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Share Price Response to New Information with Short Horizon Investors: the Case of Hong Kong

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Abstract

The reversion of Hong Kong to Chinese rule in 1997, formalized in 1984, is fast approaching. The Hong Kong stock market thus provides a natural laboratory in which to explore the implications of 推 oise trader? and other models which highlight the link between short-horizon investors and price volatility. We use changes in the degree of serial correlation in daily returns to draw inferences regarding the over-reaction of Hong Kong stock prices to economic and to political news during the period 1984 to 1993. We find that subsequent to the June 4 massacre in 1989, but not before, there is significant over-reaction of stock prices in Hong Kong to changes in the U.S. treasury bill rate and to an index of favourable and unfavourable political news. We interpret these findings as evidence that the importance of short-horizon investors increased after the June 4 massacre, and contributed to the observed volatility of Hong Kong stock prices.

I. Introduction

The possibility that stock markets are not informationally efficient, either at the aggregate or individual share level, has received increased attention in recent years. The dramatic decline in U.S. share prices on October 19, 1987 - when the S&P500 composite index plunged 22.9 percent in a single day - is seen by many as an event for which there is no apparent explanation in terms of economic fundamentals (Miller (1991)).

There is a wave of recent research which suggests that when investors have short trading horizons, assets may deviate from their fundamental values. The noise trader literature (Kyle (1985), Black (1986), and DeLong, Shleifer, Summers and Waldman (1989), (1990a)) is one such example.[1] Noise traders are uninformed investors who are not fully rational. Their demand for risky assets is often affected by 捞 entiment? which may be unrelated to fundamentals.[2] When trading horizons

[1] Other short horizon arguments that lead to market inefficiency include: positive information spillover or herding (Froot, Scharfstein and Stein (1992)), rational bubble (Tirole (1982), Blanchard and Watson (1982)), and positive feedback trading (DeLong, Shleifer, Summers and Waldman (1990b)).

[2] In the Hong Kong stock market for example, "sentiment" is a favourite explanation for daily stock market movements ("...sentiment remained soft..." (Reuters, December 1, 1994);

are short, arbitrage becomes risky and thus imperfect. Consequently, noise traders may drive stock prices away from fundamentals, and their actions may not be completely countered by arbitrageurs. Schwert (1989a,b) shows that macroeconomic variables, which are economic fundamentals at the aggregate level, have limited explanatory power for stock market volatility.[3] Part of the unexplained portion of the volatility may indeed be generated by noise trader risk.

The purpose of this paper is to address the question of whether the aggregate level of share prices is too volatile, as evidenced by the autocorrelation pattern of daily returns around announced dates for both economic and political news. This is not, of course, a new question. The contribution of the paper is its focus on the Hong Kong stock market.

We focus on the Hong Kong stock market for several reasons. First, share prices in Hong Kong are far more volatile than share prices in the United States. If there is a link between volatility and over-reaction, this link is likely to be strong - and readily detected - in the data from Hong Kong. Second, the Hong Kong stock market has a unique feature which may enhance the relevance of the noise trader model. The year 1997 - in which Hong Kong is scheduled to revert back to Chinese rule - is fast approaching, and short-term speculation may have become more appealing, at least to some investors. Such investors, in effect, may plan to exit the Hong Kong market before 1997, and adjust their investment horizon accordingly.[4] For this reason, the Hong Kong stock

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"Sentiment is very fragile..." (Reuters, December 2, 1994); "...sentiment sank lower and lower..." (Reuters, January 13, 1995)).

[3] Using U.S. data, Schwert (1989a,b) finds that although stock market volatility rises sharply during recessions and financial crises and falls during expansions, the relationship between macroeconomic uncertainty and stock market volatility is surprisingly weak.

[4] Noise traders may also rely more heavily on the public statements of highly visible financial gurus. The record surge in October 1993 in which the Hang Seng index rose more than 24 percent in one month was considered by market watchers to have been sparked by Morgan Stanley

market may provide an especially interesting laboratory in which to test for market efficiency.[5] Third, as documented by Kim and Mei (1995), political developments exert a particularly strong impact on share prices in Hong Kong. This observation invites the question of whether any over-reaction of share prices to 搉 ews? is likely to differ between political and economic influences. Kim and Mei (1995), who do not address market efficiency issues, focus on the period 1989 to 1993. We extend their sample period to include the early 1980s, when political uncertainty may also play an important role. Fourth, Glosten, Jagannathan and Runkle (1993) uncover a strong positive relationship between stock market volatility and interest rates. Since the Hong Kong dollar is pegged to the U.S. currency (introduced on October 17, 1983 at a rate of $7.80 per U.S. dollar), Hong Kong interest rates follow their U.S. counterparts very closely. We take advantage of this fact and test the over-reaction hypothesis by comparing stock market responses in the two countries to changes in U.S. interest rates. Whether a market is 搕oo volatile? is difficult to judge in isolation. Employing the U.S. stock market as a benchmark provides a frame of reference. Finally, because stock markets may respond differently to 搒 ood? and 搃 ad? news, we also separate interest rate changes and

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emerging markets specialist Barton Biggs, who declared himself "maximum bullish" on China-related stocks in Hong Kong at the end of September 1993. It is interesting to note that seven weeks later, Mr. Biggs changed his tune unexpectedly and warned investors that they should reduce their weighting on Hong Kong stocks. The Hang Seng index fell almost two percent on the following day. This example illustrates that fund managers who (supposedly) have long-term objectives are making extremely short-term speculation about Hong Kong, and that highly visible market commentators may seek to maneuver market sentiment to their own advantage.

[5] In addition, the Hong Kong stock market is notorious for being driven by speculation and superstition. Every time there was a rumour that Deng Xiaoping's health had deteriorated, sell orders jumped. When the then British Prime Minister Margaret Thatcher stumbled and fell on the steps outside the Great Hall in Beijing during an official visit to discuss Hong Kong担 future in September 1982, investors took that as a bad omen and the stock market fell almost two percent on the following day.

major political events into these two categories to look for possible asymmetric reactions.

This paper is organized as follows. In section II, we present several descriptive statistics. In section III, we discuss three possible explanations for serial correlation in stock returns and their implications for our results. In section IV, we compare the responses of the Hong Kong and the U.S. stock markets to changes in interest rates. In section V, we assess the impact of political news on the Hong Kong stock market. A summary section concludes the paper.

II. Descriptive statistics

Figures 1 and 2 show the daily returns on the Hang Seng index in the Hong Kong stock market and the daily returns on the S&P500 index in the U.S. stock market from 1981 to 1993.[6] Casual observation suggests that the Hong Kong market has been more volatile, especially during the early 1980s and subsequent to the crash in October 1987. The Hang Seng index experienced its largest one-day drop (40.54 percent) on October 26, 1987, one week after the crash in the U.S.. The reason for the delayed reaction is that the Hong Kong Stock Exchange was closed from October 20 to 23. Given that the U.S. stock market had begun to recover, the magnitude of the drop in Hong Kong was spectacular.

For the period 1981 to 1993, the annualized average nominal return (without compounding)

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[6] The daily returns are estimated using the log price relatives:

$$R_t \text{ ' } \ln(P_t) \text{ \& } \ln(P_{t\&1})$$

where R_t = daily stock return on day t, and P_t = stock price index on day t.

on the Hang Seng index is 16.06%; for the S&P500 index, 9.52%.[7] The annualized standard deviations are 455.02% and 258.33%, respectively.

III. Autocorrelation in daily returns

In the next two sections, we study the impact of economic and political news on the autocorrelation pattern in daily stock returns. Before we proceed, it is useful to document this pattern in our data for the full sample period. It is also important to discuss the possible explanations for the observed pattern, as the interpretation of our results is likely to differ according to each explanation.

In the first panel of Table 1, we report the first- to sixth-order sample autocorrelations of daily returns in the Hong Kong and the U.S. stock markets.[8] For the sample period January 2, 1981 to December 31, 1993, both U.S. and Hong Kong stocks exhibit a significant degree of autocorrelation. The first-order autocorrelation coefficient in Hong Kong is 0.0539, compared with 0.0419 in the U.S.. Both are statistically significant.

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[7] The average annual inflation rate in Hong Kong over the full sample period 1981-1993 is 8.68%. That for the U.S. is 4.43%.

[8] The model is:

$$R_t = \eta + \sum_{j=1}^{6} \rho_j R_{t-j} + \varepsilon_t$$

where

$$\rho_j = \frac{\text{Covariance}(R_t, R_{t-j})}{\text{Var}(R_t)},$$

R_t = daily stock return on day t, η = constant, and ρ_j = autocorrelation coefficient for the jth lag.

[Table 1]

Campbell, Grossman and Wang (1993) find that the first-order autocorrelation of daily stock returns in the U.S. is significantly affected by the day of the week, a pattern that we confirm for the Hong Kong stock market as well.[9] The results are reported in Table 1, panel b. Note, for example, that Fridays have a strong positive effect on both markets. We thus include day-of-the-week dummies in *all* of the autocorrelation models in the next two sections.[10]

There are several possible reasons why stock returns are serially correlated. The first is the traditional argument that serially correlated returns are the basic symptom of an informationally inefficient market. Fama (1965) and others have shown, however, that the degree of autocorrelation is often too small to allow investors to profit.

The second possible reason that stock returns may be autocorrelated is that variations in the risk premium accorded stocks are partially predictable. In this context, it merits note that stock price volatility is itself serially correlated, as evidenced by the empirical success of ARCH models. One explanation that has been offered for this latter finding is the presence of a serially correlated news arrival process (Diebold and Nerlove (1989), Gallant, Hsieh and Tauchen (1991), and Lamoureux

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[9] The regression model we employ to test for the day-of-the-week effect is:

$$R_t = \sigma + \sum_{i=1}^{5} \tau_i DD_{i,t-1} R_{t-1} + \varsigma_t$$

where R_t is the stock return on day t, and DD_{it} is the day-of-the-week dummy, $i = 1 \ldots 5$.

[10] Note that the parameter estimate for the Monday dummy is negative and statistically significant in the U.S. data. This finding however, appears to be solely the result of the influence of Black Monday. Re-estimating the day-of-the-week effect using subsamples from January 2, 1981 to October 18, 1987 and from October 26, 1987 to December 31, 1993 shows that the Monday dummy remains negative, but not significantly different from zero in both cases.

and Lastrape (1990)). An autocorrelation in stock returns created by an ARCH effect does not, of course, provide evidence of market inefficiency.

The third possible reason that stock returns may be serially correlated is institutional. Scholes and Williams (1977) have documented the fact that nonsynchronous trading can cause serial correlation in stock returns. Cohen, Hawawini, Maier, Schwartz and Whitcomb (1980) find that minimum-size price changes and bid-ask spreads can also induce serial correlation in stock returns. Again, observed autocorrelation in stock returns arising from this source conveys no information regarding market inefficiency.

The fourth possible reason why stock prices may be autocorrelated is a result of rational behaviour. If investors? absolute risk aversion declines with wealth, then during a stock market boom, demand for risky assets would increase, and vice versa. The result is that investors trade in a similar fashion to 損 ortfolio insurance? strategies. However, one might argue that this reason is more applicable to lower frequency data. In this paper, all of our data are daily observations.

In our empirical tests, we focus on the *change* in the autocorrelation patterns around days in which there is important economic or political news. It is thus not necessary for us to choose among the several reasons why the basic autocorrelation patterns exist. If news causes a reduction in the first-order autocorrelation, we view this response as an over-reaction. Suppose, counterfactually, that there is no evidence of serial correlation in daily returns. Then negative first-order serial correlation around 搉 ews? days would suggest overreaction and subsequent correction. If investors over-react to bad news and stock prices fall too much on bad news days, the market may correct itself quickly and rise on the following day. This would reduce the first-order autocorrelation whenever bad news is released.

If the first-order autocorrelation increases around 掸 ews? days, then our interpretation depends upon how the higher-order autocorrelations coefficients are affected. If the increase in first-order autocorrelation is subsequently reversed, we interpret this response as an extended over-reaction. It is an over-reaction because the reversal can be viewed as a market correction. It is extended because the correction take several trading days. In the context of these tests, an over-reaction is an indication of excess volatility in the stock market. If the increase in first-order autocorrelation is not subsequently reversed, we interpret this result as delayed response to the new information.

IV. Reactions to economic news: interest rate changes

In this section, we address the question of whether or not the Hong Kong stock market systematically over-reacts to economic news, using the responses in the U.S. market as a benchmark. First, we examine the reaction of stock returns to interest rate changes. Second, we divide the interest rate changes into positive and negative changes to allow for possible asymmetric responses of stock returns. For example, we might find that prices systematically over-react to bad news, but not to good news. Because Hong Kong is 12-13 hours ahead of Eastern Standard Time (EST), there will not be a reaction in the Hong Kong stock market to interest rate changes in the U.S. until the following day. For this reason, the interest rate variables are lagged one day in tests using Hong Kong data.

Before we proceed, it is useful to determine if the changes in the U.S. 30-day treasury bill rate have the expected effect on stock returns on the day of the change. To assess whether these interest rate changes exert a statistically significant impact on returns in Hong Kong, we employ the

following regression model:

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\begin{aligned}
R_t &= \mu + \psi \Delta I_{t-1} + u_t \\
u_t &= \sqrt{h_t}\, v_t \\
\ln(h_t) &= \omega + \varphi[\theta v_{t-1} + |v_{t-1}| - E|v_{t-1}|] + \lambda \ln(h_{t-1})
\end{aligned}
\qquad \textbf{(1)}
$$

where R_t = daily stock return, ? = constant, u_t = error in the conditional mean return, h_t = conditional variance of u_t, v_t = normalized u_t (by h_t), *i.i.d.* with zero mean and unit variance, ΔI_{t-1} = lagged change in the closing value of the 30-day U.S. treasury bill rate.

Model (1) is a standard EGARCH (1,1).[11] We add the lagged change in the interest rate in the conditional mean equation to examine its impact on R_t. The parameter θ measures the 捲everage effect? In previous U.S. studies, θ is found to be significantly negative, indicating the presence of this effect. The estimation results are reported under Model 1 in Table 2.

[Table 2]

The estimated coefficient for ΔI_{t-1} has the expected negative sign, and is statistically significant. For the U.S. stock market, we employ the same EGARCH model (1), with the exception that ΔI_{t-1} is replaced by ΔI_t in the conditional mean equation. The estimation results are reported in Table 2. The data reveal that interest rate changes also exert a statistically significant negative, though smaller, impact on stock returns in the U.S.. The fact that the same interest rate changes have a considerably larger impact on Hong Kong stocks (on average, a one percentage point increase in the 30-day treasury bill rate reduces the Hang Seng index by 0.82 percent, while it only reduces the

[11] There is a large body of research which suggests that stock price volatility tends to cluster over time (see Bollerslev, Engle and Nelson (1993)). Consequently, the error term, u_t, in (5) will be heteroskedastic. ARCH models are designed to capture this statistical property. We choose the EGARCH framework because it has the attractive feature of allowing volatility to respond differently to positive and negative returns (the 慘everage effect? . Engle and Ng (1993) also conclude that the EGARCH model performs reasonably well against other ARCH models for stock market data.

S&P500 index by 0.48 percent) is not necessarily an indication of over-reaction in the Hong Kong market. The reason is that the Hang Seng Index has a heavy weighting in property stocks which are more sensitive to interest rate movements.

To examine how interest rate changes affect the autocorrelation pattern of daily stock returns documented in Table 1. We employ the following regression model for six lags:

$$R_t = \alpha + \left[\sum_{i=1}^{5} \beta_i DD_{i,t\&j} + \gamma \Delta I_{t\&1\&j} \right] R_{t\&j} + \varepsilon_t \qquad j = 1 \ldots 6 \qquad \textbf{(2)}$$

where R_t is the stock return on day t, DD_{it} is the day-of-the-week dummy, $I = 1 \ldots 5$, and ΔI_t is the change in the closing value of the 30-day U.S. treasury bill rate.

We expect market participants in Hong Kong to shorten their investment horizon when political uncertainty increases. Hence, we should detect more symptoms of over-reaction after the June 4 massacre in Beijing in 1989, which sparked a major wave of emigration from Hong Kong. To test this hypothesis, we divide the data into two subsamples and compare the results. The first subsample spans a relatively tranquil period in Hong Kong from December 20, 1984, the day after the signing of the Joint Declaration between the Chinese and the British governments,[12] to the day before Black Monday. The second subsample begins on June 5, 1989, the day after the June 4 massacre, and ends on February 25, 1993, the last entry in our interest rate data. This is the period when political uncertainty intensifies. We also apply model (2) to the U.S. data. The results are reported in Table 3. (The estimates for the day-of-the-week dummies, which do not affect the

[12] In the Joint Declaration, the Chinese government promises to maintain Hong Kong□s unique economic system and way of life for 50 years.

interpretation of our main findings, are excluded to conserve space.)

[Table 3]

Our results show that changes in the interest rate have no impact on the autocorrelation pattern of daily returns in the U.S. during the two subperiods in question. The estimates for Hong Kong reveal a different story. In the first subperiod from December 20, 1984 to October 19, 1987[13], interest rate changes do not affect the autocorrelation pattern of daily returns in the Hong Kong stock market. In the second subperiod from June 5, 1989 to February 25, 1993 however, there is evidence of over-reaction. A change in the interest rate on day t, ΔI_t, initially increases the autocorrelation of daily returns. The effect of ΔI_t on the first-order autocorrelation is positive (0.3515), although statistically insignificant. This momentum continues to build, and ΔI_t increases the second-order autocorrelation by a very significant amount (0.6863). Hence, there is a further response (in the same direction) in the stock market on days $t+1$ and $t+2$ to the change in the interest rate on day t. However, this trend is sharply, though not completely, reversed on day $t+4$. ΔI_t reduces the fourth-order autocorrelation by 0.6073, and this estimate is statistically significant. The results thus indicate that most of the further response to the change in the interest rate on day t is an over-reaction that is subsequently reversed.[14]

There is increasing evidence that the stock market reacts differently to good and bad news

[13] Because of the difference in time zone, the stock market crash on Black Monday in the U.S. had not occurred when the Hong Kong market closed for trading on October 19, 1987.

[14] One might argue that if the change in the U.S. interest rate is itself serially correlated, it will have an effect on the autocorrelation pattern of daily stock returns in Hong Kong. In particular, this effect will be unrelated to market efficiency issues, and hence our interpretation of the results will be incorrect. However, we can rule out this possibility since these interest rate changes have *no* impact on the autocorrelation pattern of U.S. stock returns.

(see for example, McQueen, Pinegar and Thorley (1996)). We divide the interest rate changes into positive and negative changes, ΔPI_t and ΔNI_t, to look for possible asymmetric response in the Hong Kong market. Once again, we begin by assessing the initial impact of each type of changes on stock returns using an EGARCH(1,1) model similar to (1). The results are reported under Model 2 in Table 2.

The parameter estimates for both ΔPI_t and ΔNI_t carry the expected sign,[15] but only that for ΔNI_t is statistically significant. This finding suggests the possibility of a delayed response to interest rate increases which we will explore in the autocorrelation model (3) below. The estimation results are reported in Table 4. The estimates for the day-of-the-week dummies are again excluded to conserve space.

$$R_t = \alpha + \left[\sum_{i=1}^{5} \beta_i DD_{i,\,t\&j} + \gamma_P \Delta PI_{t\&1\&j} + \gamma_N \Delta NI_{t\&1\&j} \right] R_{t\&j} + \varepsilon_t \qquad j = 1 \ldots 6 \qquad \textbf{(3)}$$

where R_t is the stock return on day t, DD_{it} is the day-of-the-week dummy, $I = 1 \ldots 5$, ΔPI_t represents positive changes in the closing value of the 30-day U.S. treasury bill rate and zero otherwise, ΔNI_t represents negative changes in the same treasury bill rate and zero otherwise.

[Table 4]

As shown in Table 4, none of the parameter estimates for the two interest rate variables are statistically significant during the relatively tranquil period in Hong Kong from December 20, 1984 to October 19, 1987. After the June 4 massacre in 1989 however, there is evidence of over-reaction to both interest rate increases and reductions, although the pattern of the over-reaction is quite different. A rise in the interest rate increases the second- and third-order autocorrelation of daily

[15] The sign for ΔNI_t is correct, since ΔNI_t contains all negative values.

returns by a large (0.9828 and 1.1469, respectively) and statistically significantly amount. This delayed response in the stock market to the increase in the interest rate - in the same direction as the initial response on the day of the increase - is partially reversed on the fourth day: the parameter estimate for interest rate increases in the fourth-order regression is -0.9641 and is statistically significant. For interest rate reductions, there is no statistically significant delay, but the initial response in the stock market on the day of the reduction is more than offset by a reversal which occurs on the third day after the interest rate change.[16]

V. Reactions to political news

Hong Kong is scheduled to revert back to Chinese rule on July 1, 1997. During the last fifteen years, political turmoil in China, the tug-of-war between the British and the Chinese governments in endless rounds of negotiation, and the power struggle among local political parties have dominated the colony担 press. In the previous section, we suggest that investors? trading horizon may have shortened after the June 4 massacre in 1989. As a result, we are more likely to detect symptoms of market inefficiency after this date due to, for example, risk averse arbitrageurs in a market with noise traders (De Long et al. (1990)) or herding of information (Froot, Scharstein and Stein (1992)). In this section, we test this hypothesis by examining the effects of political news on the autocorrelation pattern of daily returns.

In the previous section, we establish that the Hong Kong stock market reacts differently to good and bad economic news. It is therefore interesting to see if there is a similar asymmetric

[16] We should note that our findings for the second subperiod are robust to whether or not the June 5, 1989 observation is included in the sample. This is the date the Hong Kong stock market first responded to the June 4 massacre in Beijing, which took place on a Sunday.

reaction to favourable and unfavourable political events. To do so, we employ two dummy variables in the tests, GP_t and BP_t, where $GP = 1$ if there is 掠ood? political news on day t and zero otherwise, and $BP = 1$ if there is 捷ad? political news on day t and zero otherwise. As before, our tests focus on two subperiods: December 20, 1984 to October 19, 1987, and June 6, 1989 to December 31, 1993.[17] The latter is the period in which we expect the influence of short-horizon investors to be relatively more important. We document from several sources[18] the major political events that occurred in these two subperiods.[19] They are listed in the appendix. There are 5 events in the first subperiod, 1of which is classified as bad news, and 4 of which are classified as good news. There are 14 events in the second subperiod, 7 of which are classified as good news, and 7 of which are classified bad news.[20]

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[17] The June 4 massacre in Beijing is recorded in BP_t, the dummy variable for bad political news, as June 5, 1989, since June 4 was a Sunday. The second subperiod begins on June 6, 1989 so that the empirical tests are not biased by the event that defines the subsample. December 31, 1993 is the end of our full sample period.

[18] Our major political events are documented from the following collections at the Hong Kong Resource Centre, Joint Centre for Asia Pacific Studies, University of Toronto and York University: 1. Hong Kong Review (Government Information Services). 2. Hong Kong Year Book (Wah Kiu Yat Po). 3. Hong Kong Economic Annual (Economic Information Agency). 4. *The Nineties* (Going Fine Limited). 5. Wong, Sanglin, Hong Kong Yesterday and Today (Hong Kong Youth Press). 6. Chan, Ming K., Precarious Balance: Hong Kong Between China and Britain (M.E. Sharpe Inc.). 7. Barrie, Robin and Gretchen Tricker, Shares in Hong Kong (Hong Kong Stock Exchange Limited). 8. Hong Kong Newspapers Index (Hong Kong Catholic Social Communications Office). 9. Morrison, Donald (ed.), Massacre in Beijing: China担 Struggle for Democracy (Warner Books).

[19] If an event originated from Britain, the following trading date is recorded in the relevant dummy variable because there is an 8-hour time difference between Hong Kong and Britain. If an event was likely to have be announced in the afternoon in Hong Kong or China, such as the outcome of an official meeting, the following trading date is again recorded instead of the actual event date.

[20] Although there are more political events in the second subperiod, there are also nearly twice as many observations in the second subperiod as in the first.

To determine if these political events have the expected impact on stock prices and whether or not the impact is statistically significant, we again use an EGARCH(1,1) framework. The results are reported in Table 5.

[Table 5]

Both dummy variables have the expected signs, and the parameter estimates are statistically significant except for GP_t in the second subperiod. This suggests the possibility of a delayed reaction to good political news in the second subperiod. Note that in the first subperiod, stock prices in Hong Kong fell by 1.39 percent in response to bad political news, while in the second subperiod, they only fell by 0.96 percent. This comparison is probably a bit misleading since there is only one 捷 ad" piece of political news in the first subperiod, whereas there are 7 in the second subperiod. Hence, the estimate of 0.96 percent represents an 揳 verage? stock market reaction to bad political news in the second subperiod.[21]

The autocorrelation model we employ to test market reaction to political news is (6) below, and the estimation results for both subperiods are reported in Table 6.

$$R_t = \alpha + \left[\sum_{i=1}^{5} \beta_i DD_{i,\,t\&j} + \gamma_G GP_{t\&j} + \gamma_B BP_{t\&j} \right] R_{t\&j} + \varepsilon_t \qquad j = 1 \ldots 6 \qquad \textbf{(4)}$$

where R_t = the stock return on day t, DD_{it} = the day-of-the-week dummy, $I = 1 \ldots 5$, $GP = 1$ if 揋 ood□ political news and zero otherwise, and $BP = 1$ if 捷 ad? political news and zero otherwise.

[Table 6]

As shown in Table 6, there are significant impacts on the serial correlation in returns only

[21] If we include the June 5, 1989 response of the stock market to the June 4 massacre in Beijing in the second subperiod, the average reduction in stock prices to bad political news actually increases to 3.45 percent.

in the second subperiod. There is strong evidence of over-reaction to both good and bad political news, although the time pattern of the over-reaction differs sharply.

The stock market exhibits a large and delayed positive response to good political news, as evidenced by the first-order autocorrelation coefficient (0.8436). During the next four days, this movement is (more than) reversed, as evidenced by the large and significant negative coefficients. The results for bad political news suggests an over-reaction on 搉 ews據 ays, which persists until partial correction begins to take place on the third day, as evidenced by the significant negative parameter estimate of *BP* in the second-order regression. Further correction occurs two days later.

VI. Summary

The imminent takeover in Hong Kong, which presumably shortens the investment horizon of at least some investors, makes this stock market a natural laboratory in which to explore the efficiency with which prices respond to new information. In light of the importance of political considerations, this natural experiment invites an analysis of the response of stock prices to political as well as to economic events.

As a diagnostic, and following Campbell, Grossman and Wang (1993), we use the change in the serial correlation of daily returns to identify possible inefficiencies in the market response to new information. In particular, we draw the following inferences: (1) if there is no change, then the market has efficiently processed the new information; (2) if there is a significant reinforcement of the extant positive serial correlation, which is subsequently reversed, there is strong evidence of over-reaction; and (3) if there is an increase in the degree of positive serial correlation, then there is evidence of a delayed processing of the information and a resultant departure from market

efficiency. In light of the much higher volatility of stock prices in Hong Kong relative to the United States, we find the possibility of (2) to be of particular interest.

The substantive empircal findings are as follows. First, prior to the June 4 massacre in Beijing in 1989 (which is used to split the sample period 1984 to 1993 into two subsamples), there is no evidence of over-reaction of prices to either economic or to political news. Second, after the June 4 massacre, there is statistically significant evidence of over-reaction of stock prices to both economic and political news. As shown in Table 3, there is a significant over-reaction and subsequent correction of stock prices in response to interest rate 推 ews? for which there is no counterpart either in the U.S. stock prices or in Hong Kong stock prices prior to the June 4 massacre. Third, as shown in Table 4, the pattern of over-reaction is different for interest rate increases as distinct from interest rate reductions, with the degree of over-reaction larger when interest rates rise. Fourth, as shown in Table 6, there is significant over-reaction in Hong Kong stock prices to political news, as well as an asymmetric response to favourable and unfavourable events.

It is reasonable to assume that the investment horizon of at least some investors shortened after the June 4 massacre. Under the null hypothesis, the statistical findings cited above serve as evidence that - as anticipated by the literature on noise traders (De Long et al. (1990a) for example) - the increased activity of short-horizon traders may add to the volatility of aggregate stock prices.

Table 1
Sample Autocorrelations in Daily Stock returns
January 1, 1981 to December 31, 1993

Panel a: Autoregressive Coefficients (without day-of-the-week dummies)

Lag	Hong Kong	U.S.
1	0.0539*	0.0419*
	(0.0177)	(0.0175)
2	-0.0017	-0.0438*
	(-0.0177)	(0.0175)
3	0.0882*	-0.0210
	(0.0177)	(0.0175)
4	0.0031	-0.0364*
	(0.0177)	(0.0175)
5	-0.0028	0.0439*
	(0.0177)	(0.0175)
6	-0.0315	0.0011
	(0.0177)	(0.0175)
Adjusted R^2	0.0095	0.0055
DW	1.997	2.000

Panel b: First-order autoregressive coefficients (with day-of-the-week dummies)

	Hong Kong	U.S.
$DD_{1t-1}R_{t-1}$	-0.0292	-0.1330*
	(0.0260)	(0.0295)
$DD_{2t-1}R_{t-1}$	0.0021	0.0603
	(0.0461)	(0.0409)
$DD_{3t-1}R_{t-1}$	0.2310*	-0.0151
	(0.0521)	(0.0432)
$DD_{4t-1}R_{t-1}$	-0.0039	0.1809*
	(0.0423)	(0.0446)
$DD_{5t-1}R_{t-1}$	0.3492*	0.2987*
	(0.0502)	(0.0418)
Adjusted R^2	0.0196	0.0254
DW	1.981	2.017

Notes:
The standard errors are reported in parentheses. Estimates that are at least twice as large as their standard errors are marked with an asterisk. In panel b, the dependent variable is R_t, stock return on day t, and DD_i, i = 1...5, are the day-of-the-week dummies. Estimate for the constant term is not reported.

Table 2
EGARCH(1,1) Estimates
October 17, 1983 to February 25, 1993

Model 1: Effect of Interest Rate Changes on Stock Returns

$$R_t = \mu + \psi \Delta I_{t-1} + u_t$$
$$u_t = \sqrt{h_t}\, v_t$$
$$\ln(h_t) = \omega + \varphi[\theta v_{t-1} + |v_{t-1}| - E|v_{t-1}|] + \lambda \ln(h_{t-1})$$

Model 2: Effect of Positive and Negative Interest Rate Changes on Stock Returns

$$R_t = \mu + \psi_P \Delta PI_{t-1} + \psi_N \Delta NI_{t-1} + u_t$$
$$u_t = \sqrt{h_t}\, v_t$$
$$\ln(h_t) = \omega + \varphi[\theta v_{t-1} + |v_{t-1}| - E|v_{t-1}|] + \lambda \ln(h_{t-1})$$

where R_t = daily stock return, ? = constant, u_t = error in conditional mean return, h_t = conditional variance of u_t, v_t = normalized u_t (by h_t), *i.i.d.* with zero mean and unit variance, ΔI_{t-1} = lagged change in the closing value of the 30-day U.S. t-bill rate (f or the U.S. stock market, the contemporaneous change is used), ΔPI_t = positive changes in the t-bill rate and zero otherwise, ΔNI_t = negative changes in the t-bill rate and zero otherwise.

Parameter	**Hong Kong**		**U.S.**
	Model 1	**Model 2**	**Model 1**
μ	0.0013*	0.0011*	0.0003
	(0.0003)	(0.0003)	(0.0002)
ψ	-0.0082*		-0.0048*
	(0.0022)		(0.0017)
ψ_P		-0.0054	
		(0.0036)	
ψ_N		-0.0108*	
		(0.0032)	
ω	-0.5873*	-0.5859*	-0.3474*
	(0.0748)	(0.0779)	(0.0796)
φ	0.3144*	0.3147*	0.1661*
	(0.0213)	(0.0213)	(0.0208)
θ	-0.4268*	-0.4276*	-0.4955*
	(0.0586)	(0.0603)	(0.0952)
λ	0.9297*	0.9299*	0.9618*
	(0.0087)	(0.0090)	(0.0084)
Log likelihood	6732.942	6733.350	7806.981

Notes:

October 17, 1983 was the first day of the currency peg. The standard errors are reported in parentheses. Estimates that are at least twice as large as their standard errors are marked with an asterisk.

Table 3
Autocorrelation Models: Reaction to Interest Rate Changes
The Hong Kong and the U.S. Stock Markets
Various sample periods

Order	1	2	3	4	5	6
			Hong Kong			
			December 20, 1984 - October 19, 1987			
$\Delta I_{t-1-j} R_{t-j}$	-0.3600	-0.0226	0.2287	-0.0898	-0.1930	0.3847
	(0.4909)	(0.4906)	(0.4130)	(0.4117)	(0.4166)	(0.4062)
Adjusted R^2	0.0149	0.0000	0.0122	0.0187	0.0027	0.0000
DW	1.879	1.711	1.747	1.727	1.691	1.708
			June 5, 1989 - February 25, 1993			
$\Delta I_{t-1-j} R_{t-j}$	0.3515	0.6863*	0.1613	-0.6073*	0.0168	-0.0392
	(0.2664)	(0.2694)	(0.3045)	(0.3012)	(0.3058)	(0.3047)
Adjusted R^2	0.0302	0.0279	0.0000	0.0208	0.0000	0.0000
DW	1.719	1.715	1.725	1.686	1.712	1.718
			U.S.			
			December 20, 1984 - October 18, 1987			
$\Delta I_{t-j} R_{t-j}$	0.1919	0.0082	0.2416	-0.4946	-0.0055	0.3546
	(0.3905)	(0.3616)	(0.3628)	(0.3628)	(0.3626)	(0.3611)
Adjusted R^2	0.0247	0.0032	0.0000	0.0000	0.0000	0.0086
DW	1.975	1.763	1.732	1.729	1.731	1.749
			June 5, 1989 - February 25, 1993			
$\Delta I_{t-j} R_{t-j}$	0.2328	0.0467	0.1733	0.2541	-0.1090	0.1388
	(0.3050)	(0.3031)	(0.3036)	(0.3027)	(0.3017)	(0.3031)
Adjusted R^2	0.0023	0.0036	0.0000	0.0050	0.0054	0.0000
DW	2.002	1.919	1.913	1.900	1.901	1.914

Notes:
The dependent variable is R_t, where R_t is the stock return on day t. The lags are from $j = 1$ to $j = 6$. The day-of-the-week dummy variables are included in the regressions, though their estimated coefficients are not reported in the table. ΔI is the change in the closing value of the 30-day U.S. treasury bill rate. The standard errors are reported in parentheses. Estimates that are at least twice as large as their standard errors are marked with an asterisk.

Table 4
Autocorrelation Models:
Asymmetric Reaction to Good and Bad Economics News
Positive and Negative Interest Rate Changes
The Hong Kong Stock Market
Various sample periods

Order	1	2	3	4	5	6
			December 20, 1984 - October 19, 1987			
$\Delta PI_{t-1-j}R_{t-j}$	0.7225	-0.6969	0.0700	-0.2010	0.1777	-0.0609
	(0.8134)	(0.8268)	(0.5296)	(0.5307)	(0.5341)	(0.5259)
$\Delta NI_{t-1-j}R_{t-j}$	-1.3419	0.5692	0.5775	0.1520	-1.0185	1.3744
	(0.7661)	(0.7628)	(0.8362)	(0.8357)	(0.8531)	(0.8464)
Adjusted R^2	0.0175	0.0000	0.0111	0.0174	0.0030	0.0000
DW	1.878	1.712	1.749	1.727	1.687	1.706
			June 5, 1989 - February 25, 1993			
$\Delta PI_{t-1-j}R_{t-j}$	0.4215	0.9828*	1.1469*	-0.9641*	-0.0797	0.0577
	(0.4016)	(0.4018)	(0.4000)	(0.3978)	(0.5432)	(0.4046)
$\Delta NI_{t-1-j}R_{t-j}$	0.2682	0.3230	-1.5159*	0.0021	0.1797	-0.2010
	(0.4459)	(0.4538)	(0.5386)	(0.5365)	(0.5432)	(0.5388)
Adjusted R^2	0.0292	0.0279	0.0112	0.0218	0.0000	0.0000
DW	1.719	1.718	1.725	1.676	1.713	1.717

Notes:
The dependent variable is R_t, where R_t is the stock return on day t. The lags are from $j = 1$ to $j = 6$. The day-of-the-week dummy variables are included in the regressions, though their estimated coefficients are not reported in the table. ΔPI_t represents positive changes in the closing value of the 30-day U.S. treasury bill rate and zero otherwise, ΔNI_t represents negative changes in the same treasury bill rate and zero otherwise. The standard errors are reported in parentheses. Estimates that are at least twice as large as their standard errors are marked with an asterisk.

Table 5

The Effects of Good and Bad Political News on Stock Returns
EGARCH(1,1) Estimates
The Hong Kong Stock Market

$$R_t = \mu + \psi_G GP_t + \psi_B BP_t + u_t$$
$$u_t = \sqrt{h_t}\, v_t$$
$$\ln(h_t) = \omega + \varphi[\theta v_{t-1} + |v_{t-1}| - E|v_{t-1}|] + \lambda \ln(h_{t-1})$$

where R_t = daily stock return, ? = constant, u_t = error in the conditional mean return, h_t = conditional variance of u_t, v_t = normalized u_t (by h_t), *i.i.d.*with zero mean and unit variance, GP_t = 1 if there is good political news on day *t* and zero otherwise, NP_t = 1 if there is bad political news on day *t* and zero otherwise.

Parameter	**Subperiod 1**	**Subperiod 2**
μ	0.0015*	0.0017*
	(0.0004)	(0.0002)
ψ_G	0.0086*	0.0013
	(0.0005)	(0.0042)
ψ_B	-0.0139*	-0.0096*
	(0.0005)	(0.0045)
ω	-1.1661*	-1.8804*
	(0.3789)	(0.3908)
φ	0.2091*	0.3768*
	(0.0491)	(0.0516)
θ	-0.8930*	-0.2500*
	(0.2402)	(0.0812)
λ	0.8655*	0.7836*
	(0.0433)	(0.0444)
Log likelihood	2067.321	3388.271

Notes:
Subperiod 1 is from December 20, 1984 to October 19, 1987. Superiod 2 is from June 6, 1989 to December 31, 1993. The standard errors are reported in parentheses. Estimates that are at least twice as large as their standard errors are marked with an asterisk.

Table 6
Autocorrelation Models:
Asymmetric Reaction to Good and Bad Political News
The Hong Kong Stock Market
Various sample periods

Order	1	2	3	4	5	6
			December 20, 1984 - October 19, 1987			
$GP_{t-j}R_{t-j}$	0.0985	-0.2878	-0.1663	-0.1735	-0.0521	-0.0438
	(0.4045)	(0.4091)	(0.4054)	(0.4039)	(0.4074)	(0.4086)
$BP_{t-j}R_{t-j}$	-1.2610	-0.1087	0.0878	-0.7409	0.1449	0.5444
	(1.0638)	(1.0759)	(1.0661)	(1.0620)	(1.0713)	(1.0744)
Adjusted R^2	0.0148	0.0000	0.0106	0.0181	0.0010	0.0000
DW	1.881	1.711	1.748	1.728	1.691	1.711
			June 6, 1989 - December 31, 1993			
$GP_{t-j}R_{t-j}$	0.8436*	-0.8845*	-0.1879	-0.8677*	-1.0470*	0.6586
	(0.3488)	(0.3511)	(0.3570)	(0.3513)	(0.3547)	(0.3568)
$BP_{t-j}R_{t-j}$	0.0647	-0.2059*	-0.1520	-0.2724*	0.0980	-0.0106
	(0.0738)	(0.0742)	(0.0755)	(0.0743)	(0.0750)	(0.0752)
Adjusted R^2	0.0440	0.0318	0.0000	0.0308	0.0120	0.0000
DW	1.955	1.830	1.882	1.852	1.832	1.849

Notes:
The dependent variable is R_t, where R_t is the stock return on day t. The lags are from $j = 1$ to $j = 6$. The day-of-the-week dummy variables are included in the regressions, though their estimated coefficients are not reported in the table. *GP* is the dummy variable for good political news. *NP* is the dummy variable for bad political news. The standard errors are reported in parentheses. Estimates that are at least twice as large as their standard errors are marked with an asterisk.

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APPENDIX: List of Political Events in Hong Kong
Subperiod 1 (December 20, 1984 to October 19, 1987)

July 8, 1985 (***GP***)
The end of the first plenum of the Hong Kong Basic Law Drafting Committee. Chinese press releases described the meetings as "constructive" and delegates from Hong Kong as being "very cooperative".

December 5, 1986 (***BP***)
Hong Kong Governor Youde died suddenly in Beijing.

April 9, 1987 (***GP***)
David Wilson arrived as the new Hong Kong Governor. Given the favourable reputation of Wilson, citizens expected a better Sino-british relation in the future.

April 16, 1987 (***GP***)
Deng Xiaoping attended the fourth plenum of the Hong Kong Basic Law Drafting Committee. Deng reassured Hong Kong and foreign investors of China's committment to maintain Hong Kong□s capitalist system for 50 years, and that China's plans for modernization and reform would continue.

August 26, 1987 (***GP***)
The end of the fifth plenum of the Hong Kong Basic Law Drafting Committee. Definite progress was reported to have been made.

Subperiod 2 (June 6, 1989 to December 31, 1993)

July 2, 1989 (***BP***)
British foreign secretary Sir Geoffery Howe announced that Britain could not give the right of abode in the U.K. to the 3.25 million British Dependent Territory Hong Kong citizens.

July 21, 1989 (***BP***)
People's Daily, an influential newspaper in China, published an article criticizing the then popular Hong Kong legislators Martin Lee and Sezto Wah for "subversive activities" against the People担 Republic of China (PRC).

Monday, October 23, 1989 (***GP***)
Hong Kong's political advisor, William Ehrman, dispatched a letter to Ji Shaoxiang, head of New China News Agency's foreign affairs department, asserting that "the Hong Kong government has no intention of allowing Hong Kong to be used as a base for subversive activities against the PRC."

February 19, 1990 (***GP***)
The end of the final (ninth) plenum of the Hong Kong Basic Law Drafting Committee. Sino-British officials reached a tentative agreement on the future political structure of Hong Kong.

March 26, 1990 (***GP***)
U.S. President Bush renewed the Most Favored Nation (MFN) status of China. The renewal of MFN was vital for the flourishing economy in Hong Kong.

April 30, 1990 (***BP***)
The controversial airport project provided a pretext for China to interfere in the administration of Hong Kong well before 1997. Guo Fengmin, the new Chinese head of the JLG, asserted that China expected to be consulated on all major decisions involving Hong Kong before 1997. The arrogant attitude of Chinese authorities provided residents of Hong Kong with examples of how Hong Kong would be run under Chinese rule.

June 10, 1991 (***BP***)
The 1991 Hong Kong Bill of Rights was enacted, overriding all other law. Chinese officials however, claimed that they reserved the right to review all Hong Kong laws, including the Bill of rights, after 1997 and to repeal them if they were found to be incompatible with the Basic Law.

July 4, 1991 (***GP***)
Governor Wilson held a press conference to announce the Sino-British Hong Kong airport accord.

September 16, 1991 (***GP***)
The Hong Kong government conducted its first-ever direct elections for 18 geographical constituency seats in the Legislature. The Liberal Democrats score a landslide victory by capturing sixteen seats.

October 8, 1992 (***BP***)
Governor Patten announced his proposal for 1994-1995, provoking stern opposition from Beijing.

November 11, 1992 (***GP***)
Zhou Nan and Chris Patten arranged a surprise meeting in an attempt to settle their differences after Patten担 political reform stirred up criticism of violation of the Basic Law.

November 19, 1992 (***BP***)
Zhu Rongji, vice-premier of China delivered a speech in London in which he was very critical of the British policies concerning Hong Kong. It set off a wave of panic in Hong Kong.

December 2, 1992 (***BP***)
Negotiations between China and Britain over the future of Hong Kong hit another wall. Both sides threatened to breach the Joint Declaration and the Basic Law.

April 13, 1993 (***GP***)
Beijing and London announced plans to reopen talks and to discuss elections in Hong Kong after a long standstill.