INTERNATIONAL JOURNAL OF BUSINESS, 2(1), 1997 ISSN: 1083-4346

On Existence of An "Optimal Stock Price": Evidence from Stock Splits and Reverse Stock Splits in Hong Kong

Lifan Wu and Bob Y. Chan

We analyze a sample of stock splits and reverse stock splits on the Stock Exchange of Hong Kong (SEHK) over the period 1986 through 1992. Consistent with studies on stock splits and reverse stock splits made in the U.S. capital markets, our analysis shows that stock splits are associated with a positive and significant stock market response while reverse stock splits are associated with a negative but statistically insignificant price effect. We also investigate the "optimal price range" hypothesis, which states that firms choose the split factor (SF) as a device to return the stock price to a "preferred price range." Our result suggests a positive relation between the magnitude of the SF and the deviation of the pre-split stock price from the historical price level in the stock split sample. However, we do not find a systematic pattern affecting the use of the SF in the reverse split sample.

I. INTRODUCTION

This paper studies stock splits and reverse stock splits in Hong Kong. Our analysis focuses on two issues of stock distributions made by firms: (1) What are the valuation effects of such decisions? (2) How do firm managers decide on the magnitude of the split factor? While the existing literature on stock distributions provides some empirical evidence on these two issues, such studies typically use the U.S. stock market as a reference point. Our study extends this limitation by studying a comprehensive stock distribution sample, both for stock splits and reverse stock splits, from Hong Kong. Also, our study provides additional insight into the understanding of stock distributions concerning the usage of the split factor. We find that in the stock split sample firms that have experienced a larger pre-split stock price runup tend to use a larger split factor, but this pattern does not prevail in the reverse split sample.

While the evidence of stock distributions in the U.S. is quite abundant, empirical evidence of stock splits and reverse stock splits in capital markets other than the U.S. is rather rare. Our contributions in this empirical study are two-fold. First, we provide a comprehensive study on the valuation effects of both stock splits and reverse stock splits in Hong Kong. The results are pertinent to the

Lifan Wu and Bob Y. Chan, Department of Economics and Finance, City University of Hong Kong, Tat Chee Avenue, Kowloon, Hong Kong.

understanding of stock distributions because firms use stock distributions quite extensively, and Hong Kong firms have the discretion on the size per round lot after the split.[1] We find a positive and significant stock market reaction to the announcement of a stock split and a neutral reaction on the effective (ex-) date. For the reverse stock split sample, we find a negative abnormal return both on the announcement date and on the effective date. However, the negative returns are not statistically significant.

Our second contribution concerns the issue of why firm managers choose to initiate stock distributions. We extend the "optimal stock price" hypothesis proposed by Lakonishok and Lev [8] and examine how firm managers utilize the split factor in stock distributions. In particular, we empirically test whether the split factor is related to the deviation of the pre-split price from the historical average price, the industry average price, and the market average price. We find in the stock split sample that the ratio of the pre-split price to the historical price of the firm is a prominent factor in explaining cross-sectional differences in the split factor. However, we do not observe any systematic pattern of the split factor usage in the reverse split sample.

The remainder of the paper is organized as follows. Section II provides a brief review of the literature on capital market reactions to stock distributions and the usage of the split factor. Section III describes the data used in this paper. Section IV presents empirical results on valuation effects of stock splits and reverse stock splits, and Section V analyzes the adoption of the split factor by firms announcing stock distributions. Finally, Section VI provides a discussion of the results and offers conclusions.

II. LITERATURE REVIEW

A stock split (or forward split) is an event in which the firm decides to divide each share of stock into a multiple of one share. Conversely, a reverse stock split is an event in which a number of shares is combined into one new share. Unlike the selling of new shares, which is limited by the total number of authorized but not yet issued shares, stock splits and reverse stock splits typically have no limitation on their usage.[2] In theory, stock distributions are merely "cosmetic" changes in the equity, which should impose no economic significance to shareholders. The major reason that stock splits and reverse stock splits catch the attention of financial economists is that studies have repeatedly documented an "abnormal" capital market reaction to these events as a contradiction to the theoretical prediction. Grinblatt, Masulis, and Titman [7] study a sample of stock splits and report a positive abnormal return of 3.3% over the two-day event window surrounding the

announcement. This result is verified in later studies, including those by Lamoureux and Poon [9].

The significant stock market reactions to the announcements of stock splits are difficult to explain since firm managers seem to be able to decide both the direction (i.e., forward or reverse split) and the magnitude (i.e., the split factor) at will. While some studies ([2, 10]) suggest that stock distributions can serve as a signalling device, the economic content of such signals is ambiguous.[3] Moreover, the signalling argument of stock distribution lacks theoretical support since there is no apparent signalling cost in either stock splits or reverse stock splits.

A plausible reason for firms to initiate stock distributions is the intention of firm managers to maintain the stock price at a "preferred" trading range. Rather than signalling a higher firm value, the firm may seek a "clientele" of potential shareholders. If investors infer, at least in part, the firm type from the prevailing level of stock price, firm managers may have incentives to keep the stock price within a target band and "adjust" the level of share price through stock splits (when the stock price has increased significantly) or through reverse stock splits (when the stock price has decreased significantly).[4] Lakonishok and Lev [8] (hereafter LL) hypothesize that firms prefer a long-run average price and that firm managers adopt the market average price and the industry average price as indicators of the long-run price target. LL find in their sample of stock splits that the magnitude of the split factor is positively related to the ratio of the pre-split share price to these two variables.

III. SAMPLE DESCRIPTION

We collected from the *Fact Book* published by the Stock Exchange of Hong Kong (SEHK) all stock splits and reverse stock splits completed for the period 1986 through 1992. The *Fact Book* covers financing activities and capital changes in Hong Kong-listed companies. We excluded from our sample stock distributions in the form of stock dividends. In Hong Kong, publicly listed companies use stock dividends (also called bonus shares) extensively. Stock dividends are typically announced concurrently with earnings announcements and are reported separately in the *Fact Book*. We included in our sample only stock splits but not stock dividends.[5] Our sample consisted of 67 stock splits and 29 reverse stock splits.[6] The exchange regulation in Hong Kong imposes no limitation on the usage of either stock splits or reverse stock splits. While Peterson and Peterson [11] point out that price limitations imposed by the AMEX and the NMS of the NASDAQ induce some firms to initiate "non-discretionary" reverse splits, such restrictions are not found in the Hong Kong stock market.

Announcement dates of the stock distributions were collected from the *Securities Bulletin* published by the SEHK. Company names, effective dates, and

split factors were collected from the *Fact Book* and verified using the *Securities Bulletin*. We searched the *Fact Book* for confounding events around the announcement dates that might impose valuation effects on the splitting stock. We excluded the observations that had announcements of earnings, dividends, rights issues[7], and mergers and acquisitions. Our sample of "pure" stock distributions covered 33 stock splits and 26 reverse stock splits. Finally, daily stock returns, the market return, trading volume, and bid-ask spreads were obtained from the PACAP database compiled by the University of Rhode Island.

Table 1 presents some descriptive statistics of the sample. The table shows the distribution of stock splits and reverse stock splits made in each of the event years. When one looks at the distribution of the whole sample, stock splits do not appear clustered around a short period of time during the sample period or around a particular state of market condition.[8] For the reverse stock splits sample, 14 reverse splits (48.3%) were made in 1992. Other than this, reverse splits were also fairly evenly spread. Table 1 also shows the distribution of the split factor (SF). We define the SF as the number of new shares after the split per original share. For example, a "4-for-1" split will have a split factor of 4. For the reverse split sample, the SF is in the form of a fraction of one: a "1-for-4" split will have a split factor of ¼. For the stock split sample, the largest number of firms chose to have 2-for-1 splits. Twenty-one splits (31.3%) were made with a split factor of 2. Also, 4-for-1 splits and 5-for-1 splits appeared to be popular, accounting for 16 splits (23.9%) and 17 splits (25.4%), respectively. Nine 10-for-1 splits (13.4%) were made, while there was only one 5-for-2 split. A split factor exceeding 10 was rarely used. The sample shows the adoption of one 20-for-1 split and two 50-for-1 splits. For the reverse split sample, the most popular types are the 1-for-5 split and the 1-for-4 split. These two types account for 11 splits (37.9%) and 8 splits (27.6%), respectively. There were five 1-for-10 splits; and there was one of each of the 1-for-2, 1-for-6, and 1-for-15 types. Similar to the forward split sample, a split factor less than $1/20$ was rare. Only two observations fit in this category.

Table 1. Sample Description

This table reports sample descriptive statistics of stock splits and reverse stock splits in the Hong Kong stock market from the period of April 1986 through December 1992. The whole sample refers to the sample of all forward (reverse) splits. The pure sample refers to the sample of forward (reverse) splits excluding concurrent events such as announcements of earnings, dividends, and rights issues. Split Factor is defined as the number of new shares per original share after the split.

Panel A. Forward Splits

Year of Split		Split Factor							
		2	**2.5**	**4**	**5**	**10**	**20**	**50**	**Total**
1986	Whole	0	0	0	1	0	0	0	1
	Pure	0	0	0	0	0	0	0	0
1987	Whole	6	0	5	11	5	0	0	27
	Pure	2	0	1	4	2	0	0	9
1988	Whole	4	0	5	2	1	0	2	14
	Pure	2	0	3	1	1	0	1	8
1989	Whole	0	0	4	0	1	0	0	5
	Pure	0	0	3	0	1	0	0	4
1990	Whole	7	1	0	3	2	1	0	14
	Pure	3	0	0	2	2	1	0	8
1991	Whole	2	0	1	0	0	0	0	3
	Pure	1	0	0	0	0	0	0	1
1992	Whole	2	0	1	0	0	0	0	3
	Pure	2	0	1	0	0	0	0	3

Panel B. Reverse Splits

Year of Split		Split Factor							
		1/2	**1/4**	**1/5**	**1/6**	**1/10**	**1/15**	**<1/20**	**Total**
1986	Whole	0	0	1	0	1	0	0	2
	Pure	0	0	1	0	1	0	0	2
1987	Whole	0	0	2	0	1	0	0	3
	Pure	0	0	2	0	1	0	0	3
1988	Whole	0	1	2	0	0	0	0	3
	Pure	0	1	2	0	0	0	0	3
1989	Whole	0	0	0	0	0	0	0	0
	Pure	0	0	0	0	0	0	0	0
1990	Whole	0	0	0	0	0	0	0	0
	Pure	0	0	0	0	0	0	0	0
1991	Whole	0	0	5	0	0	0	2	7
	Pure	0	0	3	0	0	0	1	4
1992	Whole	1	7	1	1	3	1	0	14
	Pure	1	7	1	1	3	1	0	14

Table 2 summarizes the distribution of share prices before and after the stock distribution. For the stock split sample (Panel A), the largest category of pre-

split stock price ranges is from HK$3.01 to HK$10. This category accounts for 29 observations (43.28%). The next two categories are above the HK$20 group and the group of HK$1.01 to HK$3, accounting for 18 observations (26.86%) and 13 observations (19.4%), respectively. After the split, the largest group of price range is HK$1.01 to HK$3, accounting for 31 observations (46.27%), followed by below HK$1, representing 17 observations (25.37%) and HK$3.01 to HK$10, representing 12 observations (17.91%). Interestingly, more than two-thirds of the splitting firms adjust their post-split stock price to below HK$3; and almost all of the firms have a post-split price of less than HK$10.

Panel B of Table 2 shows the pre-split and post-split distributions of stock price for the reverse split sample. A majority of firms in this sample has a pre-split price of less than HK$1 (23 splits or 79.3%). After the reverse split, the leading groups in the number of observations are, respectively, the HK$1.01 to HK$3 group (15 splits or 51.7%) and the group from HK$3.01 to HK$10. Together, Panels A and B of Table 2 suggest that firms might use the stock split and the reverse stock split to adjust the stock price to a "target" zone.

Table 2. Price Distribution of Pre- and Post- Share Prices

This table reports the summary statistics about price distribution before and after forward (reverse) splits during the period of April 1986 through December 1992. The whole sample refers

to the sample of all forward (reverse) splits. The pure sample refers to the sample of forward (reverse) splits excluding concurrent events such as announcements of earnings, dividends, and rights issues. Share price (p) is in terms of the Hong Kong dollar (HK$) and the official exchange rate of the HK$ against the U.S. dollar (US$) is HK$ 7.8 = US$ 1.

Panel A. Forward splits

Price Range		Pre-split	Post-split
P < 1	Whole	1	17
	Pure	1	9
1 < P ≤ 3	Whole	13	31
	Pure	5	17
3 < P ≤ 10	Whole	29	12
	Pure	20	5
10 < P ≤ 20	Whole	6	7
	Pure	2	2
20 < P	Whole	18	0
	Pure	5	0

Panel B. Reverse splits

Price Range		Pre-split	Post-split
P ≤ 1	Whole	23	4
	Pure	21	4
1 < P ≤ 3	Whole	4	15
	Pure	3	14
3 < P ≤ 10	Whole	2	8
	Pure	2	6
10 < P ≤ 20	Whole	0	2
	Pure	0	2
20 < P	Whole	0	0
	Pure	0	0

IV. VALUATION EFFECTS

To study the valuation effects of stock splits of Hong Kong firms, we employed the market model [4] to calculate the abnormal return in our sample period. The estimation period covers two calendar years dating back from the last trading date of the year previous to the event date. The method of estimating the market model parameters is similar to that used by Vijh [12], which studies the ex-date effects of

corporate spin-offs and mergers. The daily abnormal returns (AR) are expressed as follows,

$$AR_{it} = r_{it} - \hat{\alpha}_i - \hat{\beta}_i r_{mt} \quad (1)$$

where AR_{it} is the abnormal return for security i on day t,
r_{mt} is the normal return for the SEHK equally weighted index on day t,
r_{ir} is the normal return for security i on day t, and
$\hat{\alpha}_i$ and $\hat{\beta}_i$ are intercept and slope estimators from the market model.

For each event date t, the average of the AR for all firms is calculated to yield the average abnormal return (AAR):

$$AAR_t = \frac{1}{n}\sum_{i=1}^{n} AR_{it} \quad (2)$$

For an event window of p days, the cumulative abnormal return (CAR_p) is calculated as the aggregate of each of the p ARs for the event window:

$$CAR_p = \sum_{t=1}^{p} AAR_t \quad (3)$$

where t=1 is defined as the first day in the event window.

Finally, the t-statistic (t) for the AAR and the CAR is calculated as follows:

$$t_{AAR} = \frac{AAR}{SD_{AAR}}$$

$$t_{CAR} = \frac{CAR}{SD_{CAR}} \quad (4)$$

where SD_{AAR} and SD_{CAR} are, respectively, estimated standard deviations over the event date and the sample period as defined by Brown and Warner [4].

Our event studies cover both the announcement date and the effective (ex-) date. In the case of announcements, the event date (Day 0) is identified as the date of announcement as reported in the *Securities Bulletin*. Similarly, the event date for the ex-date is the effective date of the stock distribution as reported by the *Securities Bulletin*. We calculated the raw return, the cumulative raw return, the abnormal return, the cumulative abnormal return, and the t-value of the event-date abnormal return for the period beginning 20 days before the event to 20 days after the event day.

Stock Splits

Table 3 presents estimations of the market model parameters obtained for our estimation period. Table 4 shows the event study results on both the announcement

date and the ex-date of the sample of 33 "pure" stock splits, which are not affected by other events that might affect the market reactions to the splits. Panel A of Table 4 shows that over the pre-announcement period (Day -20 through Day -5) the average splitting stock experiences a significant runup in stock price.[9] The average cumulative raw return of the sample is 7.71%, and the average cumulative market model return is -26.6%. The raw return sustains a slight upward drift, but the market model return turns significantly negative. This result suggests that the firms in our sample announce their stock splits when the stock return and the general stock market are performing well. This result is consistent with the observations done on the U.S. stock splits [6].

Table 3. Estimated Parameter Values of the Market Model

Estimated parameter values of the market model, $r_{it} = \hat{\alpha}_i + \hat{\beta}_i r_{mt} + \varepsilon_{it}$, are for 33 forward split stocks and 26 reverse split stocks over the estimation period covering two calendar years dating back from the last trading day of the year previous to the announcement date. r_{it} is the return on stock i on day t, r_{mt} is the market return, and ε_{it} is the residual return. $\hat{\alpha}_i$ and $\hat{\beta}_i$ are estimated values for the model.

Variable	Mean (STD)	Median	Percentage of Significance	Average Adj. R^2
α	0.0076 (0.0030)	0.0022	28%	0.2506
β	1.3696 (0.4187)	1.0018	76%	

Panel A of Table 4 shows that over the 3-day event window from Day -1 through Day 1, using the market model, abnormal returns are 9.0%, 8.5%, and 0.7%, respectively. The t-values show that the abnormal returns for Days -1 and 0 are highly significant (t-values equal 1.77 and 2.01, respectively). Together, the 3-day event period shows an 18.2% market model abnormal return. This positive return, however, is largely reversed in the following three trading days. The abnormal returns in the period Day 2 through Day 5 are -5.1%, -5.8%, -2.6%, respectively. All three returns are statistically significant (t-values are -4.80, -5.51, and -2.51, respectively). These three post-announcement days together account for a negative abnormal return of 13.5%. After Day 4, there does not appear to be a significant change in the return patterns of the sample firms.

Panel B of Table 4 shows the event study results of the pure stock split sample using the ex-date as the event date. Prior to the ex-date, there appears to be positive cumulative returns for both the cumulative raw return and the cumulative abnormal return. However, significant negative abnormal returns are recorded following the ex-date. It ends up with a -15% cumulative abnormal return for whole sample period. This result is probably due to the downward drift in stock returns after the announcement date, which is included in the pre-event period. Over the 3-day event window, the abnormal returns are -0.2%, -0.8%, and 1.6%, respectively. The overall 3-day abnormal return is 0.7%. Only the return in Day 1 is significant at 10%. Overall, the result does not suggest a positive market reaction on the ex-date. This result is in contrast to the positive ex-date abnormal return documented by Grinblatt et al. [7]. Figure 1 illustrates the cumulative raw return and the cumulative abnormal return for the stock split sample.

Table 4. Market Model Abnormal Returns of Stock Splits for the Pure Sample

Results for the event-study model, $AR_{it} = r_{it} - \alpha_i - \beta_i r_{mt}$, are for 33 forward split stocks over the period 20 days before and 20 days after event dates (e.g., the announcement date and ex-date). The various returns are calculated as follows: Column 2, average of daily raw returns (RR) across the events; Column 3, cumulative average raw returns from Day -20 to τ, CRR $= \sum_{t=-20}^{\tau} RR_t$; Column 4, average of daily abnormal returns (AAR) across the events; Column 5, standard deviation for AR; Column 6, cumulative average abnormal return from Day -20 to τ, re $CAR\tau = \sum_{t=-20}^{\tau} AAR_t$; Column 7, t-value $t_{(AR)} = AAR_t/SD$, where SD is the estimated standard deviation of adjusted returns over the comparison period.

Panel A. Around announcement date

Event Date	Average Raw Return	Cumulative Raw Return	Average Abnormal Return	Standard Deviation	Cumulative Abnormal Return	t-value
-20 to -5	0.0771	0.0771	-0.2660	0.1077	-0.2660	-2.4690**
-4	0.0202	0.0973	0.0109	0.0060	-0.1575	1.7956**
-3	0.0118	0.1091	0.0101	0.0084	-0.0561	1.2141*
-2	0.0211	0.1302	0.0140	0.0061	0.0837	2.2938**
-1	0.0417	0.1718	0.0896	0.0050	0.1733	1.7748*

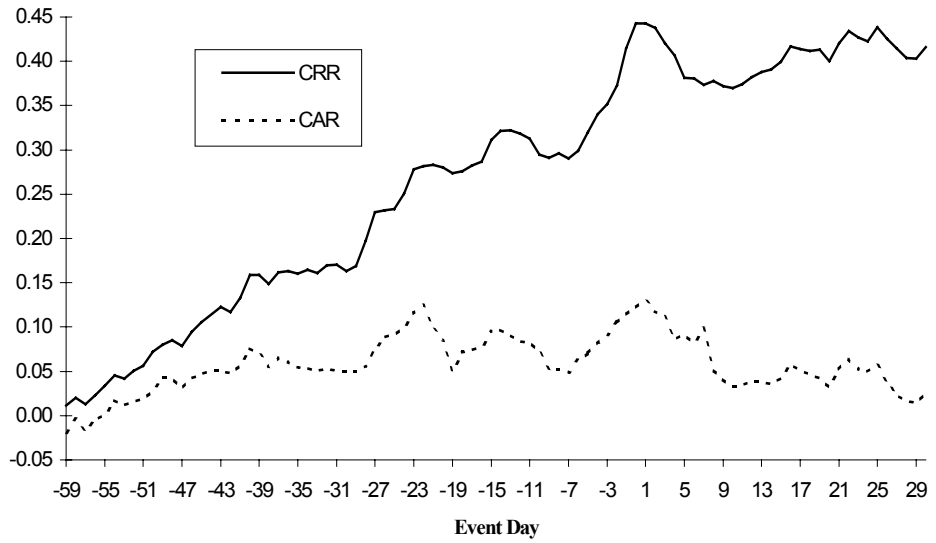
0	0.0283	0.2001	0.0848	0.0040	0.2580	2.0146**
1	-0.0003	0.1998	0.0074	0.0104	0.2655	0.7123
2	-0.0048	0.1950	-0.0513	0.0026	0.2142	-4.8034***
3	-0.0176	0.1774	-0.0580	0.0010	0.1562	-5.5072***
4	-0.0137	0.1638	-0.0262	0.0011	0.1300	-2.4876**
5 to 20	-0.0126	0.1512	-0.0092	0.0084	0.1208	-1.0981

Panel B. Around ex-date

Event Date	Average Raw Return	Cumulative Raw Return	Average Abnormal Return	Standard Deviation	Cumulative Abnormal Return	t-value
-20 to -5	0.0050	0.0050	0.0349	0.1352	0.0349	0.2581
-4	0.0009	0.0059	-0.0070	0.0071	0.0279	-0.9807
-3	0.0030	0.0089	0.0280	0.0072	0.0559	3.8682***
-2	0.0127	0.0215	-0.0437	0.0990	0.0122	-4.4277***
-1	-0.0021	0.0195	-0.0018	0.0095	0.0104	-0.1899
0	-0.0109	0.0086	-0.0079	0.0094	0.0025	-0.8422
1	0.0227	0.0313	0.0162	0.0087	0.0187	1.8433*
2	-0.0152	0.0161	-0.1282	0.0095	-0.1095	-13.4155***
3	0.0054	0.0215	-0.1408	0.0096	-0.2503	-14.7077***
4	0.0103	0.0318	0.0960	0.0100	-0.1543	9.6153***
5 to 20	-0.0191	0.0127	0.0003	0.0006	-0.1540	0.5143

* Denotes significance at the 10 percent level.
** Denotes significance at the 5 percent level.
*** Denotes significance at the 1 percent level.

Figure 1: Plot of returns around the announcement date of stock split



* CRR and CAR are cumulative raw return and cumulative abnormal return, respectively.

Another phenomenon shown in Table 4 is a high return volatility surrounding the announcement of stock splits. In contrast to the evidence in the U.S. markets, where typically daily returns are less than one percent, we often observed large fluctuations in daily stock prices in the Hong Kong stock market. So the large magnitude of daily stock price movements may partially be due to the volatile nature of emerging stock markets.

Reverse Stock Splits

Tables 5 reports market responses to the announcement and the ex-dates of reverse stock splits for the pure reverse stock sample.[10] Event study results in Table 5 are analogous to event study results for the discretionary reverse split sample of Peterson and Peterson [11].[11] Panel A of Table 5 summarizes the stock market response to the announcement of reverse stock splits. Up to 5 trading days prior to the announcement day, the cumulative raw return is -0.5% while the cumulative abnormal return is -0.1%. These figures suggest that, in contrast to the stock split sample, reverse stock splits are not associated with a sustained positive or a

negative return period for the stock. The neutral return figures are maintained throughout the pre-announcement period. For the 3-day announcement period, the daily abnormal returns are -0.2%, -1.0%, and -4.2%, respectively, contributing to a 3-day abnormal return of -5.4%. Only the Day 1 return is statistically significant at the 10% level (t-value = 1.92). After the announcement date, the reverse stock split sample experienced a downward drift. Panel B of Table 5 summarizes returns around the ex-date. Similar to Panel A, the return figures are not significant at conventional levels. After the ex-date, there is also evidence of a downward drift in abnormal returns. The cumulative abnormal return at Day 20 drops 5% following the ex-date. Figure 2 illustrates the cumulative raw return and the cumulative abnormal return for the reverse stock split sample.

Table 5. Market Model Abnormal Returns of Reverse Stock Splits for the Pure Sample

Results for the event-study model, $AR_{it} = r_{it} - \alpha_i - \beta_i r_{mt}$, are for 26 reverse split stocks over the period 20 days before and 20 days after event dates (e.g., the announcement date and ex-date). The various returns are calculated as follows: Column 2, average of daily raw returns (RR) across the events; Column 3, cumulative average raw returns from Day -20 to τ, CRR $= \sum_{t=-20}^{\tau} RR_t$; Column 4, average of daily abnormal returns (AAR) across the events; Column 5, standard deviation for AR; Column 6, cumulative average abnormal return from Day -20 to τ, CARτ $= \sum_{t=-20}^{\tau} AAR_t$; Column 7, t-value $t_{(AR)} = AAR_t/SD$, where SD is the estimated standard deviation of adjusted returns over the comparison period.

Panel A. Around announcement date

Event Date	Average Raw Return	Cumulative Raw Return	Average Abnormal Return	Standard Deviation	Cumulative Abnormal Return	t-value
-20 to -5	-0.0047	-0.0047	-0.0107	0.0309	-0.0107	-0.3462
-4	0.0064	0.0017	0.0026	0.0044	-0.0081	0.5909
-3	0.0065	0.0082	0.0030	0.0075	-0.0051	0.4000
-2	0.0111	0.0194	0.0126	0.0132	0.0076	0.9545
-1	0.0010	0.0203	-0.0022	0.0080	0.0053	-0.2750
0	-0.0087	0.0116	-0.0098	0.0105	-0.0045	-0.9333
1	-0.0419	-0.0303	-0.0416	0.0217	-0.0461	-1.9170*
2	-0.0207	-0.0511	-0.0170	0.0152	-0.0632	-1.1184
3	-0.0042	-0.0553	-0.0044	0.0068	-0.0676	-0.6470
4	-0.0038	-0.0590	-0.0030	0.0074	-0.0706	-0.4054

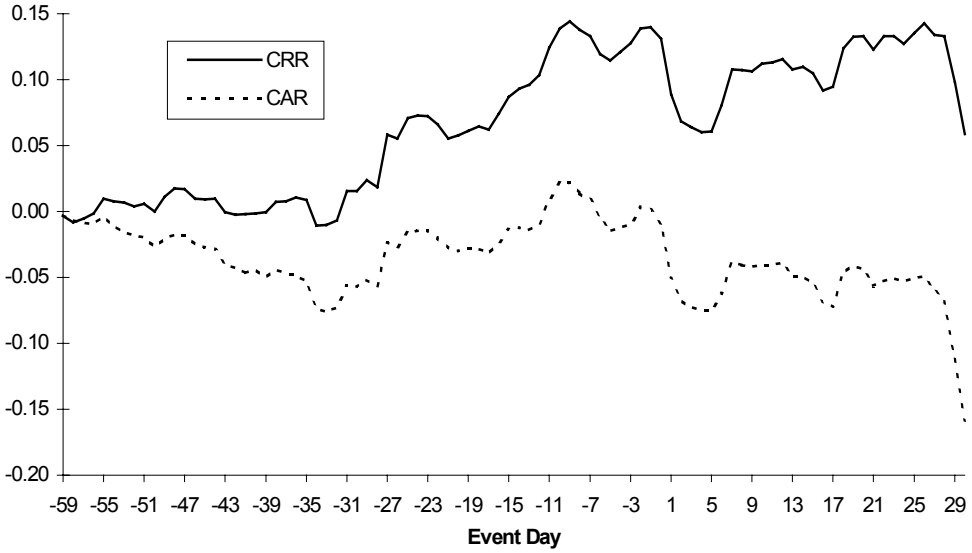
5 to 20	0.0005	-0.0586	-0.0028	0.0061	-0.0734	-0.4590

Panel B. Around ex-date

Event Date	Average Raw Return	Cumulative Raw Return	Average Abnormal Return	Standard Deviation	Cumulative Abnormal Return	t-value
-20 to -5	-0.0056	-0.0056	-0.0049	0.0067	-0.0049	-0.7313
-4	0.0015	-0.0041	0.0002	0.0003	-0.0047	0.6667
-3	0.0196	0.0155	0.0141	0.0129	0.0093	1.0930
-2	0.0057	0.0212	0.0064	0.0078	0.0157	0.8205
-1	-0.0197	0.0015	-0.0155	0.0136	0.0002	-1.1397
0	0.0093	0.0108	0.0080	0.0091	0.0081	0.8791
1	-0.0090	0.0018	-0.0082	0.0092	0.0000	-0.8913
2	-0.0147	-0.0129	-0.0152	0.0134	-0.0152	-1.1343
3	-0.0213	-0.0342	-0.0174	0.0141	-0.0327	-1.2340
4	-0.0186	-0.0527	-0.0131	0.0124	-0.0457	-1.0564
5 to 20	0.0025	-0.0502	-0.0041	0.0056	-0.0499	-0.7321

* Denotes significance at the 10 percent level.

Figure 2: Plot of returns around the announcement date of reverse stock split



* CRR and CAR are cumulative raw return and cumulative abnormal return, respectively.

V. THE SPLIT FACTOR

The second stage of our analysis concerns the usage of the SF in stock distributions. In particular, we investigate whether splitting firms use the SF as a device to adjust the level of stock price. Following [8], we used the following functional form to study the cross-sectional deviations of the SF as a function of firm, industry, or market-wide variables,

$$SPLIT = \alpha + \beta_1 FIRM + \beta_2 IND + \beta_3 MKT + \varepsilon \quad (5)$$

where SPLIT is a measure of the magnitude of the SF;
FIRM is a measure of firm-specific factors affecting the stock price;
IND is a measure of industry-specific factors affecting the stock price;
MKT is a measure of market-wide factors affecting the stock price; and
ε is a residual term.

Since the SF is unlikely to be affected by confounding factors such as earnings announcements, we used in our analysis the whole sample of stock distributions to obtain a more powerful test result. For the split sample, we used the term $ln(1 + SF)$ as a measure for the magnitude of the split. Because of the non-linear nature of the distribution of SF, we took the natural logarithm of (1 + SF). This measure is consistent with the methodology of the LL [8] study. For the reverse split sample, we used the term $ln(1 + \frac{1}{SF})$ as the measure for the intensity of the reverse split.[12] As there occur extreme values of split factors as summarized in Table 1, we excluded those distributions with split indicators larger than 50. As a result of this treatment, our final sample, which represented 65 splits and 25 reverse splits, provided sufficient information for our analysis.

We use three proxies for potential influences on the usage of the SF as a tool to adjust the stock price to the "preferred level." Similar to LL [8], we define the market-wide factor, MKT, as the log-ratio of the pre-split stock price (i.e., the stock price one day prior to the split announcement date) to the average stock price of all firms listed on the SEHK in that year:

$$MKT = \ln\left(\frac{P_{-1,j}}{P_M}\right) \quad (6)$$

where $P_{-1,j}$ is the stock price for firm j one day prior to the announcement date of the distribution and P_M is the average stock price for all stocks listed on the SEHK in that year. Also, we define the industry factor, IND, as the log-ratio of the pre-split stock price to the average stock price of the same industry classification as defined by the SEHK[13] in that year:

$$IND = \ln\left(\frac{P_{-1,j}}{P_I}\right) \quad (7)$$

where $P_{-1,j}$ is the stock price for firm j one day prior to the announcement date of the distribution and P_I is the average stock price for all stocks listed in the same industry category of j in that year.

Lastly, we use the variable FIRM, defined as the log-ratio of the pre-split price to the average stock price for a one-year period prior to the stock distribution ending the last trading day of the previous year, as the indicator of a firm-specific factor indicating the "preferred" trading range of the stock price:

$$FIRM = \ln\left(\frac{P_{-1,j}}{P_J}\right) \quad (8)$$

where $P_{-1,j}$ is defined as in Equations (6) and (7) and P_J is the historical average stock price for firm J.

Our hypothesis of "preferred trading price" suggests that firms use the magnitude of the SF to "adjust" the stock price to the preferred range. While LL [8] use only market-wide and industry-specific indicators to account for this preference, we hypothesize that firms adopt a specific trading range for the firm itself. Thus, our reasoning would lead to a stronger effect of the firm specific indicator (FIRM) over the industry (IND) and market (MKT) variables. Table 6 summarizes the regression results of SF using FIRM, IND, and MKT as the explanatory variables. Panel A of Table 6 shows that for the split sample, the variable FIRM is positive and significant for all model specifications. In Model 1 the regression result suggests that FIRM is strongly related to the use of SF: When the pre-split stock price is more deviated from the historical stock price, the SF adopted by the splitting firm is likely to have a larger magnitude. This relation is significant at the 1% level with a t-value of 3.872. Also, the adjusted R^2 of 0.2058 suggests that the variable FIRM can explain a significant portion of the cross-sectional variations in SF.

Model 2 of Panel A indicates that when the variable IND enters into the regression, IND is positive and significant at the 10% level with a t-statistic of 1.822. Also, FIRM remains positive and significant at the 1% level. The adjusted R^2 is 0.2391, indicating a moderate improvement in the explanatory power of the equation with IND. Model 3 includes FIRM, IND, and MKT in the regression. Contrary to the results of LL [8], our regression result shows that MKT is not statistically significant. Also, IND has changed its sign, but the new coefficient is insignificant. FIRM is the only variable that is significant with a t-statistic of 3.139. Lastly, Model 3 shows that the variable MKT provides no improvement in the explanatory power of the regression suggested by a reduction in the adjusted R^2 to 0.2337.[14]

Panel B of Table 6 summarizes the regression results of the SF using the reverse split sample. Unlike the split sample, Panel B shows that the coefficient of FIRM is positive in Model 1 but reverses signs in Models 2 and 3. Also, in all model specifications, FIRM is not statistically significant. The only variable with a significant coefficient is IND, which has a positive and significant coefficient in Model 2. This fact suggests that when the pre-split price is "high" relative to the industry average, the value $1 + \frac{1}{SF}$ is also high; i.e., the stock is split into more shares. However, this relation is no longer significant when the variable MKT is included in Model 3.

Table 6. Cross-sectional Regression of Split Factor

Results of the regression of the split factor (SPLIT) on the firm-specific factor (FIRM), industry-specific factor (IND) and market-wide factor (MKT) in the period 1986-92. The explanatory variables are defined as follows: FIRM = *ln* (Pre-split Stock Price / Average Stock Price of Firm), IND = *ln* (Pre-split Stock Price / Average Industry Stock Price), and MKT = *ln* (Pre-split Stock Price / Average Market-wide Stock Price). The t-statistic is in parentheses.

Panel A. Split sample (sample size = 65)

Model: $SPLIT = \alpha + \beta_1 FIRM + \beta_2 IND + \beta_3 MKT + \varepsilon$

	Coefficient estimates				
Model	FIRM	IND	MKT	F-value	Adj. R^2
1.	0.2999			14.99	0.2058
	(3.872***)				
2.	0.2569	0.0775		9.49	0.2391
	(3.872***)	(1.822*)			
3.	0.2511	-0.0821	0.1704	6.49	0.2337
	(3.139***)	(-0.401)	(0.797)		

Panel B. Reverse Split sample (sample size = 25)

Coefficient estimates

Model	FIRM	IND	MKT	F-value	Adj. R^2
1.	0.1147			1.561	0.0220
	(1.250)				
2.	-0.0407	0.4262		8.521	0.3757
	(-0.485)	(3.821***)			
3.	-0.0342	0.0737	0.3608	6.176	0.3831
	(-0.409)	(0.223)	(0.319)		

* Denotes significance at the 10 percent level.
** Denotes significance at the 5 percent level.
*** Denotes significance at the 1 percent level.

VI. CONCLUSIONS

In this paper we have conducted a comprehensive study of the Hong Kong stock market. Hong Kong provides several favorable features to further our understanding of why firms initiate stock splits and reverse stock splits. First, Hong Kong firms appear to be frequent users of stock distributions. Our sample collection procedures allowed us to identify a sample of firms which initiate "clean" splits and reverse splits in the sample period, thus avoiding the contaminating effects of including stock dividends in our sample. Second, we included in our analysis both splits and reverse splits. Our separate treatments of these two events enabled us to distinguish the possible difference in a firm's motivations for these events. Third, we improved upon the Lakonishok and Lev [8] hypothesis of an "optimal price range" by adopting a firm specific variable of historical stock price to explain cross-sectional differences in the use of the spilt factor.

Our analysis on valuation effects of stock distributions showed that stock splits in Hong Kong are in general associated with a large positive return surrounding the announcement date. The three-day announcement day abnormal return averages 18.2%, which is highly significant. This result is consistent with event studies of stock splits such as those conducted by Grinblatt, Masulis, and Titman [7] and Lamoureux and Poon [9], but the magnitude is higher. We also documented an immediate reversal of the stock return after the announcement date. On the ex-date, however, we did not find a significant market response. This result contrasts the positive stock market reactions documented in the literature.

On the reverse stock split sample, we found a negative stock market reaction similar to the results of Peterson and Peterson [11]. However, the returns

are not statistically significant. This may be due to the relatively small size of the reverse split sample.

Our analysis of the cross-sectional distribution of the split factor provides strong support for the "optimal price range" hypothesis in the stock split sample. We found that the coefficients of the relative price of the pre-split price to the historical firm price, the industry average price, and the market average price are all positive. Among the three variables, we found that the relative price of the pre-split price to the historical firm price is most prominent in explaining the usage of the split factor. However, we did not find any systematic pattern in the reverse split sample.

Our cross-sectional results can be interpreted in the following way. If firms intend to appeal for a long-term price target, which can be proxied by a historical average price, firm managers may actively use the magnitude of the split factor to achieve such a task. In the case of reverse splits, one needs to bear in mind that these firms usually suffer from a downward drift in stock return. Hence, the reverse stock split can be viewed as a passive reaction to an erosion in operating performance rather than an active means to achieve a specific objective.

Last but not least, the question of whether the split (or the split factor) is related to the stock market reactions is still debatable. For example, Brennan and Copeland [2] attest that the stock split serves as a signalling device based on the transaction cost argument; i.e., that given the fixed (100) shares per round lot, a split is associated with a change in the transaction cost. Alternatively, Anshuman and Kalay [1] argue that as a result of discrete quoted prices, a split will induce traders to temporarily aggregate their trading when the expected loss of liquidity is lower. Thus, splits can lead to increased liquidity and an associated positive stock return. These arguments, however, do not receive general acceptance because both issues of whether a stock split is a costly signal and whether liquidity increases after the split are not very clear. In the case of splits in Hong Kong, the firm has the discretion to alter the lot size and, hence, the tick size. While not reported in this paper, we have investigated the trading volume and the bid-ask spreads of the firms in our sample. We did not find significant changes in either the trading volume or the bid-ask spread. Thus, the link between the size of the split and its valuation effect would yield to a subject of further investigation.

NOTES

1. The Stock Exchange of Hong Kong (SEHK) provides no guideline on the number of shares per round lot. In our sample all firms with

available data announce a change in the number of shares per round lot simultaneously with the announcement of the split factor. In general, the number of shares is to be adjusted such that the dollar value per round lot is lower than the value prior to the announcement for the stock split sample and higher than the pre-announcement level for the reverse split sample. For example, the Sincere Co., Ltd., initiated a 20-for-1 split effective April 20, 1990. The size per round lot subsequent to this split is adjusted from 500 shares to 1,000 shares. Based on the average pre-split price of $90 in April, the dollar value per round lot is adjusted from HK$45,000 to HK$4,500.

2. Typically, a firm needs to expand the number of authorized shares before the issuance of new securities. This is done at the firm's annual meeting by passing a motion to increase the share base and subsequently applying to the SEC for such a change. It can be argued that to some extent this step puts some limitation on the usage of such activities.
3. The immediate consequence of a stock split or a reverse stock split is the change in the stock price. It is not clear whether a lower (as in the case of a stock split) or a higher (as in the case of a reverse stock split) would convey a clear signal of the value of the firm. One possible implication of firm value is that the lot size of the stock is affected: If the number of shares per round lot remains the same, the lot size (in dollars) will be reduced in a stock split. Such a change in market microstructure of the stock may have implications on trading costs on investors (see [5]).
4. For example, investors may infer a relatively high share price as a large in a mature industry. Similarly, a relatively low share price may be associated with a small and growing company. Thus a young company with fast growth would like to stay in a low share price range, whereas a more mature company would like to remain in a high share price category. Conversely, stocks that have declined significantly in price may prefer to maintain a higher stock price to avoid being labeled as a "penny stock."
5. We collected from the *Fact Book* and the *Securities Bulletin* a total of 266 stock dividends made within the sample period covered by this study. We did not adopt the stock dividend sample in our study for three reasons. First, stock dividends (also called bonus shares) are almost always distributed with cash dividends. Thus, a "pure" sample of stock dividends is impossible to assemble. Second, the size (i.e., the percentage of new shares distributed) is quite small. Although there were a few cases in which the distribution sizes exceeded one, the majority of distribution

sizes covered 10%, 20%, and 25%. These measures also represented the 25 percentile, the median, and the 75 percentile of the size distribution. Based on this observation, we doubt if the stock dividend acts as an active means to regulate the level of the stock price. In addition, since stock dividends are usually distributed along with cash dividends, it is plausible that the stock dividend is, in general, used as a substitute/complement for the cash dividend, as suggested by Lakonishok and Lev [8].

6. There were 66 stock-splitting firms and 27 reverse stock-splitting firms over the 7-year sample period.
7. Similar to the case of the United Kingdom, companies in Hong Kong typically issue seasoned equity through rights issues. Rights issues are therefore analogous to seasoned equity offerings in the U.S. capital markets.
8. The stock market performance in Hong Kong experienced wide fluctuations over the sample period. In 1986 the Hang Seng Index showed a 25% return. In 1987 the stock market advanced sharply in the first nine months and then suffered an intense decline in October. Over the year the Hang Seng advanced by 47.2%. The returns of the Hang Seng in 1988 through 1992 were, -11.4%, 8.8%, 8.9%, 14.7%, and 59.8%, respectively. [Source: *Hong Kong Monthly Digest of Statistics* published by the Census and Statistics Department, Hong Kong Government, various issues].
9. We also calculated the event study results using the whole sample of 67 firms. The results are not materially different from the result using the pure sample.
10. Again, we calculated the market responses using the whole sample of 29 firms. The results are not materially different from the result using the pure sample.
11. Peterson and Peterson [11] found that while the discretionary reverse split sample showed a negative stock price reaction, the valuation effect on reverse split announcements of the non-discretionary sample was positive.
12. Our measure of the split intensity in the split sample is the same as the one used in LL [8]. Since the LL study does not cover reverse stock splits, we adopted the measure in the reverse split analysis that parallels the measure for the split sample. We note that both measures are indicators of the magnitude of the distribution: a large value of $ln(1 + SF)$ suggests a larger split factor; similarly, a larger value of $ln(1 + \frac{1}{SF})$ suggests a reverse split of a "large" magnitude (i.e., each old share is split into more new shares).

13. The SEHK has defined four categories of industries for Hong Kong-listed companies: Financial, Utilities, Property, and Industrial Commercial. We followed this classification rule to account for the industry effect in determining the optimal stock price.
14. The most significant difference between our analytical method and that of LL [8] is that LL do not include the variable FIRM in their cross-sectional models. We repeated the LL methodology, excluding the variable FIRM, and obtained results similar to those of LL.

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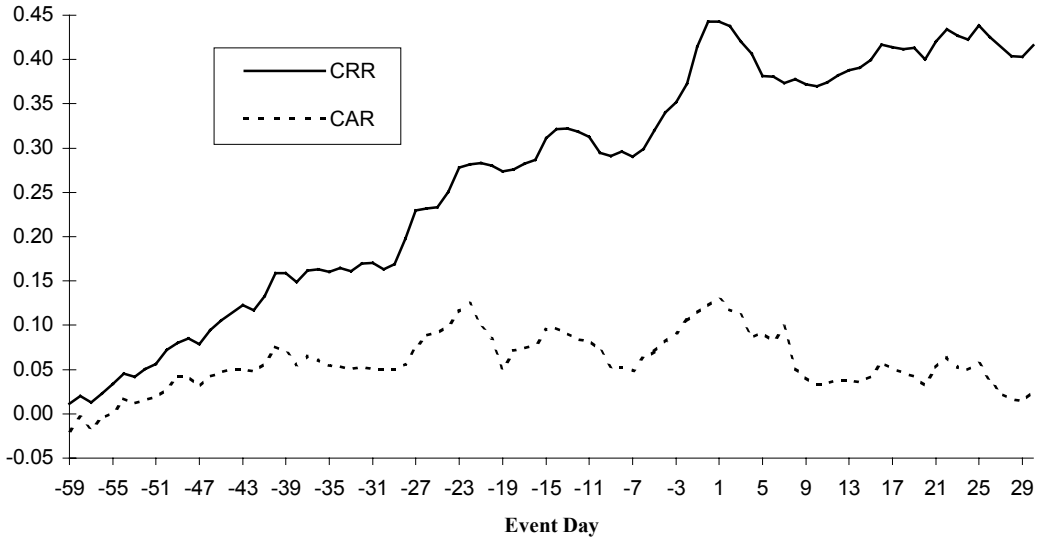
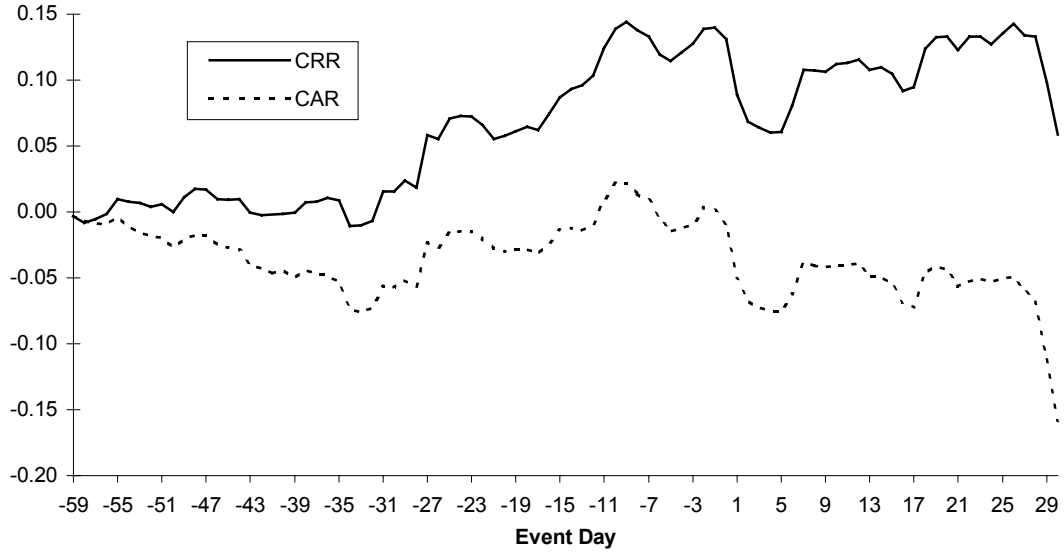
Figure 1: Plot of returns around the announcement date of stock split



* CRR and CAR are cumulative raw return and cumulative abnormal return, respectively.

Lifan Wu and Bob Y. Chan, Department of Economics and Finance, City University of Hong Kong, Tat Chee Avenue, Kowloon, Hong Kong.

Figure 2: Plot of returns around the announcement date of reverse stock split



* CRR and CAR are cumulative raw return and cumulative abnormal return, respectively.