The effect of stock splits on liquidity and excess returns: Evidence from shareholder ownership composition

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February 7, 2002

* We thank Rene Stulz, William Compton, an anonymous referee and seminar participants at the College of William and Mary and the American Finance Association Meetings for their helpful comments. Dennis is on the faculty of the McIntire School of Commerce, University of Virginia, Monroe Hall, Charlottesville, VA 22903. Phone: (804)-924-4050. Strickland is on the faculty of the Fisher College of Business, The Ohio State University, 1775 College Road, Columbus, OH 43210 and is visiting the SEC. Phone: (202)-942-8033. Dennis thanks the McIntire School of Commerce for financial support. Strickland thanks the Fisher College of Business and the Dice Center for financial support.

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Abstract

We examine the impact of firm ownership composition on both the abnormal returns at the announcement of a stock split and liquidity changes following a stock split. We find three results. First, the largest post-split increase in institutional ownership occurs for firms that had low institutional ownership prior to the split. Second, changes in liquidity are negatively related to the level of institutional ownership prior to the split. Last, the abnormal return following a split is negatively related to the level of institutional ownership prior to the split. These findings are important as they shed new light on the source of stock split announcement returns.

I. Introduction

The effects of stock splits are puzzling. In theory a stock split is merely an accounting change, which leaves investors no better or worse off than they were before the split. Yet stock splits are relatively common occurrences. This implies that there must be some benefit, either real or perceived, that results from a firm splitting its stock. Survey evidence indicates that managers split their stock to get the stock's price into some optimal trading range (Baker and Gallagher (1980)). Managers believe this will attract small investors, which implies that managers believe that splitting their firm's stock has implications for the firm's ownership structure. Our goal in this paper is not to explain why managers decide to split their firm's stock, but rather to examine the linkage between splits, ownership structure, volume, and abnormal returns.

Why should a stock split affect ownership structure? One argument is that individual shareholders tend to be wealth constrained and, therefore, cannot afford to acquire a round lot of a firm's stock if the price is too high. By splitting their stock, firms make their stock more attractive for the individual investor (Lakonishok and Lev (1987), Conroy and Harris (1999), Schultz (2000)). With the lower post-split price, we should observe a lower proportion of institutional ownership, and a higher proportion of individual ownership, after the split than before the split. A second argument is based on trading costs. Several studies (Conroy, Harris and Benet (1990), Gray, Smith and Whaley (1999)) show that the percentage bid/offer spread increases following a split. The fact that institutions trade more frequently than individuals, and that the bid/offer spread is the primary component of their trading cost, implies that institutions should dislike splits unless some other benefit exists. Following a split, we would expect the

proportion of institutional ownership of a stock to decrease, as institutions flock to equivalent stocks with lower relative bid/offer spreads.

Our results regarding the post-split change in ownership structure contradict what one might expect. We find that the proportion of institutional ownership following a split, conditional on the level of institutional ownership prior to a split, increases and is statistically significant. This result is inconsistent with the argument that the effect of a stock split is to make the stock more affordable for small investors and increase individual ownership, or to drive away institutional investors due to an increased relative bid/offer spread.

Since institutions trade more than individuals, we also examine the relation between the change in ownership structure and liquidity following a stock split. Conditional on the level of institutional ownership prior to the split, we find that the greatest increase in post-split trading volume occurs in firms that have the lowest levels of institutional ownership prior to the split and that changes in ownership structure following a split appear to be driving the post-split volume changes.

Finally, we examine the relation between abnormal returns and ownership structure at the announcement of a stock split and find that the abnormal return is positive and is negatively related to the proportion of institutional ownership prior to the split. Several authors (Grinblatt, Masulis and Titman (1984), Muscarella and Vetsuypens (1996), Lamoureux and Poon (1987), Ikenberry, Rankine, and Stice (1996)) have shown that there is a significantly positive abnormal return at the announcement of a stock split. One hypothesis for the positive abnormal return is that a split may be interpreted as a signal that the firm's managers are optimistic regarding its future prospects. A second hypothesis is that a split may improve the stock's liquidity and, in turn, lower its expected return. Our finding that the abnormal return at the announcement of a

split is negatively related to the proportion of institutional ownership prior to the split is more consistent with the liquidity hypothesis than the signaling hypothesis. Firms with low institutional ownership prior to the split experience the largest increase in institutional ownership and, therefore, the largest increase in post-split liquidity. These firms, however, also have lower post-split abnormal returns that are inconsistent with the signaling hypothesis.

II. Data

The CRSP tapes were used to collect a sample of all split announcements that occurred for firms that trade on the NYSE, AMEX or NASDAQ from January 1, 1990 to December 31, 1993. For each firm in the sample, quarterly ownership composition data for two years (eight quarters) before and after each split were collected from the CDA/Spectrum database. Monthly and quarterly return, volume, outstanding shares and price data for two years (24 months) before and after each split were collected from CRSP. We have 1392 observations in our four-year sample.

Since stock splits are more newsworthy events than stock dividends, we chose to exclude stock dividends from our sample[1]. The market value of the shares created by stock dividends was less than two percent of the value of those created by stock splits. As a robustness check, we repeat our analysis including stock dividends in our sample and our results do not change. Also, to avoid the possibility of contaminating events, we drop events where there is an earnings announcement or an announcement of a dividend change within a two-day window of the split

[1] We use the accounting definition outlined in Rankine and Stice (1997) to classify our events by stock split vs. stock dividends.

announcement. The basic results of the paper are not sensitive to the inclusion or exclusion of these contaminating events.

During our sample period the average split ratio, defined as the number of new shares issued for each share held before the split, is four-fifths, indicating that investors who owned five shares before the split owned nine shares after the split. The median split ratio was 0.5, indicating that the median split was three for two. Also, the average stock price in the month before the split was $37.79, and the average ratio of the stock price in the month prior to the split to the average market price was 2.64. Both of these statistics show little variation from year to year.

III. Empirical Findings: Institutional Ownership

We begin our analysis with an examination of how ownership structure is affected by stock splits. Lamoureux and Poon (1987) among others report that firms that split their stock subsequently enjoy a marked increase in the number of shareholders. These papers, in general, do not distinguish between institutional and individual investors. An exception is a recent paper by Mukherji, Kim, and Walker (1997). These authors note that many researchers speculate that stock splits affect the ownership of firms. They present results that indicate that stock splits increase the number of both institutional and individual investors, though the proportions remain the same. We explore a similar question in this section with two notable exceptions. First, our sample of stock splits is larger as we include NASD firms. Second, and more importantly, we hypothesize that the ownership structure before the split may have an effect on what happens at the announcement of a split. Hence, we condition our test on this dimension of ownership structure.

Institutional Ownership Analysis

To examine the time-series pattern of institutional ownership, we measure the level of institutional ownership for eight quarters before and after the announcement of a stock split. Institutional ownership is defined as the number of shares held by institutions at the end of the quarter divided by the total number of outstanding shares held at the end of the quarter. Initially, we partition our sample into quartiles and document the time series pattern of mean and median levels of institutional ownership before and after the split. Table 1 contains these results.

Institutional ownership for the whole sample of firms that split their stock display two interesting patterns. In the eight quarters prior to the stock split announcement there is a large increase in institutional ownership. Institutional ownership increases from a mean of 32.3 percent eight quarters prior to 37.2 percent in the quarter immediately prior to the split announcement. The statistically significant increase in institutional ownership is consistent with our priors since we find that splitting firms substantially outperform the market prior to the split. The positive relation between institutional ownership and performance is consistent with the results reported in Grinblatt, Titman, and Wermers (1995).

The post-announcement pattern differs quite markedly from the pre-announcement runup. There is a slight increase from the quarter prior to the split (37.2 percent) to the quarter immediately after the split (38.2 percent) and after splitting their stock the level of institutional ownership varies within a narrow range between 38.2 and 39 percent. These changes are not statistically significant and suggest that a split does not fundamentally change the ownership structure of firms (Mukherji, Kim, Walker (1997)). It is possible, however, that our failure to condition on whether the firms have low or high institutional ownership prior to the stock split obscures an important cross-sectional variation in the change in institutional ownership. To

address this possibility, we also measure the percentage change in institutional ownership conditional on the level of institutional ownership in the quarter prior to the stock split announcement.

Institutional Sub-sample Analysis

In Table 1, we examine the time-series of institutional ownership for splitting firms conditional on the level of institutional ownership in the quarter prior to the split announcement. The time-series pattern is very different in each of the four quartiles. In the lowest quartile, the level of institutional ownership is relatively constant for the eight quarters leading up to the split. At the announcement of the split there is a jump in institutional ownership (from 7.6 to 8.8 percent), and there is a steady and statistically significant increase in institutional ownership for the eight quarters after the split (from 8.8 to 13.7 percent). In contrast, those firms with the largest percentage of institutional ownership before the split have a steady increase of institutional ownership before the split (from 56.3 to 69 percent), and a slight decrease in institutional ownership in the eight quarters after the split.

One possible explanation for these results is that firms in the fourth quartile (highest percentage of institutional ownership) have better performance before the split than firms in the first quartile, and institutions are chasing performance. To see if this is the case, we document the pre- and post-split performance of firms in each of the four quartiles in Table 2. In the 12 months before the split the performance of all firms in the sample, defined as the cumulative market-adjusted abnormal return, was significantly larger than zero. This is consistent with what we would expect. Interestingly, the abnormal return was larger for firms in the first quartile (79.3 percent) vs. firms in the fourth quartile (53.7 percent) and the difference is statistically

significant. If institutions were simply chasing recent performance, why didn't they increase their ownership of the firms in the first quartile?

Another possible explanation for the increase in the pre-to-post split institutional ownership for the first quartile could be the overall growth in institutional ownership over the sample period. Furthermore, the increase in the pre-to-post split institutional ownership may be spurious since the firms in the first quartile have the lowest amount of institutional ownership to begin with. To test if this is the case we compute the change in institutional ownership for each firm that split its stock in the lowest institutional-ownership quartile (based on the institutional ownership in the quarter prior to the split) from one quarter before the split to eight quarters after the split. From this change, we subtract the change in institutional ownership for all firms, including those that did not split their stock, that are in the lowest institutional-ownership quartile over the same time period. We find that this difference is positive and significant, indicating that the increase in institutional ownership is not being driven by the overall increase in ownership over the sample period. The result also indicates that the significant increase in institutional ownership after the split is not a spurious result induced by initially conditioning on low levels of institutional ownership before the split.

The signaling hypothesis (Brennan and Copeland (1988)) does not seem to fit our results either. If a split is a signal of positive information, why isn't the increase in institutional ownership similar for all four quartiles? One could argue that the signal is not as strong for firms in the fourth quartile, since there is already a large concentration of institutional ownership and the informational asymmetry is not as great for these firms. If we look at the post-split performance by quartile, however, we find the cumulative abnormal return is greatest for firms in

the fourth quartile. If the signal was weakest for firms in the fourth quartile, then we would expect the opposite pattern in post-split performance.

Though our results regarding the time-series changes in institutional ownership before and after a split do not seem to be consistent with either a performance based or a signaling explanation, they are consistent with Merton (1987) and Brennan and Hughes (1991) where investors only know about a subset of firms in the universe. The increased media and analyst attention surrounding the stock may make them more desirable for institutions to hold. In contrast, the firms that have the largest proportion of institutional ownership (fourth quartile) are already known to and followed by institutions, so a split does not induce them to increase their ownership position. Why shouldn't the market awareness hypothesis apply equally well to individual investors? There are two differences between individuals and institutions that may explain this. First, institutional investors are more sophisticated than individual investors, and are in a better position to interpret the stock split. Second, institutions have greater capital and tend to trade more than individuals (Gompers and Metrick (2001)). This may place them in a better position to react to a stock split.

IV. Empirical Findings: Volume

Proponents of the stock split liquidity hypothesis conjecture that the split-induced reduction in a firm's stock price provides an expanded trading base for the firm. The improved trading base results in greater volume and, therefore, improved liquidity. Consequently, many of the previous empirical papers in the stock split literature examine volume of trade before and after a firm announces a stock split. The evidence, however, does not consistently find an increase in the level of volume. Moreover, many papers find a decrease in volume subsequent to a split ((Copeland (1979), Lamoureux and Poon (1987) and Lakonishok and Lev (1987)). Given

the inconsistency of the prior results, and the fact that institutions trade more than individuals (Gompers & Metrick (2001)), we want to examine the linkage between the increase in institutional ownership and changes in the turnover (liquidity) of splitting firms.

We begin the exploration of the liquidity effect of stock splits by examining the time-series pattern of liquidity for our sample of splitting firms. As in Lakonishok and Lev (1987), we use turnover, defined as the monthly volume divided by the number of outstanding shares in the month in which volume of trade is measured, as a measure of liquidity. Turnover standardizes volume into a statistic that is consistent for large and small firms, and it also controls for the change in the number of publicly available shares around the split date. Turnover is a good proxy for liquidity since high turnover increases competition between market makers and also lowers the fixed, inventory and adverse selection costs of the market maker (Easley, O'Hara, Kiefer and Paperman (1996) and Hu (1997)).

Time-Series Patterns

If there are liquidity benefits to returning a stock's price to a lower trading range, we should observe an increase in turnover following the split announcement. Practitioners argue that the lower trading range allows capital constrained investors to trade in round lots. To test this conjecture, we examine the mean and median turnover of firms that split their stock between 1990 and 1993. We calculate the turnover each month for a period of twenty-four months prior to the announcement of the stock split and for a period of twenty-four months after the announcement of the stock split. The month in which the firm announces the stock split is excluded from the analysis. The turnover results for the splitting sample are presented in Table 3.

The pre-announcement turnover patterns are similar to those reported in Lakonishok and Lev (1987). Mean (median) turnover rises from 6.8 (3.8) percent in the twenty-fourth month prior to the split announcement to 10.3 (5.8) percent in the month prior to the stock split announcement. The 10.3 percent mean turnover in the month prior to the split announcement represents a high for the four-year period. The post-announcement pattern, however, differs from the results in Lakonishok and Lev (1987). There is a small drop-off in both mean and median turnover immediately subsequent to the stock split announcement. Mean and median turnover, however, do not significantly decline from the pre- to post-announcement period. We test for differences in mean and median turnover between corresponding pre- and post-announcement periods using a paired *t*-test and find that a majority of the post-announcement months do not have greater turnover rates. Overall, the pattern suggests that there is weak evidence of a small increase in volume and the results are not strongly supportive of a strong stock split liquidity effect.

The results in Table 3 are quite similar to those in the stock split literature, as they do not find a significant improvement in the liquidity of firms following a split. It is our conjecture, however, that the results in Table 3 and in the prior literature potentially obscure the liquidity benefit of a stock split as prior results do not control for the potential sources of the liquidity gain. This is especially surprising given that Lamoureux and Poon (1987) among others report a substantial increase in the number of shareholders for splitting firms. This suggests that any increase in liquidity is potentially a function of the ownership structure of the firm. To explore this possibility, we measure the change in turnover for splitting firms conditional on the percentage of a firm's shares held by institutions in the quarter prior to the announcement of the stock split.

The results from this analysis are presented in Table 4, which presents the mean and median change in turnover for splitting firms conditioned on the level of institutional ownership in the quarter prior to the split announcement. We define turnover change as the average monthly turnover during the two-year post-announcement period less the average monthly turnover during the two-year pre-announcement period, all divided by the average monthly turnover during the two-year pre-announcement period.

The sample of splitting firms is segmented into quartiles based on institutional ownership in the quarter prior to the split announcement. The results in Table 4 indicate that both the mean and median change in turnover decline monotonically from the low to high institutional ownership quartile. Mean turnover for firms in the first quartile increases by 54.3 percent while mean turnover for firms in the fourth quartile does not increase. The median turnover change exhibits a similar pattern. Median turnover change increases for low institutional ownership firms and does not increase for high institutional ownership firms. The results suggest the potential liquidity gain from a stock split is a function of the institutional ownership level prior to the stock split. Firms with high institutional ownership prior to the split are highly liquid (Gompers and Metrick (2001)) and, as a result, their turnover will not increase after the stock split. This is strongly supportive of our conjecture that the failure of previous studies to discern a liquidity effect stems from the fact that they did not condition on the presence of a class of investors who generate the lion's share of a firm's volume.

The results in Table 4 are also obtained if turnover in the pre-announcement period is used as the conditioning variable. This is not surprising since we find that the pre-announcement turnover is positively related to contemporaneous institutional ownership. It is also possible, however, that we are simply sorting firms by post-split performance. To address this concern, in

Table 2 we compare the two-year post-split market-adjusted holding period return of the institutional quartiles. We find that the market-adjusted holding period returns are positive and significant for the quartile with the highest institutional ownership, but not different from zero for the quartile with the lowest institutional ownership. This suggests that the results in Table 4 are not the result of the low institutional ownership firms outperforming high institutional ownership firms. While the results in Table 4 are interesting, we have not controlled for changes in overall market turnover. To address this concern, we explore the turnover and institutional ownership relation in a regression framework.

Regression Analysis

To examine the relation between the change in turnover for firms that announce a stock split and the level of institutional ownership, we estimate the following regression:

$$\Delta turnover_j = \alpha + \beta_1(mpcturn_j) + \beta_2(institutional_j) + \varepsilon_j$$

where $\Delta turnover$ is the percentage change in average turnover from the pre-announcement to the post-announcement period, *mpcturn* is the percentage change in market turnover from the two-year pre-announcement to the two-year post-announcement period, *institutional* is the percentage of the firm's shares held by institutions in the quarter prior to the split announcement, and ε is the error term for firm *j*. Model (1) in Table 5 presents the results of the regression above. The institutional ownership conjecture predicts that there is a negative relation between institutional ownership and the change in turnover. The estimated institutional ownership coefficient is negative and significant at the one-percent level. This evidence is supportive of the hypothesis that firms with lower institutional ownership realize larger increases in liquidity following a stock split.

In model (2) of Table 5, we decompose institutional ownership into ownership by mutual funds/investment advisors and ownership by all other institutions (banks, pension funds, insurance companies, etc.). We chose to divide ownership in this fashion since mutual funds/investment advisors trade more frequently than banks, pensions funds, etc. The results of this regression suggest that there is not much of a difference between the effect of the pre-split level of mutual fund ownership and other types of ownership on the change in turnover. What is more interesting to look at, however, is the relationship between the change in ownership and the change in turnover. In model (3) we regress the percentage change in turnover on the change in institutional ownership. The results are consistent with what we would expect: the change in institutional ownership is directly related to the change in turnover. Finally, in model (4) we decompose the change in total institutional ownership into the change due to mutual fund ownership and the change due to other types of institutional ownership. We find that the change in mutual fund ownership is significant and positive, whereas the change in other forms of institutional ownership is not significant.

Overall, the results in Table 5 suggest that there is a strong liquidity gain when a firm splits its stock and that the liquidity improvement around stock splits is driven primarily by mutual funds, not pension funds or insurance companies. The liquidity gain, however, is observable only if one conditions on institutional ownership prior to the stock split. The fact that post-split changes in trading volume are linked to the level of institutional ownership prior to a split may explain the mixed results regarding post-split volume that other studies have found. While some studies show that the liquidity of a stock improves after a split (Muscarella and Vetsuypens (1996)), others show that the liquidity of a stock after a split is no greater than that of stocks that do not split (Lakonishok and Lev (1987)), or that the liquidity of a stock declines after

a split (Copeland (1979), Lamoureux and Poon (1987), Gray, Smith, and Whaley (1999)). These mixed results may be driven by the different ownership structures in the samples used in these various studies.

The results in Tables 4 and 5 indicate that firms with low institutional ownership prior to the split announcement have the largest increase in institutional ownership and have the largest liquidity increase. We know that (both theoretically and empirically) liquidity is inversely related to required return (Amihud and Mendelson (1986), Hu (1997)). Given this, it is natural to examine how changes in ownership structure and liquidity impact the abnormal return at the announcement of a split.

V. Empirical Findings: Abnormal Returns

We expect that the required return for a stock should be negatively related to its liquidity. Hence, the relation between institutional ownership and liquidity implies a relation between the market's reaction to the announcement of a stock split and the level of institutional ownership prior to the stock split. This conjecture of a relation between split announcement returns and institutional ownership stems from our hypothesis that the liquidity gain from a stock split is conditional on the level of institutional ownership prior to the stock split. This leads to the hypothesis that there is a negative relation between the stock split announcement return and the level of institutional ownership prior to the stock split. To test this conjecture, we analyze the announcement abnormal returns for stock splits between 1990 and 1993.

We compute abnormal returns using the standard event study approach as in Mikkelson and Partch (1986) using a 200 day window to estimate the market model parameters. When we partition the sample by the median level of institutional ownership we find that the mean

abnormal return for the partition with low (high) institutional ownership is 3.2 (1.2) percent and the difference between the two means is statistically significant at the one-percent level. While this pattern is consistent with our institutional ownership and liquidity conjecture, it is possible that the effects of ownership, firm size and split ratio on abnormal returns are not independent of each other. To address this concern, we estimate the following regression:

$$ar_j = \alpha + \beta_1(\log(p_j/p_m)) + \beta_2(split\ ratio_j) + \beta_3(size_j) + \beta_4(institutional_j) + \varepsilon_j,$$

where the dependent variable is the stock split announcement market model abnormal return for firm *j*. The independent variables are $\log(p_j/p_m)$ defined as the log of the ratio of a firm's month ending price in the month prior to the split announcement to the average price of all stocks that trade on the same exchange as firm *j* in the month prior to the split announcement, *split ratio* defined as the ratio of newly issued shares to old shares, *size* defined as the log of the market value of equity, and *institutional* defined as the percentage of a firm's outstanding shares held by institutions in the quarter prior to the split announcement.

The log of the ratio of the firm's stock price (p_j) to the average stock price (p_m) is included to control for the level of surprise. The firm's stock price is the closing price on the last trading day of the month immediately prior to the split-announcement month. The average stock price is the equally weighted average of all firms' closing prices that trade on the same exchange as firm *j* in the month immediately prior to the split-announcement month. Empirical evidence suggests that firms announce stock splits when their price is high relative to the market, hence we would expect a negative relation between the price ratio and the abnormal return. We control for the split ratio, since signaling models of stock splits (Brennan and Copeland (1988)) posit that the split ratio is related to the strength of the signal. These models suggest a positive relation between the split ratio and its announcement return. While there is no strong theoretical

justification for the inclusion of size as a control variable, in the empirical corporate literature size is often employed as an empirical proxy for risk, informational asymmetry, and other factors. Thus, we include size to maintain consistency with the literature. As a result, it is not clear if a relation between size and the stock split announcement return should be positive or negative.

The results for the regression are in Table 6. The estimated coefficient on the price ratio is negative and statistically different from zero. This suggests that the market is less surprised when firms with large price to market ratios announce a stock split. The results for the split ratio independent variable indicate that there is a positive relation between the stock split abnormal return and the split ratio. This evidence is consistent with the hypothesis that stock splits signal positive information about the firm's future prospects if the split ratio is a measure of the strength of the signal. The relation between size and split abnormal returns is negative and significant, which we interpret as being consistent with Merton (1987).

The principal independent variable of interest is institutional ownership. The estimated coefficient for institutional ownership is negative and significant at the one percent level. The estimated coefficient of –0.018 corresponds to a decrease of 1.8 basis points (0.00018) in the predicted stock split abnormal return for a one percent (0.01) increase in the level of institutional ownership. This suggests that the different levels of institutional ownership lead to large economic differences in the wealth effect of a stock split. For example, the difference in predicted stock split abnormal returns for a firm with institutional ownership in the twenty-fifth percentile and a firm in the seventy-fifth percentile is roughly 0.5 percent (-0.018×.37). The predicted difference of one half of one percent is approximately 25 percent of the mean abnormal stock split abnormal return. This indicates that the level of institutional ownership has a major effect on the magnitude of the market's reaction to the announcement of a stock split. The

results from this regression provide evidence that is supportive of our conjecture that the relation between the liquidity gains and the level of institutional ownership implies a negative relation between stock split abnormal returns and institutional ownership. It is also possible that the market may value the increased monitoring that comes from the higher proportion of institutional ownership.

To directly test the effect of the increased liquidity on announcement day abnormal returns, we re-estimate the model using the percentage change in turnover instead of the level of institutional ownership. The results in Table 6 show that the estimated coefficient on the percentage change in turnover is positive and significant. This indicates that firms with larger improvements in liquidity have larger announcement day abnormal returns. While the coefficient on turnover is consistent with what we would expect, we should interpret this result with caution since the change in turnover is not known at the split announcement date.

VI. Conclusion

The traditional view of stock splits as cosmetic transactions that simply divide the same pie into more slices is inconsistent with the significant wealth effect of the announcement of a stock split. Economists have responded to this inconsistency by suggesting that the stock splits signal positive private managerial information about the firm. Researchers have examined the earnings of firms after the announcement of a stock split and have found evidence that is supportive of the signaling hypothesis. While streetlore attributes the price reaction to improved liquidity, the empirical evidence for the liquidity hypothesis is mixed.

Muscarella and Vetsuypens (1996), however, use ADRs to disentangle the signaling and liquidity hypotheses. Their evidence suggests that the wealth effect for stock splits for ordinary

common stock may also result from a liquidity gain. This is, however, inconsistent with much of the empirical evidence. It is our hypothesis that prior research fails to discern a liquidity gain for stock splits because it does not condition on the liquidity of firms prior to the split and the investors that are the source of much of the market's liquidity, institutions. We find evidence that supports the existence of liquidity gains for a sub-sample of firms that split their stock.

We find that: (1) Institutional ownership increases (decreases) for firms with low (high) institutional ownership prior to the split announcement. Since institutions trade more frequently than individuals, this suggests that post-split gains in liquidity may be due to the split-induced change in institutional ownership. Furthermore, the post-split increase in institutional ownership may partly explain the increase in return volatility following a split (Conroy, Harris and Benet (1990), Koski (1998)). Both these studies find that the increase in return variance is not an artifact of the increased relative bid-ask spread, but rather a true increase in volatility. This increase in volatility could be driven by an increase in trading by institutions. A recent paper by Dennis and Strickland (2001) documents evidence that suggests a positive link between the level of institutional ownership and the volatility of a firm's returns. (2) Turnover increases (does not change) for firms with low (high) levels of institutional ownership prior to the split announcement and this increase in turnover is related to the level of institutional ownership prior to the split. This result suggests that there are liquidity gains for firms that split their stock, but the liquidity gains are conditional on the level of institutional ownership and liquidity prior to the split. (3) The stock split abnormal return is negatively related to institutional ownership prior to the stock split. The abnormal return result indicates that the market prices the gain in liquidity.

Overall, this evidence leads us to conclude that there is merit to the liquidity hypothesis for stock splits and that the reinterpretation of stock split excess returns as evidence of improved

liquidity as suggested by Muscarella and Vetsuypens (1996) may be correct. We do not interpret these results as evidence against the signaling model, but rather as new evidence in support of the liquidity hypothesis.

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Table 1

Institutional ownership means and medians

This table presents institutional ownership means and medians for firms that split their stock during 1990-1993. Institutional ownership is defined as the percentage of a firm's shares held by institutions. The quartiles are constructed using institutional ownership in the quarter immediately prior to the split. Quarter –8 is eight quarters prior to the stock split and quarter 8 is eight quarters after the stock split. The stock split occurred in quarter 0. ** denotes a statistically significant difference in the mean level of institutional ownership between quarters –8 and –1 or between quarters 1 and 8 using a paired t-test at the one-percent level.

Panel A: Pre-announcement institutional ownership

	whole sample		1st quartile (lowest)		2nd quartile		3rd quartile		4th quartile (highest)	
quarter	mean**	median	mean	median	mean**	median	mean**	median	mean**	median
-8	0.323	0.308	0.079	0.061	0.217	0.208	0.378	0.392	0.563	0.581
-7	0.329	0.312	0.079	0.064	0.219	0.211	0.382	0.394	0.577	0.599
-6	0.334	0.313	0.080	0.064	0.222	0.217	0.388	0.403	0.589	0.603
-5	0.338	0.319	0.076	0.062	0.228	0.222	0.401	0.413	0.601	0.614
-4	0.347	0.326	0.075	0.063	0.236	0.232	0.415	0.425	0.622	0.631
-3	0.354	0.340	0.077	0.065	0.244	0.243	0.428	0.433	0.642	0.638
-2	0.363	0.352	0.076	0.067	0.253	0.251	0.443	0.446	0.663	0.661
-1	0.372	0.359	0.076	0.072	0.264	0.261	0.460	0.462	0.690	0.676

Panel B: Post-announcement institutional ownership

	whole sample		1st quartile (lowest)		2nd quartile		3rd quartile		4th quartile (highest)	
quarter	mean	median	mean**	median	mean	median	mean**	median	mean**	median
1	0.382	0.379	0.088	0.079	0.286	0.275	0.479	0.478	0.692	0.684
2	0.386	0.380	0.103	0.088	0.294	0.282	0.482	0.483	0.685	0.678
3	0.387	0.383	0.113	0.094	0.303	0.289	0.480	0.481	0.681	0.674
4	0.389	0.388	0.125	0.100	0.307	0.291	0.478	0.483	0.675	0.672
5	0.387	0.385	0.125	0.098	0.307	0.289	0.473	0.474	0.670	0.670
6	0.386	0.383	0.127	0.099	0.309	0.291	0.472	0.469	0.663	0.666
7	0.388	0.387	0.133	0.099	0.310	0.291	0.475	0.473	0.659	0.666
8	0.390	0.386	0.137	0.108	0.313	0.295	0.477	0.484	0.653	0.661

Table 2

Stock abnormal return means and medians

This table presents stock abnormal return means and medians for firms that split their stock during 1990-1993. Institutional ownership is defined as the percentage of a firm's shares held by institutions. The quartiles are constructed using institutional ownership in the quarter immediately prior to the split. Month –24 is the month 24 months prior to the split and month 24 is the month 24 months subsequent to the stock split. ** denotes significance in a test of difference from zero at the one percent level. Also, a *t*-test shows that the mean abnormal returns between the 1st and 4th quartile for the months –12 to –1 are statistically different at the five percent level of significance. There are 860 (1010) observations in the whole sample in the months before (after) the stock split.

	whole sample		1st quartile		2nd quartile		3rd quartile		4th quartile	
months	mean	median	mean	median	mean	median	mean	median	mean	median
-24,-13	0.177**	0.084**	0.161**	0.081**	0.157**	0.095**	0.164**	0.103**	0.240**	0.129**
-12,-1	0.597**	0.357**	0.793**	0.420**	0.518**	0.307**	0.550**	0.350**	0.537**	0.358**
1,12	0.069	0.017	0.045	0.029	0.074	-0.020	0.086**	0.009	0.092**	0.052
13,24	-0.045	-0.079**	-0.054	-0.082**	-0.033	-0.063**	-0.072**	-0.123**	-0.009	-0.026

Table 3

Split sample turnover averages

This table presents monthly turnover means and medians for firms that split their stock during 1990-1993. Turnover is defined as monthly volume divided by shares outstanding. A * denotes rejection of the equality of means (medians) between pre-announcement and post-announcement turnover at the five percent level using a paired *t*-test. There are between 880 and 1090 observations in each month.

	Pre-announcement		Post-announcement	
Months before or after stock split	mean	median	mean	median
1	0.103	0.058	0.095	0.051
2	0.098	0.052	0.098	0.053
3	0.095	0.052	0.101	0.053
4	0.089	0.049	0.096	0.053
5	0.085*	0.048	0.096	0.053
6	0.089	0.049	0.098	0.055
7	0.084*	0.048	0.097	0.050
8	0.083*	0.046	0.098	0.050
9	0.084*	0.045	0.097	0.054
10	0.084	0.044	0.093	0.049
11	0.080*	0.045	0.097	0.053
12	0.083*	0.045	0.094	0.053
24	0.068*	0.038	0.088	0.049

Table 4

Turnover percentage change partitioned by institutional ownership

This table presents the mean and median percentage change in turnover for firms that split their stock during 1990-1993. Turnover is defined as the two year prior (post) announcement mean of monthly turnover where monthly turnover is defined as monthly volume divided by shares outstanding. Turnover percentage change is defined as the change in turnover between the post-announcement and pre-announcement period divided by pre-announcement period turnover. Institutional ownership is defined as the percentage of a firm's shares held by institutions. *,** denote significance in a test of difference from zero at the five percent and one percent level respectively.

	mean	median
Entire Sample	0.321**	0.060*
1st quartile (low institutional ownership)	0.543**	0.151**
2nd quartile	0.272**	0.084*
3rd quartile	0.181**	0.054*
4th quartile (high institutional ownership)	0.057	0.001

Table 5

Turnover percentage change regressions

The dependent variable is the percentage turnover change where turnover change is defined as the percentage change in turnover between the pre-announcement and post-announcement period. Turnover is defined as the two year prior (post) announcement mean of monthly turnover where monthly turnover is defined as monthly volume divided by shares outstanding. The dependent variables are *mpcturn* which is the change in market turnover, *institutional* which is the percentage of a firm's outstanding shares held by institutions in the quarter prior to the split announcement, *mutual funds* and *other* which are percentage of a firm's outstanding shares held by mutual funds and other types of institutions (banks, pension funds and insurance companies), Δ*institutional*, Δ*mutual funds* and Δ*other* which are the change in the corresponding level variables from the quarter prior to the stock split to eight quarters after. Heteroskedastic consistent p-values based on White's robust standard errors are in parentheses.

variables	(1)	(2)	(3)	(4)
intercept	0.267	0.275	0.021	0.040
	(0.001)	(0.002)	(0.705)	(0.477)
mpcturn	0.884	0.885	0.929	0.763
	(0.006)	(0.012)	(0.003)	(0.017)
institutional	-0.453			
	(0.001)			
mutual funds		-0.407		
		(0.016)		
other		-0.553		
		(0.033)		
Δ*institutional*			0.176	
			(0.001)	
Δ*mutual funds*				0.098
				(0.001)
Δ*other*				0.031
				(0.123)
R^2 %	0.029	0.029	0.091	0.085
F-pvalue	0.001	0.001	0.001	0.001
N	935	935	882	832

Table 6

Split announcement abnormal return regressions

The dependent variable is the stock split announcement market model abnormal return. The independent variables are $\log(p_j/p_m)$, where p_j is stock j's closing price on the last trading day of the month immediately prior to the split announcement month and p_m is the average market price of a share of stock in the month prior to the split announcement month on the exchange where firm j trades, *split ratio* which is the ratio of newly issued shares to old shares, *size* which is measured as the log of market value of equity, *institutional* which is the percentage of a firm's outstanding shares held by institutions in the quarter prior to the split announcement, and Δ*turnover* which is the percentage change in turnover. Turnover is defined as the two year prior (post) announcement mean of monthly turnover where monthly turnover is defined as monthly volume divided by shares outstanding. Heteroskedastic consistent p-values based on White's robust standard errors are in parentheses.

variables	(1)	(2)
intercept	0.125 (0.001)	0.145 (0.001)
$\log(p_j/p_m)$	-0.010 (0.001)	-0.008 (0.032)
split ratio	0.008 (0.001)	0.007 (0.001)
size	-0.005 (0.001)	-0.006 (0.001)
institutional	-0.018 (0.019)	
Δ*turnover*		0.003 (0.044)
R^2 %	0.079	0.081
F-pvalue	0.001	0.001
N	989	916