Can the Forecasts Generated from E/P Ratio and Bond Yield be Used to Beat Stock Markets?*

Wing-Keung Wong
National University of Singapore, Singapore

Boon-Kiat Chew
Independent Economic Analysis (Holdings) Limited

Douglas Sikorski
National University of Singapore, Singapore

This study tests the performance of stock market forecasts derived from technical analysis by means of a specific indicator. The indicator is computed from *E/P* ratios and bond yields. Several stock markets are studied over a 20-year period. Two test statistics are introduced to utilize the indicator. The results show that the forecasts generated from the indicator would enable investors to escape most of the crashes and catch most of the bull runs. The trading signals provided by the indicator can generate profits that are significantly better than the buy-and-hold strategy (JEL G14, G10).

Keywords: bond yield, *E/P* ratio, interest rate, standardized yield differential, yield differential

I. Introduction

One of the earliest recorded uses of technical analysis was by Japanese rice traders in the 1700s. In the West, technical analysis started with the

*The authors are grateful to Professor Peter Theodossiou and the three referees for their valuable comments that have significantly improved this manuscript. The first author would like to thank Professors Robert Miller and Howard Thompson of the University of Wisconsin-Madison, USA for their continuous guidance and encouragement.

(*Multinational Finance Journal*, 2001, vol. 5, no. 1, pp. 41–69)

DOI: 10.17578/3-4-2

Dow Theory and has evolved to take on many forms since the 1900s. The fundamental principle of technical analysis is to identify and exploit market trends. This implicitly assumes that there is an uneven distribution of information, that 'smart money' acts on information before it becomes public, and publicly available information like the price and volume will thus be affected. It is by applying technical analysis on such publicly available information that practitioners of technical analysis hope to follow the lead of 'smart money' and in so doing earn profits. This is consistent with the idea of costly information addressed by Grossman and Stiglitz (1976) and Grossman (1976).

In fact, practitioners' reliance on technical analysis is well documented. Allen and Taylor (1989) show that for short horizons, about 90% of chief dealers use inputs from technical analysis to form expectations about price movements. Carter and Van Auken (1990) find that among investment managers, technical analysis is the second highest rated investment evaluation method. Frankel and Froot (1990) find that market professionals tend to include technical analysis when making market forecasts.

The popularity of technical analysis may stem from the notion that there is a tendency towards herding in the market, since a major use of technical analysis is for spotting and riding trends. DeLong, et al. (1990) develop the argument that rational investors may go along with the market herding behavior so as to achieve greater returns for themselves. Froot, et al. (1992) determines that this herding tendency is particularly noticeable for short-term traders. This could be why previous studies report positive autocorrelations for weekly returns, e.g. Lo and MacKinlay (1990) as well as Conrad and Kaul (1988).

On the other hand, many academics have long questioned the usefulness of such techniques, arguing that market efficiency leaves no room for technical analysis, which is based primarily on historical prices; e.g. Fama and Blume (1966), Jensen and Bennington (1970). In an efficient market, current prices reflect all publicly available information, and so historical prices convey nothing about future price movements. Also, efficient markets will discount the value of any recognized predictive tools because traders take advantage of them, and so even the best technical analysis may not be consistently reliable.

Nevertheless, many studies still stress the importance and usefulness of technical analysis to achieve an advantage in market timing. DeBondt,

et al. (1985) find extreme loser stocks over a 3-5 year period tend to have strong returns relative to the market during the following years and vice-versa. Fama and French (1988) find that autocorrelation of returns becomes strongly negative for a 3-5 year horizon.

Sy (1990) demonstrates that market timing is increasingly rewarding when the difference in returns between cash and stocks is narrowed and when market volatility increases. Sweeney (1986) finds that small filters are profitable, after taking into account the interest expense, interest income and transaction costs. Muradoglu and Unal (1994) find that stock prices in the Turkish stock market are forecastable based on past price performance. Levich and Thomas (1993) find that simple technical trading rules often lead to excess profits. Finally, an important recent article by Lo et al. (2000) examines the prevalence of various technical patterns in American share prices during 1962-96 and finds the patterns to be unusually recurrent. The study does not prove that the patterns are predictable enough to make sufficient profit to justify the risk, but the authors conclude that this is likely.[1]

Other studies have shown that some fundamental data like price-earnings ratios, dividend yields, business conditions and economic variables can predict to a large degree the returns on stocks, e.g. Campbell (1987), Breen et al. (1990) and Cochrane (1991). These studies conclude that traditional technical analysis could be combined with some economic or fundamental variables to produce some useful indicators. Wong (1993, 1994) introduced one such indicator, called the Standardized Yield Differential (*SYD*). It is based on the difference between the *E/P* ratio and the bond yield or the interbank interest rate. Ariff and Wong (1996) apply linear regression techniques to analyze the usefulness of the *SYD,* and find that there is a significant relationship between the *SYD* and share prices.

The present article extends Wong's (1993) work to study the predictive power of *SYD* to stock markets in two developed countries and one developing country. The finding is that applying the indicator enables investors to escape from most of the major crashes and catch most of the major bull runs in these countries. Two parametric test statistics are introduced to measure the performance of the *SYD*

1. The Lo study is cited in 'Economics focus: Using charts to predict share prices,' *The Economist*, 19 August 2000, p 78.

approach, and there is significant evidence that the trading signals provided by the indicator can generate significant profits. Also, the performance of the indicator is significantly better than the performance of the buy-and-hold strategy.

The article is summarized as follows: section II below introduces the *SYD* indicator and discusses different scenarios for the market. Data, the hypotheses and the testing method are discussed in section III while section IV reveals the findings of applying Wong's *SYD* in monitoring the performance of the three stock markets. This article ends with a discussion in section V of the usefulness and reliability of Wong's *SYD* model as a stock market index anticipator.

II. The Standardized Yield Differential (*SYD*) Indicator

Wong (1993, 1994) introduces a monthly indicator, the Standardized Yield Differential (*SYD*), which includes the *E/P* Ratio and the bond yield (*BY*) or interest rate. Note that the *E/P* ratio is the reciprocal of the *P/E* ratio.

This article examines the performance of applying Wong's *SYD* to the United States and Germany by using the ten-year treasury yield as the bond yield; and for Singapore using the three-month interbank rate since treasury yield figures are not available. The *E/P* ratio, EP_t at time *t* is a measure of market response to the earnings of all the firms in each stock market, calculated using the formula:

$$EP_t = \frac{E_t}{P_t} = \frac{\sum_{i=1}^{N} w_{i,t} E_{i,t}}{\sum_{i=1}^{N} w_{i,t} P_{i,t}}, \qquad (1)$$

where $E_{i,t}$ is the average earning per share for stock *i* at time *t*, $P_{i,t}$ is the average stock price for stock *i* at time *t*, $w_{i,t}$ is the weight of the stock *i* in the corresponding index, and *N* is the number of stocks in the stock market index used.[2]

2. Note that the *E/P* ratio (= E_t / P_t) at time *t* is different from the earning yield (=

The monthly yield differential, YD_t, at time t is defined as:

$$YD_t = EP_t - BY_t \,, \tag{2}$$

where EP_t is defined in (1) and BY_t is the bond yield or interest rate at time t. The standardized yield differential at time t over k months, $SYD_{t,k}$ is calculated as:

$$SYD_{t,k} = \frac{YD_t - \overline{YD}_{t,k}}{SD\left(YD_{t,k}\right)}, \tag{3}$$

where $\overline{YD}_{t,k}$ and the standard deviation $SD(YD_{t,k})$ are defined as:

$$\overline{YD}_{t,k} = \frac{\sum_{i=t-k+1}^{t} YD_i}{k},$$

and

$$SD\left(YD_{t,k}\right) = \sqrt{\frac{\sum_{i=t-k+1}^{t}\left(YD_i - \overline{YD}_{t,k}\right)^2}{k-1}}\,.$$

For simplicity, the subscript k is dropped in subsequent sections. The value of k should be from 24 to 36 months as this will capture reasonably long periods to compute *SYD*. However, an investor who believes the bull market has been going too long (like Japan in 1989) may want to take a longer period, say 60 months, to capture the long run effect. The moving average technique is common in time series analysis and in technical analysis. $SYD_{t,k}$ is a standardized measure of a moving average.

Large values of SYD_t mean that (1) yield differential, *YD*, is large relative to the mean monthly differential $\overline{YD}_{t,k}$ and (2) the yield from equity is relatively higher than the yield from bonds.

E_t+1/P_t) at time *t*. The former does not include the market anticipation of earnings growth while the latter does; see Brealey and Myers (1991) for reference. However, this study chooses to use the former *E/P* ratio to measure the actual earning from equity based on publicly available information. E_t+1/P_t data is actually not available to chartists so is not utilized for technical analysis here. The former ratio is commonly used to measure the earning of an enterprise relative to equity price and serves our purposes.

In itself, the SYD_t does not explicitly signal a trend for the stock market, or predict what the economy will be like in the future. How the SYD_t indicator is applied and interpreted in the stock market depends largely on the decision of the investors under different market conditions. Below, two possible scenarios in how to use the SYD_t indicator are discussed.

Scenario A:

Large positive values of SYD_t are possible provided the current yield differential, YD_t, is large relative to the mean monthly differential $\overline{YD}_{t,k}$. This situation may be due to a stock market correction, an increase in corporate profit, or a fall in bond/cash yield. These conditions occur during bullish periods for equities. In this respect, large positive values for SYD_t indicate that stock prices are likely to rise in the near future and hence it pays to invest in stocks. On the other hand, large negative SYD_t values indicate that the stock prices are likely to fall in the near future. The present study tests the performance of SYD_t based on this interpretation.

Scenario B:

Bull runs could be fueled by expectations of better economic prospects, which are reflected in a declining E/P ratio until the higher earnings are reported. A high E/P ratio may be indicative of poor economic prospects or a lack of confidence in the future earnings of an enterprise. Thus, a large positive SYD_t value indicates that stock prices are likely to fall in the future; and a large negative SYD_t indicates that stock prices are likely to rise in the future.

Market analysts can apply the SYD_t in different ways. As the market is a combination of many varied scenarios, one should be able to obtain better results through applying the SYD_t if one is able to clearly distinguish Scenario A, Scenario B, and the other scenarios in the market. However, for Scenario B, a wider range of economic variables is required before the SYD_t can be put to test. In this article, a simplistic approach is adopted without involving other economic variables except for the *E/P* ratios, bond yields and the interest rates, and the

performance of the SYD_t is examined only for Scenario A. If SYD_t were found to be useful for Scenario A, it should also be useful for the market in general.[3]

III. Data, Test Method and Hypotheses

The data collected are month-end stock index values, risk-free yields on 10-year Treasuries (three-month interbank rates for the Singapore market), and the *E/P* ratio in each of the three markets, namely the United States, Germany and Singapore. The period tested is from January 1975 to December 1994. The set of data covers as far back as three years before the test period, but testing has to begin from 1975 in view of the need to compute the initial *SYD* base figure using the first three years' data.

Stock indices are available from the Center for Research in Security Prices (CRSP) at the University of Chicago. The data on *E/P* ratios and the Singapore three-month interbank rates are collected from Morgan Stanley Capital International publications, while the bond yields on 10-year Treasury bonds are obtained from the Chicago Federal Reserve Board. From these two sets of yield data, a time series of standardized yield differential, SYD_t is calculated according to equation 3. Monthly return (r_t) is calculated from the monthly close of the stock index as the log-return.

In order to utilize the SYD_t indicator, assume that investors will buy (sell) when the SYD_t indicates a buy (sell) signal, say at time t and sell (buy) when the SYD_t indicates a sell (buy) signal, say at time $t + n_t$. Then the aggregate return S_{t,n_t} will be:

$$S_{t,n_t} = \sum_{i=1}^{n_t} r_{t+i} \ . \tag{4}$$

3. It may seem inappropriate to construct an indicator from an aggregation of *E/P* ratio and bond yield because earnings are an accounting figure which varies depending on accounting conventions while bond yield is market-determined. However, both *EY* and *BY* are actually market-determined since *E/P* reflects the market response to earnings however measured. Furthermore, there are indeed some relationships among stock prices, *E/P* ratio and bond yield. For example, Wong (2001) found that the logs of stock index, *E/P* ratio and bond yield are cointegrated for most bull runs.

For simplicity, S_{t,n_t} is denoted as S_t. The size of n_t depends on the buy and sell signals. For example, in table 2A, the smallest size for n_t is 1 (month) and the largest size is 29 (months).

To check whether the *SYD* is (significantly) useful is equivalent to checking whether S_t is (significantly) greater than zero in a long position and is (significantly) less than zero in a short position. Assuming r_t is distributed as $N\left(\mu_t, \sigma_t^2\right)$, letting $\operatorname{cov}\left(r_t, r_s\right) = \sigma_{t,s}$ with estimate $\hat{\sigma}_{t,s}$ and letting $\mu_{s_t} = \sum_{i=1}^{m} \mu_{t+1}$, then the test statistic

$$T_t = \frac{s_t}{\sqrt{\sum_{i=1}^{n_t}\sum_{j=1}^{n_t} \hat{\sigma}_{t+i,t+j}}},$$

will be approximately distributed as $N(0,1)$ if μ_{S_t} is 0. Testing the hypothesis H_0: $\mu_{S_t} = 0$ against H_1: $\mu_{S_t} > 0$ is to test whether the return is profitable and testing the hypothesis H_0: $\mu_{S_t} = n_r \times \mu_r$ against H_1: $\mu_{S_t} > n_r \times \mu_r$ is to test whether the *SYD* approach is better than the buy-and-hold strategy where r is the market return for the entire period with mean μ_r.

If n_t is large, it is not necessary to impose the normality assumption on r_t as T_t will still approach the standard normal distribution by virtue of the law of large numbers. Moreover, it is well-known that r_t is not iid (independent and identical distributed) as normal, for example, see Fama (1965), Fama and French (1988) for the violation of the normality assumption and see Lo and MacKinlay (1990) and Conrad and Kaul (1988) for the violation of the independence assumption. In conclusion, the profit generated by using the *SYD* is significantly greater than zero if

$$\begin{cases} T_t > z_\alpha & \text{in a long position} \\ T_t > -z_\alpha & \text{in a short position} \end{cases},$$

where z_α is the value such that $\alpha = p(Z > z_\alpha)$ and Z follows a standardized Normal distribution.

To check whether the *SYD* approach (significantly) outperforms the buy-and-hold strategy, it is necessary to test whether the return from applying the *SYD* is (significantly) greater than the return from using the buy-and-hold strategy. First assume that $\overline{S}_t$ is independent of $\overline{r}$ without loss of generality and apply the following test statistic:

$$T_t' = \frac{\overline{S}_t - \overline{r}}{\sqrt{\sum_{i=1}^{n_t}\sum_{j=1}^{n_t} \hat{\sigma}_{t+i,t+j} \Big/ n_r + \hat{\sigma}_r^2 \Big/ N}}, \tag{6}$$

where $\overline{S}_t = S_t / n_t$, r and $\hat{\sigma}_r$ are the sample mean and the sample standard deviation respectively of the return r derived by using the entire period. N is the number of observations in the entire period. The $\overline{r}$ is approximately equal to the actual mean return μ_r with very small standard deviation due to very large N. T'_t is approximately distributed as $N(0, 1)$ when the return from *SYD* is the same as the return from the buy-and-hold strategy.

Using the *SYD* approach is significantly better than using the buy-and-hold strategy if

$$\begin{cases} T_t > z_\alpha & \text{in a long position} \\ T_t > -z_\alpha & \text{in a short position} \end{cases}.$$

The test statistics in (5) and (6) take into consideration that r_t may be autocorrelated.

If r_t is not autocorrelated, (5) and (6) can be simplified. To check for autocorrelation, the sample autocorrelation function for the return r_t for each market should be significantly different from zero. If the return r_t is not autocorrelated, the sample autocorrelation function $\hat{\rho}_k$ of r_t will be distributed as $N(0,1/n)$, see Box and Jenkins (1976). Hence, to test the hypothesis H_0: $\rho_k = 0$ against H_1: $\rho_k \neq 0$, the p-value of the test

$z = \hat{\rho}_k \Big/ \sqrt{1/n}$ is calculated for each k from 1 to 24 and the p-value of Ljung-Box-Pierce Q-statistic for k = 6, 12, 18 and 24. The results are shown in tables 1A-1C. Note that the sample means for r_t are .00762, .0069 and .0112 and the sample standard deviations for r_t are .0446, .0503 and .0736 respectively for the U.S., German and Singapore stock markets

The results from the above tables verify the hypothesis that the return is not autocorrelated and hence the statistics in (5) and (6) can be simplified to:

$$T_t = \frac{\overline{S}_t}{\hat{\sigma}_r \sqrt{1/n_t}}, \tag{7}$$

and

$$T_t' = \frac{\overline{S}_t - \overline{r}}{\hat{\sigma}_r \sqrt{1/n_t + 1/N}}, \tag{8}$$

respectively where n_t is defined in (4) and $\hat{\sigma}_r$ and N are defined in (6). For simplicity T will be used in place of T_{t_t} and T'in place of T'_t in the next section.[4]

Recall that in this study the *SYD* is only applied under Scenario A, which assumes that a large positive value of *SYD* would be followed by upward price movement in the future, while large negative values would be followed by downward price movement in the future. Under this scenario, one may vary the values of *SYD* as market entry/exit points, or use it in different ways just like the other indicators. For example, one may buy when *SYD* reaches 2 from the south while another may buy when *SYD* reaches 2 from the north. To illustrate, the performance is analyzed by setting this rule: Categorical values greater than +2 (less than –2) indicate strong buy (sell) signals while values between 0 and 2 (between –2 and 0) indicate weak buy (sell) signals. Investors will buy when *SYD* reaches the predetermined value from the south and sell

4. Refer to Chew (1997) for the situation in which the transaction costs are included. The holding period in applying *SYD* is usually long enough so that the transaction costs become negligible. Chew (1997) finds that the results including transaction costs are about the same as that without the transaction costs.

when *SYD* reaches the predetermined value from the north. If *SYD* works well under such a rule, it should be useful for the market if investors are able to apply it with different categorical values to determine entry/exit points.

For Scenario A, the *SYD* values of greater than +1/+2 indicate a strong buy signal, while *SYD* values of less than –1/–2 show strong sell signals (refer to the discussion and the charts in the next section). It is not necessary to impose the assumption of normality of the indicator *SYD*, but just use the concept of normality to select the pre-determined entry or exit point, e.g. knowing that $P(Z \geq 0) = .5$, $P(Z \geq 1) \approx .16$ and $P(Z \geq 2) \approx .025$. Hence, 0, $\pm$ 1 and $\pm$ 2 are used as predetermined values in the study.

For simplicity, only three sets of buy and sell points are tested (Strategies A to C). The first strategy, i.e. Strategy A, is to buy when the *SYD* reaches zero from the south and sell when it reaches zero from the north. The second strategy, i.e. Strategy B, with the distance between the points at 1 unit, is to buy when the *SYD* reaches zero from the south and sell when it reaches –1 from the north. Finally, the third Strategy C, where the distance between the points is at 2 units, is to buy/sell when *SYD* reaches 1/–1 in a similar way. The sets of trading rules are summarized as follows:

Strategy	Buy Point	Sell Point	Distance Between Points
A	0	0	0
B	0	–1	1
C	1	–1	2

IV. The Findings

To better illustrate the findings from the strategies discussed in the previous section, the 2-year (24-month) *SYD* and the stock indices (DJIA, DAX and STII) are plotted for the U.S., German and Singapore markets in figures 1, 2 and 3 respectively.

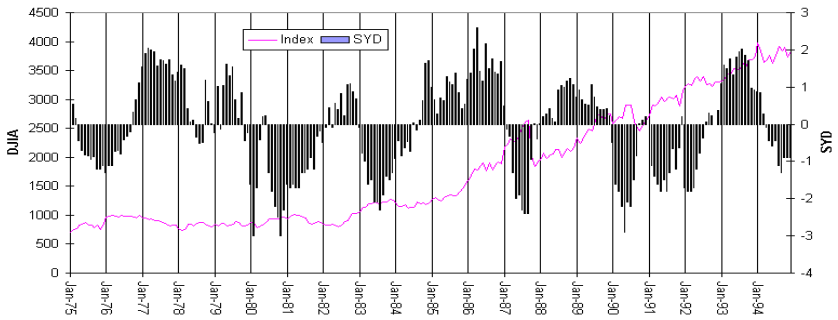

FIGURE 1.—United States and 2-year *SYD*

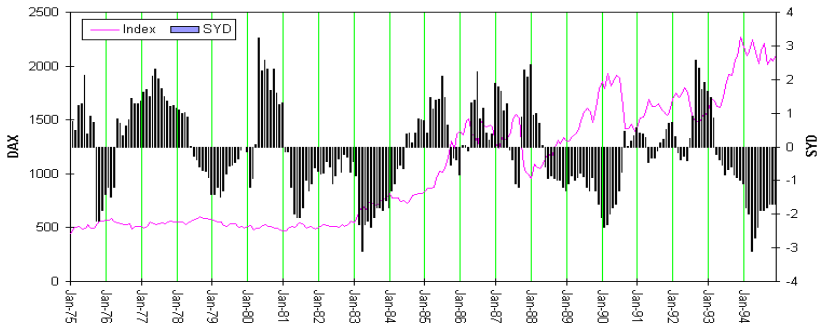

FIGURE 2.— Germany and 2-year *SYD*

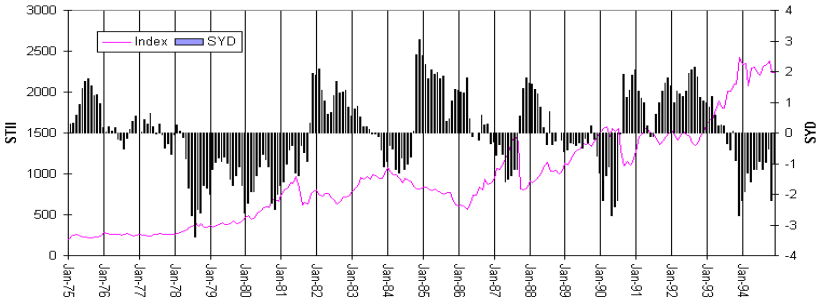

FIGURE 3.— Singapore and 2-year *SYD*

In figure 1 (for the U.S. market), using *SYD* = –1 (i.e. *SYD* reaches the value –1 from the north) or *SYD* = –2 (i.e. *SYD* reaches the value –2 from the north) as the sell strategy enables the investor to escape the stock market crashes of 1987 and 1990. In addition, better returns can be obtained by adopting *SYD* = –2 as the sell strategy. When *SYD* = 0 (i.e. *SYD* reaches 0 from the south) is adopted as the buy strategy, investors are able to ride on the bull runs between 1984 and 1988. The tools for technical analysis employed here undoubtedly bring better returns for the investors.

In figure 2 (for the German market), using *SYD* = –1 as the sell strategy enables the investor to escape from the stock market crash in 1987. On the other hand, using *SYD* = –2 as the sell strategy not only results in better returns but also in the avoidance of the stock market crash in 1990. And if *SYD* = 0 is adopted as the buy strategy, investors are able to ride on the bull runs during the periods 1984-1986 and 1990-1994. Also, using *SYD* = 1 as the buy strategy results in better returns in the 1988-1990 bull market.

In figure 3 (Singapore market), using any value of *SYD* between –1 and –2 as the sell strategy helps investors escape from the stock market crash in 1987. By waiting until the *SYD* rebounds from the bottombefore taking further action, better returns can be achieved. Similarly, using any value of *SYD* between –1 and –2 as the sell strategy results in the avoidance of the stock market crash in 1990. In addition, using *SYD* $\geq$ 1 as buying strategy and *SYD* = –2 as sell strategy enables the bull runs in 1988-1990 and 1990-1994 to be captured completely.

From figures 1 to 3, it is clear that an investor needs to set different values for *SYD* at different times to optimize the returns from the stock market. Investors may buy when *SYD* reaches a predetermined value, or wait until it drops from the peak to a predetermined value, as they thinks acceptable.

Hence, there is no hard-and-fast rule for investors to set the *SYD* values. While it is evident that the above *SYD* approach does produce convincing and impressive results, *SYD* cannot be used as a foolproof tool for predicting the stock market movement. This can be seen from figure 1, where incorrect sell signals occurred between 1991 & 1992. There are also incorrect sell signals between 1981 & 1983 in figure 2; and between 1978 & 1980 in figure 3. Nevertheless, so far nearly all the buy signals are correct. This could be attributed to the fact that the

testing period under this study is, on the whole, a bull market.

The occurrence of incorrect signals could be attributed to the fact that only Scenario A is considered. Clearly, *SYD* should be a more effective tool to predict stock market movement if one could distinguish Scenario A from Scenario B and other scenarios.

For simplicity, only the effect of applying 2-year (24-month), 2½-year (30-month) and 3-year (36-month) *SYD* to the U.S., German and Singapore markets were studied, and only the following results reported:

(i) significant and insignificant trades arising from the use of 2-year *SYD* and Strategy A for the U.S. markets, as shown in table 2A;
(ii) significant trades arising from the use of 2-year *SYD* and Strategies B & C for the U.S. markets, as shown in table 2B;
(iii) significant trades arising from the use of 2-year *SYD* and Strategies A, B & C for the German and Singapore markets, as shown in tables 3 and 4 respectively.

Refer to Chew (1997) for the detailed report. These tables contain information about entry date, entry price, entry *SYD* value, exit date, exit price, exit *SYD* value, total months of holding between entry and exit, aggregate return *S* for the trading, *T* and *T'*. Where *S* is defined in equation 4, *T* is the value of the test statistic in (7) while *T'* is the value of the test statistic in (8). '***','**'and'*'are used to denote statistics which are significant at the 1%, 5% and 10% levels of significance respectively and the statistics are the right sign, and'###','##'and'#'are used to denote statistics which are significant at the 1%, 5% and 10% levels of significance respectively but the wrong sign.

Table 2A tabulates the results arising from the use of 2-year *SYD* and Strategy A for the U.S. market. The following details are obtained from the table:

(i) There are 31 trades. Among them, 15 are long and 16 are short.
  (a) Of the 15 long trades, 13 show the correct sign for statistic *T* whereas out of the 16 short, 8 show the correct sign for *T*.
  (b) Of the 15 long trades, 10 show the correct sign for statistic *T'* whereas of the 16 short trades, 14 show the correct sign for *T'*.

TABLE 2. Using the 2- year *SYD* and Strategies A, B, and C for the U.S. Market

Position	Entry Date	Entry Price	Entry *SYD*	Exit Date	Exit Price	Exit *SYD*	Months	aqq ret.	*T*	*T'*
A. Use Strategy A										
Short	Apr-75	831.0	–.45	Oct-76	966.1	.32	18	.15	.80	.07
Long	Oct-76	966.1	.32	Jul-78	860.7	–.34	21	–.12	–.57	–1.29#
Short	Jul-78	860.7	–.34	Oct-78	827.8	1.19	3	–.04	–.50	–.80
Long	Oct-78	827.8	1.19	Jan-79	840.9	–.23	3	.02	.20	–.09
Short	Jan-79	840.9	–.23	Feb-79	815.8	1.02	1	–.03	–.68	–.85
Long	Feb-79	815.8	1.02	Mar-79	855.3	–.14	1	.05	1.06	.89
Short	Mar-79	855.3	–.14	Apr-79	855.5	1.04	1	.00	.01	–.17
Long	Apr-79	855.5	1.04	Nov-79	819.6	–.43	7	–.04	–.36	–.80
Short	Nov-79	819.6	–.43	May-80	847.4	.20	6	.03	.31	–.11
Long	May-80	847.4	.20	Jul-80	931.5	–1.30	2	.09	1.50*	1.25
Short	Jul-80	931.5	–1.30	Mar-82	833.2	.45	20	–.11	–.56	–1.27
Long	Mar-82	833.2	.45	Apr-82	849.0	–.08	1	.02	.42	.25
Short	Apr-82	849.0	–.08	May-82	815.0	.56	1	–.04	–.92	–1.08
Long	May-82	815.0	.56	Jan-83	1060.0	–.07	8	.26	2.08**	1.57*
Short	Jan-83	1060.0	–.07	Jul-84	1135.0	.04	18	.07	.36	–.35
Long	Jul-84	1135.0	.04	Aug-84	1224.0	–.15	1	.08	1.69**	1.52*
Short	Aug-84	1224.0	–.15	Sep-84	1199.0	.11	1	–.02	–.46	–.63
Long	Sep-84	1199.0	.11	Feb-87	2220.0	–.13	29	.62	2.56***	1.55*
Short	Feb-87	2220.0	–.13	Nov-87	1842.0	.02	9	–.19	–1.40*	–1.87**
Long	Nov-87	1842.0	.02	Dec-87	1939.0	–.40	1	.05	1.15	.98

TABLE 2. (Continued)

Short	Dec-87	1939.0	–.40	Jan-88	1945.0	.01	1	.00	.07	–.10
Long	Jan-88	1945.0	.01	Jan-90	2586.0	–.48	24	.28	1.30*	.44
Short	Jan-90	2586.0	–.48	Oct-90	2455.0	.02	9	–.05	–.39	–.88
Long	Oct-90	2455.0	.02	Jan-91	2731.0	–.01	3	.11	1.38*	1.08
Short	Jan-91	2731.0	–.01	Dec-91	3170.0	.21	11	.15	1.01	.43
Long	Dec-91	3170.0	.21	Jan-92	3223.0	–1.70	1	.02	.37	.20
Short	Jan-92	3223.0	–1.70	Aug-92	3257.0	.06	7	.01	.09	–.36
Long	Aug-92	3257.0	.06	Nov-92	3305.0	–.02	3	.01	.19	–.11
Short	Nov-92	3305.0	–.02	Dec-92	3301.0	.38	1	.00	–.03	–.20
Long	Dec-92	3301.0	.38	Apr-94	3682.0	–.09	16	.11	.61	–.07
Short	Apr-94	3682.0	–.09	Nov-94	3739.0	.00	7	.02	.13	–.32
B. Use Strategy B										
Long	Oct-76	966.1	.32	Jan-80	881.5	–1.60	39	–.09	–.33	–1.29#
Long	May-80	847.4	.20	Jul-80	931.5	–1.30	2	.09	1.50*	1.25
Long	Mar-82	833.2	.45	Mar-83	1130.0	–1.00	12	.30	1.97**	1.35*
Long	Jul-84	1135.0	.04	Apr-87	2280.0	–1.30	33	.70	2.72***	1.63*
Short	Apr-87	2280.0	–1.30	Nov-87	1842.0	0.02	7	–.21	–1.81**	–2.23**
Long	Nov-87	1842.0	.02	Feb-90	2636.0	–1.60	27	.36	1.55*	.62
Long	Oct-90	2455.0	.02	Feb-91	2910.0	–1.10	4	.17	1.91**	1.55*

TABLE 2. (Continued)

C. Use Strategy C										
Long	Dec-76	999.8	1.12	Jan-80	881.5	–1.60	37	–.13	–.46	–1.40#
Long	Sep-82	907.7	1.07	Mar-83	1130.0	–1.00	6	.22	2.01**	1.57*
Long	Nov-84	1182.0	1.65	Apr-87	2280.0	–1.30	29	.66	2.74***	1.71**
Short	Apr-87	2280.0	–1.30	Aug-88	2002.0	1.05	16	–.13	–.73	–1.37*
Long	Aug-88	2002.0	1.05	Feb-90	2636.0	–1.60	18	.28	1.45*	.70

TABLE 3. Using the 2- year SYD and Strategies A, B, and C for the German Market

Position	Entry Date	Entry Price	Entry SYD	Exit Date	Exit Price	Exit SYD	Months	aqq ret.	*T*	*T'*
Use Strategy A										
Short	Feb-81	473.7	–.14	Jul-84	729.4	.37	41	.43	1.34#	.43
Long	Jul-84	729.4	.37	Oct-85	1301.0	–.55	15	.58	2.97***	2.37***
Long	Feb-86	1361.0	.05	Apr-86	1507.0	–.13	2	.10	1.43*	1.23
Short	Apr-86	1507.0	–.13	May-86	1369.0	1.30	1	–.10	–1.91**	–-2.04**
Short	Jun-87	1383.0	–.09	Oct-87	1164.0	.88	4	–.17	–1.71**	–1.97**
Use Strategy B										
Long	Jul-84	729.4	.37	Aug-87	1548.0	–1.10	37	.75	2.46***	1.51*
Short	Aug-87	1548.0	–1.10	Oct-87	1164.0	.88	2	–.29	–4.01***	–4.18***
Long	Sep-90	1421.0	.47	Dec-93	2268.0	–1.00	39	.47	1.49*	0.59
Use Strategy C										
Short	Apr-81	510.4	–1.20	Mar-85	865.0	1.46	47	.53	1.53#	.54
Long	Mar-85	865.0	1.46	Aug-87	1548.0	1.10	29	.58	2.15**	1.33*
Short	Aug-87	1548.0	–1.10	Nov-87	1030.0	2.28	3	–.41	–4.68***	–4.88***
Long	Nov-87	1030.0	2.28	Oct-88	1311.0	–1.00	11	.24	1.45*	.97
Long	Sep-92	1484.0	2.57	Dec-93	2268.0	–1.00	15	.42	2.18**	1.60*

TABLE 4. Using the 2- year SYD and Strategies A, B, and C for the Singapore Market

Position	Entry Date	Entry Price	Entry SYD	Exit Date	Exit Price	Exit SYD	Months	aqq ret.	*T*	*T'*
Use Strategy A										
Short	Apr-78	304.5	–.15	Nov-81	758.7	.31	43	.91	1.89##	.82
Long	Jul-86	741.9	.01	Aug-86	838.5	–.23	1	.12	1.66**	1.51*
Long	Oct-87	818.6	.56	Jul-88	1143.0	–.38	9	.33	1.51*	1.04
Short	Jul-88	1143.0	–.38	Aug-88	1037.0	.71	1	–.10	-1.32*	–1.47*
Short	Nov-89	1411.0	–.21	Sep-90	1099.0	1.90	10	–.25	-1.07	–1.52*
Long	Sep-90	1099.0	1.90	Jun-91	1490.0	–.13	9	.30	1.38*	.91
Use Strategy B										
Short	Jun-78	348.2	–1.80	Nov-81	758.7	.31	41	.78	1.65##	.63
Short	May-87	1220.0	–1.60	Oct-87	818.6	.56	5	–.40	-2.42***	–2.74***
Long	Oct-87	818.6	.56	Jan-90	1515.0	–1.30	27	.62	1.61*	.78
Short	Jan-90	1515.0	–1.30	Sep-90	1099.0	1.90	8	–.32	-1.54*	–1.94**
Long	Sep-90	1099.0	1.90	Dec-93	2426.0	–2.70	39	.79	1.72**	.72
Use Strategy C										
Short	Jun-78	348.2	–1.80	Dec-81	780.8	1.93	42	.81	1.69##	.65
Short	Dec-83	1002.0	–1.10	Nov-84	817.6	2.56	11	–.20	-0.83	–1.31*
Short	May-87	1220.0	–1.60	Nov-87	800.0	1.44	6	–.42	-2.34***	–2.68***
Long	Nov-87	800.0	1.44	Jan-90	1515.0	–1.30	26	.64	1.70**	.88
Short	Jan-90	1515.0	–1.30	Sep-90	1099.0	1.90	8	–.32	-1.54*	–1.94**
Long	Sep-90	1099.0	1.90	Dec-93	2426.0	–2.70	39	.79	1.72**	.72

(ii) There are 6 significant and correctly-signed long trades, 1 at the 1% level, 2 at the 5% level and the other 3 at the 10% level for *T*.
(iii) There is 1 correctly signed short trade that is significant at the 10% level for *T*.
(iv) There are 3 long trades with correct signs, all are significant at the 10% level for *T'*.
(v) There is 1 short trade with correct sign, significant at the 5% level for *T'*.
(vi) There is only 1 long trade with incorrect sign, significant at the 10% level for *T'*.
(vii) There is no significantly incorrectly signed trade for *T*.

From (1a), (2), (3) and (7), it can be concluded that applying the *SYD* can result in significantly better returns than holding cash. Chew (1997) had studied the situation with the inclusion of interest earned and drew the same conclusion. Hence, the interest earned while holding cash was not considered. From (1b), (4), (5) and (6), it can be concluded that applying the *SYD* is significantly better than using the buy-and-hold strategy.

The same conclusion can be drawn from tables 2B to 4. Similarly, the hypotheses can be tested by using the 2½-year *SYD*, the 3-year *SYD* or *SYD*s of other periods. In this article, the results are presented for the 2-year, 2½-year and 3-year *SYD*. To be concise, the details of applying the 2½-year *SYD* and the 3-year *SYD* are omitted, with only a summary of the results provided here. Refer to Chew (1997) for further details.

Table 5 tabulates the proportion of points with the correct sign. The results show that there are much more trades with the correct sign than with incorrect sign for both long and short positions as well as for both *T* and *T'*. Using selected results from table 5 as an example; looking at the statistics *T* for long positions in the U.S. market, there are 15, 8 and 5 trades generated by the *SYD* for Strategies A, B and C respectively using the 2-Year *SYD*. Among these, there are 13, 7 and 4 correct trades respectively. Note that there are 2 (15–13), 1 (8–7) and 1 (5–4) incorrect trades generated by the *SYD* for Strategies A, B and C respectively.

The results in table 5 support the hypotheses that:

TABLE 5. Proportion of Periods with Correct Sign

	Syd for *T*			Syd for *T*'		
Strategy	2-Yr	2½-Yr	3-Yr	2-Yr	2½-Yr	3-Yr
Long Position for the U.S. Market						
A	13/15	12/14	9/10	10/15	10/13	9/10
B	7/8	4/5	4/5	6/7	4/5	4/5
C	4/5	3/4	3/3	4/5	3/4	2/3
Short Position for the U.S. Market						
A	8/16	7/15	5/11	14/16	13/15	8/11
B	5/9	4/6	3/5	7/9	6/6	5/5
C	1/5	2/4	1/3	4/5	4/4	2/3
Long Position for the German Market						
A	7/8	8/10	6/7	4/9	5/11	2/8
B	5/5	5/5	4/5	3/5	3/5	3/5
C	6/6	6/6	4/6	4/6	4/6	4/6
Short Position for the German Market						
A	5/10	5/12	3/9	6/10	6/12	4/9
B	3/6	3/6	3/6	5/6	5/6	5/6
C	3/5	2/5	1/5	4/5	4/5	4/5
Long Position for the Singapore Market						
A	9/13	7/10	8/9	8/12	5/10	7/9
B	5/5	5/5	4/4	4/4	4/4	3/4
C	5/5	5/5	4/4	4/5	3/5	2/4
Short Position for the Singapore Market						
A	7/13	6/10	6/9	10/13	7/10	7/9
B	3/4	3/4	2/3	3/4	3/4	2/3
C	3/4	3/4	2/3	3/4	3/4	2/3

(i) Applying the *SYD* approach can generate better returns than holding cash.
(ii) The *SYD* approach is better than the buy-and-hold strategy.

To further investigate the effects of applying the *SYD*, the significant statistics in tables 6A-C are summarized. The results reflect many significant (1%, 5% as well as 10%) long and short trades with correct sign in all the markets. On the other hand, there are hardly any significant trades generated by the *SYD* with incorrect sign for both *T* and *T'*. For example, looking at the statistics *T*, table 6A shows that

TABLE 6. Number of Significant Periods Generated by the SYD

	2 Year *SYD*			2½ Year *SYD*			3 Year *SYD*			
Strategy	1%	5%	10%	1%	5%	10%	1%	5%	10%	Total
A. U.S. Market[a]										
Long Position for *T* with Correct Sign										
A	1	3	6	1	3	4	1	1	3	
B	1	3	5	1	2	4	1	3	4	
C	1	2	3	1	2	2	0	2	2	63
Short Position for *T* with Correct Sign										
A	0	0	1	0	1	1	0	1	1	
B	0	1	1	0	1	1	0	2	2	
C	0	0	0	0	0	0	0	0	0	13
Short Position for *T* with Incorrect Sign										
A	0	0	0	0	0	0	0	0	0	
B	0	0	0	0	0	0	0	0	0	
C	0	0	0	0	0	0	0	0	1	1
Long Position for *T*' with Correct Sign										
A	0	0	3	0	2	3	0	1	1	
B	0	0	3	0	0	2	0	1	2	
C	0	1	2	0	1	2	0	0	1	25
Long Position for *T*' with Incorrect Sign										
A	0	0	1	0	0	1	0	0	1	
B	0	0	1	0	0	0	0	0	0	
C	0	0	1	0	0	0	0	0	0	6
Short Position for *T*' with Correct Sign										
A	0	1	1	0	1	1	0	1	1	
B	0	1	1	0	1	1	1	2	2	
C	0	0	1	0	0	0	0	0	1	17
B. German Market[b]										
Long Position for *T* with Correct Sign										
A	1	1	2	1	2	3	1	1	2	
B	1	1	2	1	1	2	0	1	2	
C	0	2	3	0	1	3	0	2	2	38
Short Position for *T* with Correct Sign										
A	0	2	2	1	1	1	1	1	1	
B	1	1	1	1	1	1	1	1	1	
C	1	1	1	1	1	1	1	1	1	8

TABLE 6. (Continued)

Short Position for *T* with Incorrect Sign										
A	0	0	1	0	0	0	0	0	1	
B	0	0	0	0	0	0	0	0	1	
C	0	0	1	0	1	1	0	1	1	17
Long Position for *T*' with Correct Sign										
A	1	1	1	1	1	2	1	1	1	
B	0	0	1	0	0	1	0	0	1	
C	0	0	2	0	0	1	0	0	1	29
Short Position for *T*' with Correct Sign										
A	0	2	2	1	1	2	1	1	1	
B	1	1	1	1	1	1	1	1	1	
C	1	1	1	1	1	1	1	1	1	
C. Singapore[c]										
Long Position for *T* with Correct Sign										
A	0	1	3	0	0	2	0	0	3	
B	0	1	2	0	1	2	0	2	3	
C	0	2	2	0	2	2	0	2	2	32
Short Position for *T* with Correct Sign										
A	0	0	1	0	0	2	1	1	3	
B	1	1	2	1	1	2	1	2	2	
C	1	1	2	1	1	2	1	1	1	32
Short Position for *T* with Incorrect Sign										
A	0	1	1	0	1	2	0	1	1	
B	0	1	1	0	1	1	0	1	1	
C	0	1	1	0	1	1	0	0	1	18
Long Position for *T*' with Correct Sign										
A	0	0	1	0	0	0	0	0	0	
B	0	0	0	0	0	0	0	0	1	
C	0	0	0	0	0	0	0	0	0	2
Short Position for *T*' with Correct Sign										
A	0	0	2	0	2	4	1	2	5	
B	1	2	2	1	2	3	1	2	2	
C	1	2	3	1	2	3	1	2	2	49

Note [a]No 'Long Position for *T* with Incorrect Sign' and no 'Short Position for *T*' with Incorrect Sign. [B]No 'Long Position for both *T* and *T*' with Incorrect Sign' and no 'Short Position for *T*' with Incorrect Sign'. No 'Long Position for both *T* and *T*' with Incorrect Sign' and no 'Short Position for *T*' with Incorrect Sign.

when the 2-year *SYD* is used with Strategy A for the U.S. market, there are 6 significant long trades and 1 significant short trade with the correct sign but no trades generated with incorrect sign. These results further support the hypotheses 1 and 2 above that applying the *SYD* approach can generate significantly better returns than holding cash, and the *SYD* approach is significantly better than the buy and hold strategy.

From the results shown in tables 2 to 6 and figures 1 to 3, it is evident that *SYD* does produce incorrect signals occasionally when Scenario A is considered only. This could be due to the possibility that Scenario B actually existed during that particular period, instead of Scenario A assumed earlier. Since the *SYD* indicator was tested only under the context of Scenario A, incorrect signals could thus arise. Supposing this is the real cause for generating incorrect signals in the tests; then if investors can distinguish Scenario A and Scenario B from the other scenarios, they should be able to use the *SYD* better and produce more convincing results.

The question arises as to whether there is more prevalence of Scenario A or more Scenario B in the market. The answer is not difficult to discern as the interpretation of *SYD* under Scenario B is exactly opposite to that under Scenario A. That is to say, if one believes the market as Scenario A and gets a buy signal by applying the *SYD*, then one will get a sell signal under the assumption of Scenario B. From table 5, 74% (82% for long and 67% for short), 62% (70% for long and 55% for short) and 74% (79% for long and 69% for short) of the *SYD* signals generated under the assumption of Scenario A are of correct sign for the U.S., German and Singapore markets respectively. From tables 6A-C, 94%, 93% and 86% of the *SYD* signals generated under the assumption of Scenario A are of significantly correct sign for the U.S., German and Singapore markets respectively. These findings support the performance test under the assumptions of Scenario A.

V. Discussion

The study leads to the following conclusions:

(i) Using the *SYD* model could enable investors to escape from most of the crashes and catch most of the bull runs.

(ii) The trading signals provided by the *SYD* indicator can generate significant profits, and
(iii) The performance of the *SYD* indicator is significantly better than the performance of the buy-and-hold strategy.

The findings of this study sometimes show that the statistics are not significant, and sometimes *SYD* generates incorrect signals. There are several possible reasons for these shortcomings. Firstly, only Strategies A, B and C are adopted in this study. If more strategies are introduced, the outcome should be enhanced. Secondly, the markets only are considered under Scenario A. If Scenario B or other scenarios can be identified and examined, more complete results can be obtained. Thirdly, the market performance test consists of the *SYD* indicator alone. If other economic and fundamental indicators can be incorporated, or the *SYD* combined with other technical indicators, the results could be promising. In short, if more data were gathered from a wider spectrum of economic variables, more scenarios and more markets could be studied and examined comprehensively and the result of the *SYD* model would be more meaningful; and hopefully, it will produce more complete results to help predict market movements.

Also, the tests rely on the assumption that the returns are normally distributed. For future studies, this assumption can be relaxed to test the performance of the *SYD* indicator. One can use the following methods to do this:

(i) Three-moment or four-moment approximation to the statistics (Tiku and Wong 1998),
(ii) Robust flat-tailed estimator (Tiku, et. al. 1999, 2000), or
(iii) Robust Bayesian estimator (Matsumura, et al. 1990, Wong and Bian 2000).

A time series approach can also be used (for example, see Wong and Miller 1990) and Wong, et al (2000) to study the returns generated from using the *SYD* model. A cost of capital (Thompson and Wong 1991, 1996) approach can also be utilized to make better investment decisions. Another extension to improve the *SYD* model is to include the work of Li and Wong (1999) and Wong and Li (1999) which study the behavior of risk takers and risk averters in the stock market.

There are many other indicators besides the *SYD* for stock market movement (for example, see Chew and Wong 1996 and Wong, et. al. 1996). Each indicator has it own strengths and weaknesses. Similar

testing procedure could be applied to analyze other indicators or the combinations of indicators. Another research on stock prices examined the performance of portfolio manager's probabilistic forecasts of stock prices (for example, see Muradoglu and Unal 1994).

Finally, this paper concludes that *SYD* indicator is indeed a useful technical analysis tool for stock market investment.

References

Allen, H., and Taylor, P. 1989. Chart analysis and the foreign exchange market. *Bank of England Quarterly Bulletin* 29:547-551.

Ariff, M., and Wong, W.K. 1996. Risk-premium effect on share market prices: A Test of Loanable Funds Prediction. *RMIT Economics and Finance.* Seminar Paper.

Balvers, R. J., Cosimano, T.F., and McDonald, B. 1990. Predicting stock returns in an effcient market. *Journal of Finance* 55:1109-1128.

Box, G.P., and Jenkins, G.M. 1976. *Time Series Analysis Forecasting and Control*. 2th Edition. Prentice-Hall, Inc.

Brealey, R.A., and Myers, S.C. 1991. *Principles of Corporate Finance*. 4th Edition, McGraw-Hill, Inc.

Breen, W., Glosten L.R., and Jagannathan, R. 1990. Predictable variations in stock index returns. *Journal of Finance* 44:1177-1189.

Campbell, J.Y. 1987. Stock returns and term structure. *Journal of Financial Economics* 18:373-399.

Carter, R.B., and Van Auken, H.E. 1990. Security analysis and portfolio management: A survey and analysis. *Journal of Portfolio Management.* Summer. 81-85.

Chew, B.K. 1997. The impact of technical analysis on portfolio performance. Thesis. National University of Singapore.

Chew, B.K., and Wong, W.K. 1996. Regression analysis: A useful and flexible technical tool? *Stock Exchange of Singapore Journal*. September, 38-45.

Cochrane, J.H. 1991. Production-based asset pricing and the link between stock returns and economic fluctuations. *Journal of Finance* 46:209-238.

Conrad, J., and Kaul, G. 1988. Time-variation in expected returns. *Journal of Business* 61:409-425.

DeBondt, F. M., Werner and Thaler, R.H. 1985. Does the stock market overreact. *Journal of Finance* 40:793-805.

DeLong, J.B., Shleifer, A., Summers L.H., and Waldmann, R.J. 1990. Positive feedback investment strategies and destabilizing rational speculations. *Journal of Finance* 45:379-395.

Fama, E.F. 1965. The behaviour of stock market prices. *Journal of Business*

38:34-105.

Fama, E.F., and Blume, M. 1966. Filter rules and stock market trading profits. *Journal of Business.* Special Supplement, January, 226-241.

Fama, E.F., and French, K. 1988. Permanent and temporary components of stock prices. *Journal of Political Economy* 96:246-273.

Frankel, J., and Froot, K. 1990. The Rationality of the foreign exchange Rate: chartists, fundamentalists, and trading in the foreign exchange rate. *American Economic Review* 80:181-185.

Froot, K.A., Scharfstein D.S., and Stein, J.C. 1992. Heard on the street: information inefficiencies in a market with short-term speculators. *Journal of Finance* 47:1461-1484.

Jensen, M.C., and Bennington, G.A. 1970. Random walks and technical theories: some additional evidence. *Journal of Finance.* May. 469-482.

Levich, R.M., and Thomas, L. 1993. The significance of technical trading-rule profits in the foreign exchange market : a bootstrap approach. *Journal of International Money and Finance* 12:475-492.

Li, C.K., and Wong, W.K. 1999. Extension of stochastic dominance theory for risk averters and risk takers. *RAIRO Recherche Operationnelle* 33:509-524.

Lo, A.W., and MacKinlay, A.G. 1990. When are contrarian profits due to stock market overreaction? *Review of Financial Studies* 3:175-205.

Lo, A.W., Mamaysky H., and Wang, J. 2000. Foundations of technical analysis: computational algorithms, statistical inference, and empirical implementation. *Journal of Finance* 55: 1705-1764.

Matsumura, E.M., Tsui K.W., and Wong, W.K. 1990. An extended multinomial Dirichlet model for error bounds for dollar-unit sampling. *Contemporary Accounting Research* 6:485-500.

Muradoglu, G., and Unal, M. 1994. Weak form efficiency in the thinly traded Turkish stock market. *The Middle East Business and Economic Review* 6:37-44.

Sweeney, R.J. 1986. Beating the foreign exchange market. *Journal of Finance* 41:163-182.

Sy, W. 1990. Market timing: is it a folly? *Journal of Portfolio Management*. Summer. 11-16.

Tiku, M.L., and Wong, W.K. 1998. Testing for unit root in AR(1) model using three and four moment approximations. *Communications in Statistics: Simulation and Computation* 27:185-198.

Tiku, M.L., Wong, W.K. and Bian, G. 1999. Estimating parameters in autoregressive models in non-normal situations: symmetric innovations. *Communications in Statistics: Theory and Methods* 28:315-341.

Tiku, M.L., Wong, W.K., Vaughan, D.C., and Bian, G. 2000. Time series models with nonnormal innovations: symmetric location scale distributions. *Journal of Time Series Analysis* 21:571-596.

Thompson. H.E., and Wong, W.K. 1991. On the unavoidability of 'scientific'

judgement in estimating the cost of capital. *Managerial and Decision Economics* 12:27-42.

Thompson. H.E., and Wong, W.K. 1996. Revisiting 'dividend yield plus growth' and its applicability. *Engineering Economist* 41:123-147.

Wong, W.K. 1993. An equity indicator for the Singapore market. *Stock Exchange of Singapore Journal*. May. 21-23.

Wong, W.K. 1994. A composite equity indicator for Singapore. *Stock Exchange of Singapore.*