CANADIAN STOCK SPLITS AND FINANCIAL ANALYST FORECASTS: TESTING SIGNALING AND ATTENTION EFFECTS

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ABSTRACT

This paper analyses Canadian market reaction to stock splits over the period 1985-2000. It then attempts to explain this reaction by two hypotheses, namely signaling and attention hypotheses. Results indicate that the Canadian market reacts positively to stock split announcements. Positive average abnormal returns of 1.76% and 1.14% are reported for the announcement date and the following day, respectively. This market reaction is partly explained by signaling hypothesis. An earning prediction error of 115.05% after the announcement date is observed, giving support to this hypothesis. However, the authors are unable to validate the attention hypothesis in Canadian markets. The average revision rate of earnings per share by financial analysts is 3.49%, but is not significant.

INTRODUCTION

Stock splitting is far from being a marginal phenomenon in Canada. It has increased with time, and is receiving more and more interest from financial analysts and investors. This operation, which increases the number of outstanding shares, decreases the price of each share, but has no effect on shareholders' proportional ownership of shares, should in theory be a purely cosmetic change that has no impact on the splitting firm's value. If the total value is independent of the number of shares outstanding, 100 shares at $5 per share must give the same total value as 500 shares at $1 per share. However, empirical studies usually show that a stock split is far from being a purely cosmetic event. They report a positive market reaction to stock split announcements, thus creating a conflict between theory and practice.

There are several papers on US market reactions to stock splits, but few on Canadian market reactions (papers on Canadian markets include Charest, 1980; Kryzanowski & Zhang, 1991, 1993, 1996; Masse, Hanrahan & Kushner, 1997; and Elfakhani & Lung, 2003). Moreover, with the exception of Kryzanowski and Zhang (1996) and Elfakhani and Lung (2003), these Canadian studies do not provide explanations for the positive market reaction surrounding stock split announcements, the interest of the present paper. This paper's concern with analysis of Canadian market reaction to stock split announcements also derives from differences between US and Canadian financial markets. Canadian exchanges are proportionately smaller than US exchanges and many firms are thinly traded small stocks. Additionally, there are different capital gain tax laws in Canada. These factors may affect the way investors react to stock split events. Over a period not covered by previous studies (1985 to 2000), the presence of positive abnormal returns following stock split announcements by Canadian firms listed on the Toronto Stock Exchange (TSE) is tested. Then, the authors try to explain the market reaction (if any) using signaling and attention hypotheses.

Results indicate that Canadian markets react positively to stock split announcements. On average, firms splitting their stock record a 1.76% positive and significant abnormal return on the announcement date, and 1.14% on the following day. An earning prediction error of about 115.05% after the split is also observed. This validates signaling hypothesis, which states that firms split their stock to signal superior earnings. However, the authors are unable to validate attention hypothesis in Canadian markets. The

average revision rate of earnings per share by financial analysts is 3.49% for splitting firms, but is not significant.
The paper continues as follows: Section 2 briefly reviews existing literature on stock splits. Section 3 formulates hypotheses and describes our data and methodology. Results are presented and discussed in Section 4, and Section 5 concludes our study.

LITERATURE

Market reaction to stock splits has been discussed intensively in the financial literature. It is generally agreed that financial markets react positively to split announcements. In US markets, Grinblatt, Masulis and Titman (1984), Lamoureux and Poon (1987), and Rankin and Stice (1997) report short-term positive and significant market reaction, while Ikenberry, Rankin and Stice (1996), Desai and Jain (1997) and Byun & Rozeff (2003) find a long-term reaction to stock splits. In a Canadian market, Charest (1980) has found that split stocks traded on the TSE during the period 1963-1975 outperformed the market by 59% in the pre-split announcement months, but barely matched the market in year 1 and lost 7% in year 2. Kryzanowski and Zhang (1991) find a positive and significant mean abnormal return of 0.74% on the split proposal date over the period 1978-1987, but a non-significant abnormal return over the approval date. Kryzanowski and Zhang (1993) report a positive and significant mean abnormal return on the split ex-date using traditional event-study techniques, but this becomes insignificant after applying conditional residual variances modeled using various ARCH processes. Finally, Elfakhani and Lung (2003) find a positive and significant mean abnormal return in Canada during the period 1977-1993.

While several hypotheses have been advanced to explain financial markets' reaction to stock splits, they can be broadly classified into two groups: optimal price and signaling.

According to the optimal price (or optimal trading range) hypothesis, a stock split realigns a stock price with a "trading range" preferred by investors, thereby increasing transaction volumes and liquidity. Higher stock prices preclude some investors (usually small investors) from buying a stock. A stock split moves the stock price into a more desirable trading range. Decreased stock price makes the stock more attractive for a large number of investors (the optimal trading price results from an arbitrage between a low price, preferred by small investors, and a high price, which decreases the unit transaction cost for large investors). Maloney and Mulherin (1992) report an increase in transaction volume, a decrease in the bid-ask spread, and an increase in the number of shareholders and institutional investors following the stock split. McNichols and Dravid (1990) provide strong evidence for the trading range hypothesis and a positive relationship between returns and split factors. Lakonishok and Lev (1987) also support the trading range hypothesis. Some authors, however, find that the liquidity of split stocks decreases. Copeland (1979) finds a decrease in trading volume and an increase in both brokerage costs and bid-ask spread after the split. Lamoureux and Poon (1987) also find that liquidity is reduced by a split and increased by a reverse split. In Canada, dichotomizing trade by size, Kryzanowski and Zhang (1996) report that small firms benefit from stock splits in terms of enhanced marketability and lower liquidity premium. This is not the case for larger traders. Elfakhani and Lung (2003) find support for the trading range hypothesis and increased liquidity in Canada over the period 1977-1993.

Signaling hypothesis presumes that managers know more about the value of their firm than investors and use stock split to convey favorable information to the latter. Stock splitting, then, is a device for managers to signal their highest earnings potential to financial markets. Brennan and Copeland (1988) find that in cases where expensive signaling is used to convey credible information to investors, stock splits explain about 27% of abnormal returns. McNichols and Dravid (1990) also support signaling hypothesis and find a positive correlation between abnormal returns and the split ratio. Doran (1995) finds that following the split event, earnings significantly exceed analysts' earnings forecasts, suggesting that the split event signal represents valuable information about future favorable earnings. US evidence on signaling

hypothesis includes Lakonishok and Lev (1987), and Crawford and Franz (2001). In Canada, there is no clear evidence regarding signaling effects. Although Elfakhani and Lung's (2003) conclusions support signaling hypothesis over the period 1977-1993, their test is very weak. Specifically, they report that "earnings per share do increase after the stock split announcement but not significantly. Thus, the earnings results must be interpreted with caution" (page 210).

HYPOTHESES, DATA AND METHODOLOGY

Three hypotheses are tested in this article:

The first hypothesis concerns the informational content of stock splits. It states that stock splits are good news for financial markets. Consequently, firms that split their stock record a positive abnormal return around the announcement date. This hypothesis is formulated as follows:

Hypothesis 1: Canadian financial markets positively react to stock split announcements.

The second hypothesis tests the signaling effect of stock splits. It is based on the presumption that managers know more about the value of their firms than investors. The asymmetric information between these two parties forces managers to use financial decisions such as stock splits to convey favorable information to investors. Stock splits are a device for managers to signal higher earnings potential relative to analysts' forecasts.

Thus, Hypothesis 2 states the following:

Hypothesis 2: Firms splitting their stock record positive earnings prediction error after the announcement date.

The attention hypothesis is a special version of signaling theories. It maintains that managers announce a stock split to attract the attention of financial analysts, which leads to a reassessment of the firm's future cash flow. Based on this presumption, Hypothesis 3 is formulated as follows:

Hypothesis 3 There is an upward revision of split earning forecasts by financial analysts after the announcement date.

This study covers 16-year running from 1985 to 2000. All stock split executions reported in the *Toronto Stock Exchange Monthly Review* over the study period are identified. 458 splits made by 398 firms are obtained. Next, *The Globe and Mail, Financial Post,* and *Canadian Business Index* are used to identify stock split announcement dates. From the 458 observations 160 splits are excluded because the exact announcement dates was not identified. 95 observations from firms with a split ratio lower than 25% or simultaneously announcing other events able to induce market reaction (dividend increases or decreases, divulging of results, sales forecast updates, merger and acquisition announcements) are also excluded. After these adjustments, 203 stock split announcements free from any "contaminating" effect are used in this study. Stock returns is collected from *Datastream,* and of the 203 announcements, complete data on both dividend adjusted returns, firm size and SIC code for 119 announcements is obtained. These 119 observations (hereafter labeled a complete test sample) are used to test the first hypothesis.

To create samples for Hypotheses 2 and 3, the authors retrieve financial analyst earning forecasts from *IBES Canada Database*. To be included in the test sample, firms need to be followed by at least three financial analysts before the split announcement date. This leads to a reduced test sample of 43 observations to be used in these two hypotheses (hereafter labeled test sample). A control sample of 46 non-splitting firms is used to control for possible size and industry effects. This is done by matching

every company that had a stock split announcement to a non-splitting firm from the same industry (based on the Standard Industrial Classification (SIC) code) with an asset value that is as close as possible to the splitting company's asset value. Following Lakonishok and Lev (1987), total assets are preferred as the size measure over the market value of equity, because in the period preceding the announcement of splits there is usually a substantial increase in the market value of stocks. The following market model is used to generate expected returns which will later be used to compute event day abnormal returns:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}, \quad (1)$$

where

R_{it} is the realized return of stock i on day t, R_{mt} is the market portfolio return (the Toronto stock index) on day t, α_i and β_i are coefficients to be estimated and ε_{it} is the error term.

Parameters are estimated with ordinary least square. However, when preliminary tests indicate that return series are autocorrelated and heteroscedastic, AR (p) or GARCH (p,q) model is used.

The window used to estimate Equation (1) parameters ranges from day -60 to day -4 before the split announcement date, while the event window is represented by days -3, -2, -1, 0, 1, 2, and 3, with day 0 as the announcement day. Of particularly interest is day t = 0 and t = 1, since stock split announcements become public information a day after their official announcement.

Firm i abnormal return on event day t is given by:

$$A_{it} = R_{it} - (\hat{\alpha}_i + \hat{\beta}_i R_{mt}), \quad (2)$$

where $\hat{\alpha}_i$ and $\hat{\beta}_i$ are coefficients to be estimated from Equation (1).

Following Brown and Warner (1985), when abnormal returns are normally distributed, for each event day (t = -3, -2, -1, 0, 1, 2, 3), whether they were significantly different from zero is checked using the following student test:

$$T_{statistic} = \overline{A}_t / \hat{s}(\overline{A}_t), \quad (3)$$

where the mean and the standard deviation of mean abnormal returns are respectively given by:

$\overline{A}_t = \frac{1}{N}\sum_{i=1}^{N}(A_{it})$, with N representing the sample size,

$$\hat{s}\left(\overline{A}_t\right) = \sqrt{\frac{1}{56}\sum_{t=-60}^{-4}(\overline{A}_t - \overline{A}\,\overline{A}_t)^2}, \quad \text{with} \quad \overline{A}\,\overline{A}_t = \frac{1}{57}\sum_{t=-60}^{-4}\overline{A}_t$$

However, when abnormal returns are not normally distributed, non-parametric tests such as the sign test and the Wilcoxon test is used to check whether or not their mean value is statistically different from zero.

To test for the presence of the signaling effect formulated in Hypothesis 2, the earning prediction error for both splitting and non-splitting firms as follows are computed:

$$EPE_i(\%) = \left[AEPS_i - CEPS_i\right] / \left|CEPS_i\right|, \quad (4)$$

Where

EPE_i is the firm i earning prediction error (in percentage) after the announcement date, $AEPS_i$ is firm i observed earnings per share in the announcement year and CEPS is the consensus formed by financial analysts on firm i earning per share before the announcement date for the announcement year. *IBES Canada* provides both earnings per share -EPS- forecasts for individual financial analysts and mean EPS forecasts for all financial analysts following a stock. To form a financial analyst consensus in the EPS forecast, the median of individual EPS forecasts is used).

For both the test and the control samples, the mean EPE is computed and the Wilcoxon test is used to assess if it is positive and significant. For splitting firms, a positive and significant mean EPE is anticipated.

Further, for each pair of firms drawn from the two samples, the difference in EPE (D_EPE) is computed and is tested if its mean is significantly different from zero. A positive and significant value for mean D_EPE is anticipated.

$$D\_EPE_i = EPE_i(Test) - EPE_i(Control) \quad (5)$$

To test for the presence of the attention effect formulated in Hypothesis 3, the revision of earnings per share by financial analysts for both splitting and non-splitting firms is computed as follows:

$$REVISION_i(\%) = \left[CEPSafter_i - CEPSbefore_i\right] / CEPSbefore_i, \quad (6)$$

Where

$REVISION_i$ refers to the revision (in percentage) of firm i earnings per share by financial analysts, and CEPS is the consensus formed by financial analysts on firm i earnings per share.

For both samples, the mean REVISION is computed and the Wilcoxon test is used to assess if it is positive and significant. For splitting firms, a positive and significant mean REVISION is anticipated. Further, for each pair of firms drawn from the two samples, the difference in REVISION (D_REVISION) is computed and is tested whether its mean is significantly different from zero. A positive and significant value for mean D_REVISION is anticipated.

$$D\_REVISION_i = REVISION_i(Test) - REVISION_i(Control) \quad (7)$$

RESULTS AND ANALYSES

Descriptive Statistics

Table 1 presents the distribution of the 458 stock splits recorded over the period 1985-2000. Notice that 92% of them are large splits and that the split ratio is generally around 2 to 1.

Table 2 reports statistics on the test and control samples. The statistics presented for the test sample are related the 46 observations used to test Hypotheses 2 and 3. Although the complete test sample includes 119 observations, reduced test sample statistics are used in order to compare them with those of the control sample.

Table 1: Distribution of Stock Splits in Canada During the Period 1985-2000

Large splits (higher than 100%)			Low splits (between 25 and 100%)		
Ratio	Number	Percentage	Ratio	Number	Percentage
2:1	319	69.65	3:2	34	7.42
3:1	76	16.59	5:4	2	0.44
4:1	10	2.18	4:3	1	0.22
5:1	8	1.75			
6:1	3	0.66			
10:1	3	0.66			
7:1	2	0.44			
Total	421	92	Total	37	8

The mean and median sizes of the test sample are slightly higher than those of the control sample. For earnings per share, the two samples have an almost identical mean. Conversely, the control sample has a higher median earnings per share. On the other hand, the average number of financial analysts following firms in the test sample is almost the same as in the control sample.

Table 2: Sample Characteristics

	Total assets*	EPS*	Number of Financial Analysts
Test sample			
Mean	9,641,037	0.52	10.02
Median	420,810	0.32	6.50
Control sample			
Mean	7,294,631	0.60	9.24
Median	307,848	0.55	7.50

* Total assets and earnings per share (EPS) are expressed in Canadian dollars.

Table 3 reports descriptive statistics on abnormal returns for –3 to +3 event days. It is evident that abnormal returns are not normally distributed. In all event days, their skewness is different from zero. Their kurtosis is also larger than 3, which may signal the presence of extreme values. Consequently, non-parametric tests in the hypotheses tests are used.

Table 3: Distribution of Abnormal Returns

	Day						
Statistics	-3	-2	–1	0	+ 1	+2	+3
Minimum	-0.086	-0.127	-0.214	-0.091	-0.098	-0.065	-0.007
Maximum	0.106	0.138	0.099	0.201	0.147	0.123	0.011
Mean	0.003	0.03	0.001	0.017	0.011	0.003	0.002
Median	0.001	0.0009	0.0002	0.008	0.006	-0.001	0.000
Standard dev.	0.024	0.031	0.034	0.041	0.035	0.029	0.027
Skewness	0.789	0.205	-1.815	1.427	0.845	1.179	0.057
Kurtosis	6.712	9.755	15.893	6.850	5.472	6.039	5.482
Jarque-Bera Stat.	80.684	227.10	889.63	113.90	44.472	73.389	36.969
P-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Market Reaction to Stock Split Announcements (Hypothesis 1)

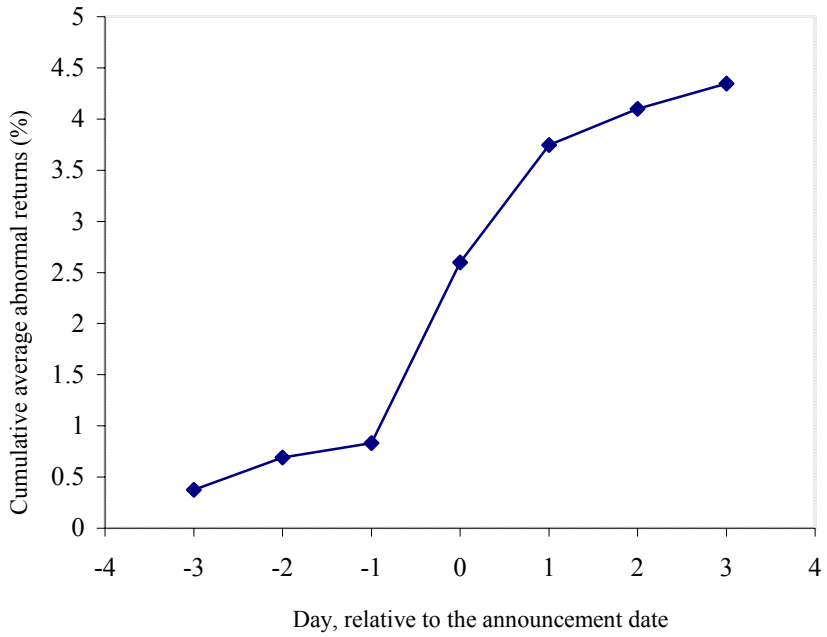
Table 4 reports an average positive abnormal return of 1.76% on the stock split announcement date and 1.14% the day after. Both the sign test and Wilcoxon test show that these average abnormal returns are statistically different from zero at a 5% level. For the other event dates, abnormal returns are not significantly different from zero at a 5% level. This validates our first hypothesis, which states that Canadian markets react positively to stock split announcements. It also confirms results previously found by some Canadian studies using different periods (see, for instance, Kryzanowski & Zhang 1991; Elfakhani & Lung, 2003).

Table 4: Non-parametric tests for market reaction to stock splits

Event date	**Mean Abnormal Return (%)**	**Sign Test**				**Wilcoxon Test**	
		Z-statistic	P-value	$A_{it} > 0$	$A_{it} < 0$	Z-statistic	P-value
T=-3	0.37	0.92	0.36	65	54	1.19	0.23
T=-2	0.31	0.91	0.35	65	54	1.38	0.16
T=-1	0.14	0.18	0.85	61	58	0.55	0.58
T=0	**1.76**	**3.48**	**0.00**	**79**	**40**	**4.40**	**0.00**
T=1	**1.14**	**2.56**	**0.10**	**74**	**45**	**3.17**	**0.001**
T=2	0.35	1.83	0.06	49	70	0.01	0.98
T=3	0.24	0.00	1.00	59	60	0.79	0.42

Figure 1 presents the cumulative mean abnormal return over the event period (days -3 to +3).

Figure 1: Evolution of Cumulative Abnormal Returns for the Six Days Surrounding the Split Announcement Date



Notice from this figure a positive cumulative abnormal returns from t = -1 to t = +1, which tends to become stable after the stock split announcement (precisely after day 1). This clearly associates abnormal returns with stock split announcements.

Existence of a Signaling Effect (Hypothesis 2)

For both splitting and non-splitting firms, the earning prediction error after the stock split announcement is computed. The results reported in Table 5 following indicate the presence of a mean earning prediction error of 115.05% for the test sample and 0.53% for the control sample. The test sample mean average earning prediction error is statistically different from zero, though this is not the case for the control sample. Moreover, the difference in mean earning prediction error between the two samples is positive (i.e., is higher for firms announcing a stock split).

Table 5: Wilcoxon test for earnings prediction error after announcement date

	Mean EPE (%)	**Z-statistic**	**P-value**
Reduced sample	115.05	3.977	0.0001
Control sample	53.61	0.767	0.9056
Difference in EPE (%)	61.44	0.994	0.320

These results validate Hypothesis 2 which states that splitting firms record surprisingly positive earnings per share. This allows us to partially explain the positive reaction of Canadian markets to stock splits by the signaling effect, and reinforces results found in Canadian markets by Elfakhani and Lung, (2003). It also confirms those found in US markets. Doran (1994) reports that in the US, firms announcing a stock split record a positive and significant earning prediction error of 22.9 %. Ye (1999) also found positive and significant earning prediction error in US markets on event days.

Existence of an Attention Effect (Hypothesis 3)

For both splitting and non-splitting firms, the revision of earnings forecast by financial analysts after the stock split announcement is computed. The results reported in the following Table 6 indicate that the mean revision of earnings per share forecasts by financial analysts is not significantly different from zero for both samples. There is an upward (but non-significant) revision of forecast earnings per share of 3.49% for splitting firms and a downward (but non-significant) revision of forecast earnings per share of 2.51% for the control sample. The 6% mean difference revision between the two samples is also not significantly different from zero at a 5% level. Consequently, Hypothesis 3 cannot be validated. This result contrasts with those reported in empirical studies of US markets. Klein and Peterson (1989) and Doran (1994), respectively, found a positive and significant 1.6% and 8.5% revision of forecast earnings per share by financial analysts for splitting firms.

Table 6: Wilcoxon test for financial analysts' revision of forecast earnings per share

	Mean Revision (%)	**Z-statistic**	**P-value**
Reduced sample	3.49	1.352	0.176
Control sample	-2.51	-1.192	0.233
Difference in revision (%)	5.99	1.579	0.114

CONCLUSION

The aim of this paper was primarily to test the existence of a positive market reaction to stock split announcements by Canadian firms over the period 1985-2000 (which is different from the periods used in previous Canadian studies), and next, to attempt to explain an eventual positive market reaction using signaling and attention effects.

Results confirm those found in previous Canadian studies. Positive and significant average abnormal returns of 1.76% and 1.14% for the announcement date and the following day, respectively is found.

The test of the signaling effect hypothesis partially explains this market reaction. Managers seem to split their stock in order to signal higher earnings to financial markets. However, they are unable catch the attention of financial analysts, since these analysts do not adjust (upward) their forecast earnings per share after the split. Thus, the authors cannot validate the attention effect hypothesis in the Canadian market.

The results found in this paper are globally interesting in that they confirm those found in previous Canadian and US studies.

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