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Intra-Industry Reactions of Stock Split Announcements

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Abstract

This paper examines whether favorable information conveyed by stock split announcements transfers to non-splitting firms within the same industry. We find that there exists intra-industry reaction; shareholders of non-splitting firms experience significant positive abnormal returns during the stock split announcement period of their industry counterparts. In addition, we find that industry-wide (level of concentration) and firm-specific characteristics (degree of similarity with the splitting firm, level of asymmetric information, and mispricing) are important determinants in explaining the impact of the announcements on non-splitting firms. We further document an increase in earnings subsequent to the announcements which is associated to the stock price reactions. However, we find little evidence that there is a decline in earnings volatility and find no significant relation between change in earnings volatility and announcement period returns.

Intra-Industry Reactions of Stock Split Announcements

1. Introduction

A substantial amount of research shows that there is an association between equity value of firms releasing information and that of non-releasing firms within the same industry. This association, known as intra-industry reaction or information transfer, has been documented in different contexts such as bankruptcy announcements (Aharony and Swary (1996), Lang and Stulz (1992)), bond rating adjustments (Akhigbe, Madura and Whyte (1997)), dividend change announcements (Firth (1996), Laux, Starks, Yoon (1998)), earnings announcements (Foster (1981)), and securities offerings (Szewczyk (1992)). In this paper, we extend prior studies by examining whether stock split announcements affect stock prices of non-splitting firms in the same industry.

Prior literature documents that the market reacts favorably to the announcements of stock splits and presents two major hypotheses to explain the positive stock returns.¹ The information content hypothesis suggests that stock splits reveal favorable information about cash dividend and/or unusual earnings increases subsequent to the announcement.² The trading range hypothesis argues that firms who experience a run-up in stock prices split their stocks to move the firms' share price into an 'optimum trading range' thus improving trading liquidity.³ By examining intra-industry reaction to stock split announcements, this study distinguishes between these two hypotheses as motivations for stock splits. Since the trading range of non-splitting firms' stocks does not change, abnormal announcement period stock price reactions of these firms cannot be attributed to enhanced liquidity but is consistent with the hypothesis that stocks splits reveal information about future prospects of the industry.

In addition, stock splits are ideal experimental setting within which to examine the impact of factors that affect market's inference about stock prices. The events that are studied in the

¹ See Fama, Fisher, Jensen, Roll (1969), Grinblatt, Masulis, and Titman (1984), Asquith, Healy and Palepu (1989), Lamoureux and Poon (1987), Brennan and Copeland (1988), McNichols and Dravid (1990), Ikenberry, Rankine, and Stice (1996), Pilotte and Manuel (1996), and Desai and Jain (1997).

² See Fama, Fisher, Jensen and Roll (1969), Asquith, Healy and Palepu (1989), McNichols and Dravid (1990) and Desai and Jain (1997).

³ See Baker and Gallagher (1980), Lakonishok and Lev (1987), Maloney and Mulherin (1992), Muscarella, and Vetsuypens (1996), and Schultz (1999). A variation of this hypothesis is presented by Angel (1994) who argues that firms split their stocks to attain an optimum tick size relative to the share price.

existing literature (*e.g.*, dividends and earnings changes, bankruptcy announcements *etc.*) all have direct cash flow implications for the announcing firm or its investors; and possibly for non-announcers. Therefore, they convey information about past and current cash flow that was not already public, as well as information about the firm's future prospects. Stock splits are cosmetic accounting changes with no direct impact on the announcer's future cash flows or that of non-announcers. Thus the stock split announcement period reactions for both the announcing and non-announcing firms only reflect the market's inference about the future prospects of these firms conveyed by the event. This paper therefore provides a clean experiment to test hypotheses relating to industry and firm-specific factors that affects information transfer about firms' value within an industry.

In examining intra-industry information transfers most prior studies document a net *contagion effect* at the announcement of a corporate event, *i.e.*, the stock price reaction for other firms in the industry moves in the same direction as that of announcing firms. However, Lang and Stulz (1992) and Laux, Starks, and Yoon (1998) argue that in highly concentrated industries where competition for market share is high, certain events may trigger a change in the competitive balance within the industry. Thus the announcements of these events will result in stock price movements for other firms in the industry in a direction opposite to that of the announcing firm, *i.e.*, *competitive effect*. In this study we explain the diverse stock price reactions of non-splitting firms at the announcements of stock splits. We find that industry-wide and firm-specific characteristics are important determinants of the differential impact of stock split announcements on non-splitting firms.

Using a sample of 327 clean stock split announcements between 1986 to 1995, we find that shareholders of non-splitting firms experience a significant increase in stock prices during the announcement period. This significant reaction suggests that there exists an intra-industry reaction to stock split announcements supporting the information content hypothesis. The positive abnormal returns of non-splitting firms also indicate that information conveyed by the announcements has a net contagion effect on the equity value of non-splitting firms. The contagion effect appears to be influenced by the degree of concentration within an industry. Firms in industries with low level of concentration experience significantly higher returns than those in industries with high level of concentration.

We also find that firm-specific characteristics explain the differential industry-wide reaction to stock split announcements. Consistent with Lang and Stulz (1992), we find that when the degree of homogeneity proxied by earnings correlation between splitting and non-splitting firms is high, non-splitting firms experience significant net contagion effects. Non-splitting firms with high degree of asymmetric information captured by return variance have a more positive stock price reaction than those firms where there is little or no asymmetric information. In addition, we find that the degree of undervaluation proxied by book-to-market ratio matters; firms that are more likely to be undervalued experience significant greater announcement period returns than those classified as overvalued firms.

Further supporting evidence is provided by the results of cross-sectional regressions where level of concentration, degree of similarity, level of asymmetric information and undervaluation significantly affect the magnitude of intra-industry announcement period reactions. We also document an increase in earnings of non-splitting firms subsequent to stock split announcements and the earnings change is positively associated with stock price reactions of non-splitting firms. These findings suggest that investors react positively to non-splitting firms in anticipation of earnings increases following the announcement.

The rest of this paper proceeds as follows: Section 2 describes the contagion and competitive effects, the different industry and firm-specific factors that would affect non-splitting firms and develops hypotheses relating to intra-industry reactions. Section 3 describes data selection and matching process. Section 4 analyzes the results and section 5 summarizes and concludes the paper.

2. Intra-Industry Reactions of Stocks Split Announcements

2.1. Contagion and Competitive Effects

Fama, Fisher, Jensen and Roll (1969), Asquith, Healy and Palepu (1989), McNichols and Dravid (1990) and Desai and Jain (1997) indicate that stock splits reveal favorable future information. Prior literature also finds evidence that stock splits are followed by abnormal increases in dividends and/or earnings. While a stock split results in an increase in stock price for the splitting firm, it might also reveal information about the industry in general. The direction of

the industry stock price movement will depend on whether the information revealed has a net contagion or competitive effect on non-splitting firms.

Foster (1981) and Szewczyk (1992) argue that because of homogeneity of firms within the industry, information released by a firm causes the market to reevaluate the value of both announcing and non-announcing firms in the same direction. Asquith, Healy and Palepu (1989) document that firms that announce stock splits are in industries that experience abnormally high earnings growth during the announcement year. They suggest that the similarity of firms within the splitting firm industry is the reason for the unusual earnings increases across all firms in the industry on average. Therefore, the positive information revealed by split announcements could generate a significant increase in share prices for splitting as well as non-splitting firms. The positive reaction for non-splitting firms is called 'contagion' effect.

However, stock splits may provide a negative impact on non-splitting firms and cause their stock prices to fall. This effect is more pronounced for industries with imperfect competition where the announcement of an event reveals comparative information about other firms in the industry. For example, the performance of non-splitting firms could be perceived as 'poor' relative to the superior performance of splitting firms. At the extreme, wealth could be redistributed from non-splitting firms to the splitting firm. Hence, a positive split signal of one firm may convey unfavorable information for other firms in the industry. This negative reaction is called 'competitive' effect.⁴

The contagion and competitive effects are not mutually exclusive and thus the observed stock price reaction is the sum of these two effects. Either a significant positive or negative reaction for non-splitting firms indicates that stock split announcements are not only firm-specific events but impact the industry as well. A positive reaction suggests that non-splitting firms gain from stock split announcements of their industry counterparts implying a net contagion effect. Alternatively, a negative reaction for the non-splitting firms suggests that these firms experience a net competitive effect, *i.e.*, the announcement of a stock split by an industry firm reveals an overall unfavorable information for non-splitting firms. The finding of significant announcement returns for non-splitting firms suggests that stock splits are employed to reveal information as opposed to increasing trading liquidity. Finally, if the stock price reaction is not significant, one

⁴ For more details, see Lang and Stulz (1992).

of the following three possibilities might explain the result. First, stock split announcements may reveal only firm-specific information and thus not have an industry-wide effect. Second, stock splits have an intra-industry effect but the positive (contagion) effects for some firms cancel the negative (competitive) effects for other firms in the industry resulting in an insignificant reaction. Third, the main motive for stock splits may not be to reveal information, but rather to increase liquidity by moving share prices into the ‘normal’ range.

2.2. Industry and Firm-Specific Characteristics Influencing Intra-Industry Reactions

In this section we examine the impact of industry and firm-specific factors on the market’s perception of change in non-splitting firms’ equity value at the stock split announcement. As stated earlier, unlike prior studies that examine intra-industry effects for events with strong current and future cash flow implications, this study tests the market’s inference of non-splitting firm’s stock value from an event that is purely accounting in nature. Thus this study provides a uncontaminated setting to test of how the market incorporates these factors in pricing securities while reacting to a corporate event.

2.2.1 Industry Reactions and Industry Characteristics

Lang and Stulz (1992) argue that in highly concentrated industries where the competition for market share among firms is high, the competitive effect is more pronounced. Thus a stock split announcement by a firm in highly concentrated industries is more likely to reveal unfavorable information about its competitors, causing a shift in the competitive balance within the industry. Therefore, relative to non-splitting firms in low concentrated industries, firms in highly concentrated industries are expected to experience less positive returns from stock split announcements of their industry counterparts. We would anticipate a negative relation between announcement period returns of non-splitting firms and the degree of concentration within the industry.

2.2.2. Industry Reactions and Firm-Specific Factors

(i) Degree of Similarity

Foster (1981), Lang and Stulz (1992), and Firth (1996) find that abnormal returns of non-announcing firms whose characteristics are closely related to those of the announcing firms are larger than the abnormal returns of non-announcing firms whose characteristics are dissimilar. They argue that this result is consistent with greater intra-industry information transfer for firms with similar characteristics that are affected by common factors. Their results would imply stock split announcements will affect non-splitting firms with a high degree of similarity to splitting firms more than those with low degree of similarity. This suggests a positive relation between abnormal returns of non-splitting firms and degree of similarity between splitting and non-splitting firms.

(ii) Level of Asymmetric Information for Non-Splitting Firms

Grinblatt, Masulis and Titman (1984) and Ikenberry, Rankine and Stice (1996) find significantly higher stock price reactions at the announcement of stock splits for firms classified as having high level of information asymmetry relative to other splitting firms. They conclude that for these firms, stock splits reveal more information. If stock splits reveal industry-wide information, their findings will imply that non-splitting firms that have a high level of asymmetric information will experience a greater impact from the announcement than other firms in the industry. This would predict a positive relation between abnormal returns for non-splitting industry firms and the degree of asymmetric information.

(iii) Degree of Underpricing for Non-Splitting Firms

Fama and French (1992) find that stocks with high book relative to their market value (*i.e.* value stocks) outperform those with low book relative to the market value (*i.e.* glamour stocks). Lakonishok, Shleifer and Vishny (1994) find evidence consistent with Fama and French (1992). They further show that earnings growth for value stocks are significantly higher than glamour stocks and argue that high (low) book-to-market ratio stocks are underpriced (overpriced). If book-to-market is a measure of the degree of undervaluation and stock splits reveals information about the industry, undervalued firms would be affected more from the announcements than overvalued firms. This suggests that returns of non-splitting firms will be positively related to book-to-market ratio.

3. Data Selection and Matching Process

3.1. Data Selection

The sample used in this study is obtained from the *Center for Research in Security Prices* (CRSP) tape and is cross-referenced with the *Wall Street Journal Index*.⁵ There are 4,497 stock distributions, *i.e.*, stock splits and stock dividends announced during the period of 1986 to 1995. Following Grinblatt, Masulis and Titman (1984), we delete stock distributions with split factor (defined as the number of additional shares per existing share) less than or equal to 0.25 (600 observations). Similar to Lang and Stulz (1992) we assign firms to an industry group on the primary four-digit SIC codes obtained from *Compustat*. We exclude firms whose (a) four-digit SIC code is not available (452 observations), (b) SIC code begins with 49- and 6- (992 observations) representing public utilities and financial institutions since these firms are regulated and thus their announcements convey little information (Asquith and Mullins (1986) and Szewczyk (1992)), and (c) shares are not traded on major exchanges (*i.e.* AMEX, NASDAQ or NYSE, 65 observations).

Foster (1980) argues that the amount of information is inversely related to the sequence of information releases. Pilotte and Manuel (1996) examine firms that conduct multiple stock splits and find evidence consistent with Foster (1980), suggesting that the market reacts more positively to the first stock split than to subsequent announcements. Therefore, to focus on stock splits that are expected to convey the greatest amount of industry-wide information, we exclude splits conducted less than one year from the previous stock split announced by a firm in the same industry (1,607 observations).⁶ Similar to Firth (1996) we eliminate 436 observations with contemporaneous announcements over the announcement period. We also drop firms that do not have return information during the announcement period window and firms with no industry matches. The final sample consists of 327 stock splits announced during 1986 to 1995.

3.2. Matching Process

⁵ The split data is from CRSP tape distribution code 5523.

⁶ Other studies relating to information transfers have also eliminated observations having low industry-wide information (Lang and Stulz (1992), Szewczyk (1992) and Firth (1996)). We find that the announcement period

The non-splitting firms include all other firms (both active and research firms) listed on *Compustat* that satisfy the following criteria:

1. They have the same four-digit SIC code as splitting firms.
2. Their shares are traded on AMEX, NASDAQ or NYSE.
3. A five-day announcement period return is available on CRSP.
4. They do not announce stock splits within an eleven-day period centered around day 0 of the splitting firm announcement.⁷

The last criterion ensures that stock splits announced by matching firms during the event window are not a possible cause for the significant results for these firms. There are 3,684 non-splitting firms in 199 different four-digit SIC codes. The average (median) number of non-splitting firms for each splitting firm is 11.26 (7) with a minimum of 1 and a maximum of 66. Only 3 observations have more than 50 matching firms.

4. Empirical Results

4.1. Abnormal Returns of Non-Splitting Firms

Similar to Aharony and Swary (1996) and Ikenberry, Rankine and Stice (1996) we use five-day cumulative abnormal returns calculated from day -2 to +2 relative to the announcement day to measure the announcement period returns for both splitting and non-splitting firms. The abnormal returns are defined as returns in excess of the value-weighted market returns.⁸ Table 1 presents the results of abnormal returns for both splitting and non-splitting firms. The splitting firms experience significant daily excess returns during the stock split announcement period. Consistent with Ikenberry, Rankine and Stice (1996) we document a significant average five-day cumulative announcement period of 3.82 percent. This result confirms the conclusion of prior studies that stock splits are considered ‘good’ news thus resulting in an increase in equity value at the announcements.

As stated earlier the effect of stock split announcements on non-splitting firms in the industry is the sum of two effects: (a) the contagion effect where shareholders of non-splitting

returns for non-splitting firms at the announcement of the second split within an industry is lower relative to the first split.

⁷ This process is similar to Firth (1996). The results are robust to the window used.

⁸ See Bar-Yosef and Brown (1977) and Brown and Warner (1985).

firms benefit from favorable information conveyed by the announcements and (b) the competitive effect where split announcements reveal comparative unfavorable information for non-splitting firms in the industry causing stock prices of these firms to decline. Observing a significant intra-industry reaction suggests that information conveyed by the stock split announcement transfers to non-splitting firms within the same industry indicating that these announcements are associated with revealing industry-wide information rather than enhancing liquidity.

To test the impact of stock splits on non-splitting firm we examine the abnormal returns for non-splitting firms around the split announcement date. However, since the announcement period for a given split is the same for all non-splitting firms in an industry, there is a correlation of returns problem that results in biased test statistics. To control for this 'clustering problem' we form an equally-weighted portfolio of all non-splitting firms in the same industry for each split. Thus the abnormal returns for non-splitting firms are portfolio abnormal returns as opposed to individual abnormal returns. The results presented in table 1 suggest that over the announcement period window the mean five-day cumulative return for non-splitting firms is 0.34 percent, significant at the 10 percent level.⁹ The small but significantly positive abnormal announcement period returns suggests that an intra-industry reaction exists in the context of stock split announcements. Since the announcement of a stock split does not impact the trading range of non-splitting firms' stocks, the significant announcement period returns for these firms are consistent with the information content hypothesis that stock splits reveal information. A positive reaction of non-splitting firms also indicates that favorable information conveyed by stock split an announcement has a net positive impact on non-splitting firms in the same industry. These results support the finding of previous studies that the market reevaluates the value of announcing firms and that of non-announcing firms in the same direction (Foster (1981) and Szewczyk (1992)).

4.2. Industry Reactions and Industry and Firm-Specific Characteristics

4.2.1. Industry Reactions and Level of Concentration

Lang and Stulz (1992) document that the competitive effect is more pronounced in highly concentrated industries where the competition among firms is high; stock splits announced by a

⁹ We eliminate an outlier where the abnormal return exceeded 300 percent. Inclusion of this observation does not significantly alter the results.

firm tend to reveal comparative information about non-splitting firms within the industry resulting in less positive returns for these firms. In this section, we test whether non-splitting firms in low concentrated industries benefit more from stock split announcements than those in highly concentrated industries. Consistent with Lang and Stulz (1992) and Laux, Starks, and Yoon (1998), we use Herfindahl Index (HI) to measure the degree of concentration within an industry. We calculate HI by summing square market share of each firm relative to all other firms with the four-digit SIC code. Market share is defined as the firm's annual sales at the fiscal-year end prior to the stock split announcement as a percentage of industry sales. A low (high) HI indicates a low (high) level of concentration and hence a low (high) degree of competition among firms. We follow the Antitrust Guidelines by the Department of Justice which uses Herfindahl-Hirschman index (HHI) as a quantitative measurement of concentration level in defining highly concentrated industries. The Department of Justice classifies an industry with HHI greater than 1,800 to be a highly concentrated industry.¹⁰

Table 2 presents abnormal returns for the portfolio of non-splitting firms partitioned by Herfindahl index. For low concentrated industries, stock prices of non-splitting firms increase significantly by 0.73 percent compared to 0.16 percent for non-splitting firms in highly concentrated industries. The test statistic for the difference in mean returns between firms in high and low concentrated industries is significant at the 10 percent level. These results suggest that the level of concentration is an important determinant of the cross-sectional variation in announcement period returns for non-splitting firms; non-splitting firms in highly concentrated industries experience lower benefits from stock split announcements than those in low concentrated industries and is consistent with the findings of Stulz (1992) and Laux, Starks, and Yoon (1998).

4.2.2. Industry Reactions and Similarity of Earnings

Foster (1981) and Lang and Stulz (1992) find evidence suggesting that the contagion effect is more pronounced for non-announcing firms with high degree of similarity to announcing firms. Foster (1981) reasons that an announcement of a firm conveys more information for non-

¹⁰ HHI is calculated by summing over the largest 50 firms in the industry. See Parkin 3rd edition.

announcing firms that display similar characteristics to the announcing firm than for those whose characteristics are different. Their findings predict that non-splitting firms with high degree of similarity to splitting firms gain more from stock split announcements of their industry counterparts than those with low degree of similarity.

Since Firth (1996) suggests that firms that are similar to each other have a high correlation of earnings we use earnings correlation as a measure of the degree of similarity between firms. To eliminate the effects of capital structure and taxes, we compute earnings correlation of annual earnings before interest and taxes for ten years preceding the stock split announcement. A non-splitting firm is considered ‘highly similar’ (‘highly dissimilar’) to a splitting firm if their earnings correlation is greater than or equal to (less than) the sample median correlation of 0.20.

Table 3, panel A, presents the results when non-splitting firms are partitioned by degree of similarity. We find that the mean abnormal returns for the sub-sample of non-splitting firms portfolios whose earnings correlation is less than the sample median (*i.e.*, dissimilar firms) is -0.34 percent. For non-splitting firms portfolios that are ‘highly similar’ to the announcing firm there is an increase in stock price of 0.26 percent in stock. Furthermore, the difference in mean abnormal returns between the two groups is significant at the 5 percent level. These results indicate that stock split announcements reveal more information to non-splitting firms with high degree of similarity to the splitting firm and is consistent with the findings of Foster (1981) and Lang and Stulz (1992).

We also examine whether the results presented in panel A are affected by the industry level of concentration. To test this hypothesis, the sample is divided into four cells based on the medians of Herfindahl index (proxying level of concentration) and earnings correlation (proxying degree of similarity). Abnormal returns for each of the four cells is the average market-adjusted excess returns of equally-weighted portfolios grouped by industry and event date. Prior results would suggest that firms that are classified as being similar (dissimilar) and in less (highly) concentrated industries would gain (lose) the most from the split announcement.

The results are presented in panel B. For firms in low concentrated industries with high degree of similarity to the splitting firm (group a) experience a stock price increase of 0.46 percent, the highest of the four cells. In contrast, the mean stock price of non-splitting firms in highly concentrated industries whose earnings correlation is low (group b) declines by a

significant 0.65 percent. Furthermore the test statistic for the difference in mean returns between these two groups is also significant at the 1 percent level. In addition, the pattern of difference among sub-samples support earlier conclusions that both level of concentration and degree of similarity are significant variables in determining the reaction of non-splitting firms. For high concentrated industries, the abnormal return for non-splitting firms that are similar to the splitting firm is statistically higher than that for dissimilar non-splitting firms. For low concentrated industries the difference in mean returns between high and low earnings correlation, although correct in direction, is not statistically significant. Similarly, controlling for the degree of similarity, we find that markets react more positively to non-splitting firms in less concentrated industries than those in highly concentrated industries and this effect is most pronounced for dissimilar firms.

4.2.3. Industry Reactions and Level of Asymmetric Information

Grinblatt, Masulis and Titman (1984) and Ikenberry, Rankine and Stice (1996) suggest that the market reacts more strongly to stock split announcements of firms that have high asymmetric information level because the announcements reveal more information. Consequently, it is hypothesized that intra-industry reaction to a stock split announcement will convey more information for non-splitting firms who have high level of asymmetric information. Since stock splits convey positive information for non-splitting firms, this would imply that shareholders of non-splitting firms with high level of information asymmetry gain significantly more than firms who have low asymmetric information.

The level of asymmetric information is measured by return variance (RVAR) defined as the variance of CRSP value-weighted market-adjusted return computed for the year preceding stock split announcements. Dierkens (1991) and Krishnaswami and Subramaniam (1998) suggest that volatility in residual stock returns captures the degree of information asymmetry.¹¹ Firms with RVAR greater than or equal to the median sample firm are classified as firms with high level of asymmetric information. Alternatively we classify firms as having low asymmetric information if RVAR is less than the sample median.

¹¹ Krishnaswami and Subramaniam (1998) report that the correlation between volatility in residual stock returns and other measures of information asymmetry (*e.g.*, analysts' earnings forecast error, volatility in abnormal returns around earnings announcements *etc.*) is greater than 0.4.

In panel A of table 4 we present results for two groups of non-splitting firms classified by RVAR. For the sub-sample of firms where the level of information asymmetry is high, the equity value of non-splitting firms increases by 1.32 percent (significant at 1 percent level) on average. For non-splitting firms with low asymmetric information level, there is a statistically insignificant decrease in stock price of 0.08 percent. The t-statistic for the difference in mean returns between high and low asymmetric information level sub-samples is significant at 5 percent level. These findings support the hypothesis that firms with high level of asymmetric information gain significantly more from the stock split announcement than those with low information asymmetry.

We also test whether the results reported in Panel A persist after controlling for industry level of concentration. To test this hypothesis, we classify the sample into four cells by the level of information asymmetry (RVAR) and the industry level of concentration (HI). Results are presented in panel B of Table 4. As predicted, the mean return is highest (1.63 percent) for firms with a high degree of information asymmetry in low concentrated industries (group a). For firms with low level of information asymmetry and in highly concentrated industries (group b), the average change in equity value is -0.20 percent. The t-statistic for the difference in mean returns between these two groups is highly significant. Consistent with earlier univariate results, we find that both concentration level and asymmetric information level are significant determinants of intra-industry reactions. Controlling for the level of industry concentration, we find that firms with high level of asymmetric information experience higher returns than firms with low level of asymmetric information. Similarly, controlling for the level of information asymmetry, we find that firms in highly concentrated industries experience lower returns than those in less concentrated industries although the differences are statistically weak.

4.2.4. Industry Reactions and Degree of Undervaluation

Lakonishok, Shleifer, and Vishny (1994) and Ikenberry, Rankine, and Stice (1996) suggest that book-to-market (B/M) ratio is a proxy for degree of undervaluation. They argue that firms that have high B/M ratio are more likely to be undervalued. Having documented that stock splits reveal significant amount of intra-industry information, we hypothesize that industry firms that are most likely to be undervalued (overvalued) will experience a greater (smaller) change in stock prices at the stock split announcement of their industry counterpart.

We test this hypothesis by dividing firms based on the degree of undervaluation and compare the returns between the sub-samples of firms that are most likely to be overvalued and undervalued. Consistent with Lakonishok, *et al.* (1994) and Ikenberry, *et al.* (1996) we use B/M ratio to proxy the degree of undervaluation. B/M is defined as the book value of assets divided by the book value of assets plus the difference between market and book value of equity as of the year-end prior to the split announcement.¹² Firms are classified as undervalued (overvalued) if the B/M ratio exceeds or equals (less than) the sample median.¹³

The results are provided in Table 5. We find that firms that are most likely to be undervalued experience a significant (10 percent level) increase in stock prices of 0.45 percent at the announcement of the stock split. For firms that have a low B/M ratio, the announcement period return is negative but insignificantly different from 0. The difference in mean returns between the two groups is significant indicating that the degree of undervaluation is important in explaining the variation in announcement period variations of non-splitting industry firms. We also test whether these results hold after controlling for industry characteristics by dividing the sample into four cells by Herfindahl index (HI) and B/M ratio. The results are presented in Table 5, panel B. Non-splitting firms in the sub-sample where B/M ratio exceeds or equals to the sample median and HI is less than the sample median experience the greatest abnormal returns of 1.14 percent. On the other hand, non-splitting firms with low B/M ratio in highly concentrated industries earn the lowest abnormal returns of -0.57 percent. The difference in mean returns between these two sub-samples is statistically significant (1 percent level). These results also suggest that B/M ratio and HI are significant determinants in explaining the stock price reactions of non-splitting firms.

4.3. Multivariate Analysis

To confirm earlier univariate results we regress five-day cumulative returns of non-splitting firms on the level of concentration, degree of similarity, level of information asymmetry, and degree of undervaluation. In addition, we use five-day cumulative market-adjusted return of splitting firms and split factor as additional explanatory variables. Firth (1996) suggests that there

¹² The similar results are obtained when B/M is defined as book relative to market value of equity.

¹³ We obtain stronger results if we use B/M ratio of 1 to classify over and undervalued firms.

is association between returns of announcing and non-announcing firms. McNichols and Dravid (1990) report the positive relationship between split factor and level of information revealed by splitting firms. We run two sets of regressions; one with individual firms and the other with non-splitting firms grouped into equally-weighted portfolios by industry for each split. In Table 6 we present regression results for individual firms only; the results for portfolios (327 observations) are similar and hence not reported.

In models 1-2, we test whether the level of concentration, degree of similarity, level of information asymmetry, and degree of undervaluation affect announcement period returns of the non-splitting firms. Consistent with the univariate analysis presented earlier we find significantly positive coefficients for earnings correlation, return variance, and book-to-market ratio and a significantly negatively coefficient for Herfindahl index. These results suggest that non-splitting firms in low concentrated industries and those that are similar to splitting firms gain significantly from stock split announcements. Similarly non-splitting firms that have high level of asymmetric information and those that are undervalued also experience higher returns from the announcements. Further, returns of non-splitting firms are positively related to those of splitting firms but the slope coefficient is not significant. These findings provide strong supportive evidence that the industry characteristics (level of concentration) and firm-specific factors (degree of similarity, level of asymmetric information and undervaluation) explain the cross-sectional variation in returns for non-splitting firms at the announcements of stock splits.

In models 3-4 we further investigate the magnitude of information transfer by regressing non-splitting firms abnormal returns against the four factors interacted with the splitting firm's announcement period return. Consistent with the results presented earlier we find that level of concentration, degree of similarity, level of asymmetric information and undervaluation are significant explanators of the degree of information transfer. We also find that stock splits by large firms transfer more information; the coefficient is positive and highly significant.

4.4. Change in Earnings Subsequent to Stock Split Announcements

The results presented thus far suggest that stock split announcements reveal industry-wide information; non-splitting firms in the same industry experience positive returns at the split announcement period. The effect is most pronounced for firms (a) that are in less concentrated

industries (b) that are similar to splitting firms (c) that have high level of information asymmetry (d) or that are undervalued. In this section we test whether there is a relation between investors' revision in non-splitting firms' value and subsequent operating performance.

Asquith, Healy, and Palepu (1989) find that stock split announcements convey favorable information about future earnings changes. Similarly, McNichols and Dravid (1990) find a positive relation between announcement period returns and subsequent earnings increases for splitting firms. These results coupled with the evidence presented earlier that stock splits reveal favorable industry-wide information predict an increase in earnings performance for non-splitting firms subsequent to the announcements. Further, if investors react to non-splitting firms anticipating an increase in future earnings, abnormal returns of non-splitting firms should be positively associated with subsequent earnings change.

To test this hypothesis, we examine the change in earnings for both short- and long-run. Short- (long-) run earnings change is defined as the change in earnings from a year (three years) subsequent to a year prior to the announcement. We use two earnings measures; earning-per-share (net income available to shareholders per share) standardized by share price at the year-end prior to the announcement and operating earnings defined as earnings before interest and taxes standardized by book value of total assets at the year-end prior to the announcement. Consistent with the abnormal return results, we group non-splitting firms into equally-weighted portfolios by industry for each split announcement.

Table 7 presents evidence of portfolio earnings changes for the non-splitting firms. In panel A we observe that non-splitting firms experience a significant increase in earnings subsequent to stock split announcements. The mean short- (long-) run increase in earnings-per-share is 3.35 (8.00) percent and highly significant. Similarly, there is an increase in earnings before interest and taxes of 1.73 (4.89) percent in the short- (long-) run. These findings support the hypothesis that stock split announcements reveal favorable information about industry-wide earning changes for both the short- and the long-run.

Panel B presents results for the test of the relation between the investors' revision in non-splitting firm value at the announcement of the stock split and future earnings performance of these firms. The dependent variable is the five-day abnormal returns for non-splitting firms and the independent variables are the short- and long-run changes in earnings-per-share and earnings

before interest and taxes. As hypothesized, there is an association between returns of non-splitting firms and increases in earnings subsequent to stock split announcements. The coefficient for the short- (long-) run earnings-per-share change and returns is 0.04 (0.01), significant at 1 (5) percent. For the earnings before interest and taxes measure, we find a significant coefficient for the long-run earnings change only. In the short-run the coefficient is positive (correct direction) but statistically weak. Overall the results presented in Table 7 suggest that non-splitting firms in the same industry as splitting firms experience a significant improvement in short- and long-run earnings performance subsequent to the stock split announcement of their industry counterpart. Furthermore investors, anticipating an improvement in future operating performance of the industry, react positively to non-splitting firms during the split announcement period.

5. Summary and Conclusion

This paper examines whether stock split announcements affect stocks prices of non-splitting firms in the same industry. The results indicate that shareholders of non-splitting firms experience a significant 0.34 percent increase in equity value during the stock split announcement period of their industry counterparts. This finding coupled with the positive abnormal returns of splitting firms suggests that the favorable information conveyed by stock split announcements transfers to non-splitting firms within the same industry. The existence of intra-industry reaction is also consistent with the information content (as opposed to the trading range) hypothesis.

Further, non-splitting firms in low concentrated industries measured by Herfindahl index gain more from split announcements than those in highly concentrated industries. This finding suggests that the positive reaction of non-splitting firms is more pronounced in low concentrated industries. In addition, non-splitting firms whose degree of similarity to splitting firms measured by earnings correlation is high experience significantly higher stock returns than those with low degree of similarity. This result is consistent with Firth (1996) that the announcements convey more favorable information for non-announcing firms whose earnings are highly correlated to splitting firms.

Non-splitting firms with high asymmetric information measured by return variance also earn significantly higher abnormal returns than those with low asymmetric information. This indicates that the higher the information asymmetry level, the greater the positive intra-industry

reaction. In addition, the mean equity value of non-splitting firms with high book-to-market ratio is significantly higher than that of non-splitting firms with low book-to-market ratio. This finding suggests that firms with high book relative to market value are undervalued and thus benefit from the announcements more than those with low book relative to market value.

In addition, the regression results indicate that abnormal returns of non-splitting firms are negatively related to Herfindahl index and positively related to earnings correlation, return variance and book-to-market ratio. The slope coefficients of these factors are significant even after controlling for other factors. Finally we find an improvement in earnings performance for non-splitting firms both in the short- and the long-run and the announcement period returns for these firms are positively related to the earnings changes. We conclude that stock split conveys favorable industry-wide information about earnings improvement and industry characteristics and firm-specific factors are significant determinants in explaining these stock price reactions.

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Table 1
Abnormal Returns for Splitting and Non-Splitting Firms at the Announcements of Stock Splits

This table presents mean abnormal returns for 327 firms that announce stock splits and portfolios of 3,684 non-splitting firms. Abnormal returns are value-weighted market-adjusted returns. The non-splitting firms are firms listed on *Compustat* that have the same four-digit SIC code as splitting firms, whose shares are traded on major exchanges and do not announce stock splits during an eleven-day period centered around stock split announcement day (day 0). The portfolios of non-splitting firms are equally weighted grouped for each event. ***,**, and * denote significance at the 1, 5 and 10 percent levels, respectively.

| (Period) | Splitting Firms | | | Non-Splitting Firms | | |
|----------|-----------------|----------|-------------|---------------------|----------|-------------|
| | N | Mean (%) | t-statistic | N | Mean (%) | t-statistic |
| (-20,-3) | 327 | 7.08 | 9.80*** | 327 | 1.29 | 2.80*** |
| (-2,+2) | 327 | 3.82 | 9.26*** | 327 | 0.34 | 1.75* |
| (+3,+20) | 327 | 2.73 | 4.82*** | 327 | -0.22 | -0.56 |

Table 2
Announcement Period Abnormal Returns For Non-Splitting Firms Classified by Level of Concentration

This table presents mean five-day cumulative value-weighted market-adjusted returns for non-splitting firms classified by level of concentration. Level of concentration is measured by Herfindahl Index (HI) defined as the sum of square market share of each firm in the four-digit SIC code. The market share is firm's annual sales at the fiscal year-end prior to the announcement as a percentage of industry sales. The non-splitting firms are grouped into equally weighted portfolios of all firms in the same industry as the splitting firm for each stock split. The t-statistic and the numbers of portfolios are in parenthesis and square brackets respectively. The last row presents the t-statistic for the statistical difference in mean between the two sub-samples. ***,**, and * denote significance at the 1, 5 and 10 percent levels, respectively.

| HI | Abnormal Returns |
|-------------|------------------------|
| ≤ 1,800 | 0.73 (2.14**) [102] |
| > 1,800 | 0.16 (0.59) [225] |
| t-statistic | 1.71* |

Table 3
Announcement Period Abnormal Returns For Non-Splitting Firms Classified by Degree of Similarity and Level of Concentration

This table presents mean five-day value-weighted market-adjusted returns for non-splitting firms classified by degree of similarity. Earnings correlation (CORR) is the correlation of earnings before interest and taxes for a ten-year period preceding the announcement and is a measure of degree of similarity between splitting and non-splitting firms. Level of concentration is measured by Herfindahl Index (HI) and is the sum of square market share, proxied by firm's annual sales at the fiscal year-end prior to the announcement as a percentage of industry sales, of each firm in the four-digit SIC code. Non-splitting firms are grouped into equally-weighted portfolios for each industry for each event. The t-statistics are in parenthesis and the numbers of portfolios are in square brackets. The test statistic for difference in mean returns between two sub-samples is in the last row. The t-statistic at the lower right hand corner in Panel B is for the difference in mean returns between sub-samples ^a (*i.e.*, firms that are similar and in less concentrated industries) and ^b (*i.e.*, firms that are dissimilar and in highly concentrated industries). ***,**, and * denote significance at the 1, 5 and 10 percent levels, respectively.

Panel A: Similarity of Earnings

| CORR | Abnormal Returns |
|-------------|---------------------------|
| ≤ Median | -0.34 (-1.52) [271] |
| > Median | 0.26 (1.25) [283] |
| t-statistic | -1.96** |

Panel B: Similarity of Earnings and Level of Concentration

| HI | CORR | | t-statistic |
|-------------|-------------------------------------|--|-------------|
| | > Median | ≤ Median | |
| ≤ 1,800 | 0.46 ^a (1.58) [93] | 0.23 (0.77) [96] | 0.54 |
| > 1,800 | 0.17 (0.60) [190] | -0.65 ^b (-2.17**) [175] | 2.00** |
| t-statistic | 0.72 | 2.08** | 2.65*** |

Table 4
Announcement Period Abnormal Returns For Non-Splitting Firms Classified by Level of Asymmetric Information and Level of Concentration

This table presents mean five-day cumulative value-weighted market-adjusted returns for non-splitting firms classified by level of asymmetric information. Information asymmetry is measured by the return variance (RVAR) of market-adjusted returns in the year preceding the stock split announcement day. Level of concentration is measured by Herfindahl Index (HI) and is the sum of square market share, proxied by firm's annual sales at the fiscal year-end prior to the announcement as a percentage of industry sales, of each firm in the four-digit SIC code. Non-splitting firms are grouped into equally-weighted portfolios for each industry for each event. The t-statistics are in parenthesis and the numbers of portfolios are in square brackets. The test statistic for difference in mean returns between two sub-samples is in the last row. The t-statistic at the lower right hand corner in Panel B is for the difference in mean returns between sub-samples ^a (*i.e.*, firms with high levels of asymmetric information and in less concentrated industries) and ^b (*i.e.*, firms with low levels of asymmetric information and in highly concentrated industries). ***, **, and * denote significance at the 1, 5 and 10 percent levels, respectively.

Panel A: Degree of Asymmetric Information

| RVAR | Abnormal Returns |
|-------------|----------------------------|
| ≤ Median | -0.08 (-0.33) [270] |
| > Median | 1.32 (2.53***) [238] |
| t-statistic | -2.43*** |

Panel B: Level of Concentration and Degree of Asymmetric Information

| HI | RVAR | | t-statistic |
|-------------|---------------------------------------|--|-------------|
| | > Median | ≤ Median | |
| ≤ 1,800 | 1.63 ^a (2.06**) [89] | 0.15 (0.51) [92] | 1.76* |
| > 1,800 | 1.13 (1.65*) [149] | -0.20 ^b (-0.58) [178] | 1.73* |
| t-statistic | 0.48 | 0.78 | 2.13** |

Table 5
Announcement Period Abnormal Returns For Non-Splitting Firms Classified by Degree of Undervaluation and Level of Concentration

This table presents mean five-day value-weighted market-adjusted returns for non-splitting firms classified by book-to-market (B/M) ratio. B/M is the ratio of book value of assets to book value of asset plus the difference between market and book value of equity. Level of concentration is measured by Herfindahl Index (HI) and is the sum of square market share, proxied by firm's annual sales at the fiscal year-end prior to the announcement as a percentage of industry sales, of each firm in the four-digit SIC code. Non-splitting firms are grouped into equally-weighted portfolios for each industry for each event. The t-statistics are in parenthesis and the numbers of portfolios are in square brackets. The test statistic for difference in mean returns between two sub-samples is in the last row. The t-statistic at the lower right hand corner in Panel B is for the difference in mean returns between sub-samples ^a (*i.e.*, firms that are undervalued and in less concentrated industries) and ^b (*i.e.*, firms that are undervalued and in highly concentrated industries). ***,**, and * denote significance at the 1, 5 and 10 percent levels, respectively.

Panel A: Degree of Undervaluation

| B/M | Abnormal Returns |
|-------------|---------------------------|
| ≤ Median | -0.31 (-0.98) [289] |
| > Median | 0.45 (1.73*) [299] |
| t-statistic | -1.85* |

Panel B: Level of Concentration and Degree of Undervaluation

| HI | B/M | | t-statistic |
|-------------|---|--|-------------|
| | > Median | ≤ Median | |
| ≤ 1,800 | 1.14 ^a (2.56***) [102] | 0.21 (0.68) [95] | 1.74* |
| > 1,800 | 0.10 (0.31) [197] | -0.57 ^b (-1.26) [194] | 1.21 |
| t-statistic | 1.90** | 1.43 | 2.70*** |

Table 6 Regression Results

This table presents multivariate regression results. The dependent variable is five-day stock split announcement value-weighted market-adjusted returns for 3,684 non-splitting firms. The non-splitting firms include firms on *Compustat* that have the same four-digit SIC code as splitting firms, whose shares are traded on major exchanges and do not announce stock splits during an eleven-day period centered around stock split announcement day. Herfindahl Index (HI) is the sum of square market share, proxied by firm's annual sales at the fiscal year-end prior to the announcement as a percentage of industry sales, of each firm in the four-digit SIC code. Earnings correlation (CORR) is a measure of similarity between splitting and non-splitting firms and is the correlation of earnings before interest and taxes for a ten-year period preceding the announcement. Information asymmetry is measured by variance of daily market-adjusted returns (RVAR) in the year preceding stock split announcement day. Book-to-market (B/M) is measured as the ratio of the book value of assets to (book value of assets – book value of equity + market value of equity). Size dummy (SIZE) takes a value of 1 if splitting firm's market value of equity is greater than the industry median and 0 otherwise. The cumulative market-adjusted returns (ARS) of splitting firms is defined as the returns in excess of the value-weighted market index. Split factor (SF) obtained from CRSP and is the number of additional shares per existing share. All values except returns and split factor are obtained from *Compustat* and are numbers at the fiscal year-end preceding stock split announcement. ***, **, and * denote significance at 1, 5 and 10 percent levels, respectively.

Table 6 continued

| Variables | Expected Sign | Model 1 | Model 2 | Model 3 | Model 4 |
|---------------------------------|----------------------|---------------------|---------------------|-------------------|---------------------|
| Intercept | | 4.66 (1.94**) | 5.17 (2.14**) | 0.64 (1.38) | 0.65 (1.41) |
| HI | - | -0.81 (-2.60***) | -0.88 (-2.83***) | | |
| CORR | + | 0.57 (1.66*) | 0.56 (1.65*) | | |
| RVAR | + | 0.04 (5.64***) | 0.04 (5.62***) | | |
| B/M | + | 1.70 (2.57***) | 1.71 (2.59***) | | |
| HI x ARS | - | | | -0.06 (-1.63*) | -0.03 (-3.15***) |
| CORR x ARS | + | | | 0.10 (2.20**) | 0.09 (2.05**) |
| RVAR x ARS ($\times 10^{-2}$) | + | | | 0.24 (3.82***) | 0.24 (3.95***) |
| B/M x ARS | + | | | 0.15 (1.68*) | 0.18 (2.12**) |
| SIZE x ARS | + | | 0.09 (2.04**) | | 0.12 (2.03**) |
| ARS | + | 0.03 (0.80) | | 0.34 (1.09) | |
| SPF | + | -0.18 (-0.39) | -0.23 (-0.48) | -0.08 (-0.18) | -0.13 (-0.27) |
| Adjusted R ² (%) | | 1.48 | 1.60 | 0.70 | 0.80 |
| p-value of F-statistic | | 0.00 | 0.00 | 0.00 | 0.00 |

Table 7
Earnings Changes Subsequent to Stock Split Announcements

This table presents earnings change of non-splitting firms subsequent to the stock split announcement year. Earnings change for short-run (s) and long-run (l) are the change in earnings from year +1 to year -1 and year +1 to year -1 respectively relative to the announcement year. Earnings are measured as either earnings per share (EPS) standardized by closing stock price a year prior to the announcement or earnings before interest and taxes (EBIT) standardized by year -1 book value of total assets. All earnings values are presented in the multiple of 100. The non-splitting firms are grouped into equally-weighted portfolios by industry for each split. N is the numbers of portfolios having earnings available from *Compustat*. In Panel B, the dependent variable is five-day market-adjusted returns of non-splitting firms. The t-statistics are in parenthesis. ***,**, and * denote significance at 1, 5 and 10 percent levels, respectively.

Panel A: Level of Earnings Changes

| Earnings Changes: | N | Mean | t-statistic |
|--------------------------|----------|-------------|--------------------|
| <i>Short-run:</i> | | | |
| ΔEPS_S | 326 | 3.35 | 6.28*** |
| ΔEBIT_S | 322 | 1.73 | 5.29*** |
| <i>Long-run:</i> | | | |
| ΔEPS_L | 274 | 8.00 | 8.67*** |
| ΔEBIT_L | 273 | 4.89 | 6.06*** |

Panel B: Regression Results

| Variables | Expected Sign | Model 1 | Model 2 | Model 3 | Model 4 |
|-----------------------------|----------------------|-------------------|------------------|-------------------|------------------|
| Intercept | | 0.13 (0.94) | 0.22 (1.25) | 0.50*** (2.55) | 0.37** (2.06) |
| ΔEPS_S | + | 0.04*** (5.40) | | | |
| ΔEPS_L | + | | 0.01** (2.28) | | |
| ΔEBIT_S | + | | | 0.02 (1.30) | |
| ΔEBIT_L | + | | | | 0.01* (1.68) |
| Adjusted R ² (%) | | 0.91 | 0.20 | 0.02 | 0.07 |
| p-value for F-statistic | | 0.00 | 0.02 | 0.20 | 0.10 |