Swire Pac. 'A'	1	0	*	—	—	**	1	NR(1)
(6) Swire Pac. 'B'	0	0	**	—	—	I	1	NR(1)
(7) Wheelock 'A'	0	0	*	—	—	I	1	R
Manufacturing								
(1) G.I. Cement	0	1	I	***	***	*	1	NR(2)
(2) Stelux	0	1	I	I	I	I	0	NR(1)
(3) Winsor	0	1	*	I	**	I	0	NR(2)
Public utility								
(1) China Light	1	0	I	—	—	I	1	R
(2) H.K. Electric	1	0	*	—	—	I	0	R
(3) H.K. Gas	0	0	I	—	—	*	1	R
(4) H.K. Telephone	1	0	I	—	—	I	2	R
(5) H.K. Yau	0	0	I	—	—	*	0	R
(6) K.M. Bus	0	0	*	—	—	I	0	R
Shipping and godown								
(1) H.K. & K. Wharf	2	1	I	**	I	*	0	NR(2)
(2) Wah Kwong Shipping	0	0	I	—	—	I	2	R

Note:
(A)=Number of serial correlation coefficients significant at the 90 per cent level.
(B)=Number of serial correlation coefficients significant at the 95 per cent level.
(C)=The statistical condition of the coefficient α_2 of equation (6) or β_2 of equation (7): "—" indicates that the regression was not performed; I indicates that the coefficient is not significant; *, **, and *** indicate that the coefficients are significant at the 90 per cent, 95 per cent, and 99 per cent, respectively.
(D)=The statistical condition of the coefficient β_3 of equation (7), the other notations are the same as (C).
(E)=The statistical condition of the joint hypothesis testing of equation (7), the other notations are the same as (C).
(F)=The statistical condition of the standard normal value of the actual number of daily runs, the other notations are the same as (C).
(G)=The number of the percentage differences, which are larger than 20 per cent in absolute size, between the actual and expected number of three-day runs, a symbol of (a) is added if the average of the percentage differences of the three subsamples is larger than 20 per cent in absolute size.
(H)=NR stands for non-random and R stands for random; figures within parentheses indicate the number of non-random criteria fulfilled.