Institutional Trading, Brokerage Commissions, and Information Production around Stock Splits

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Abstract

Using a large sample of transaction-level institutional trading data, we directly test Brennan and Hughes' (1991) information production theory of stock splits for the first time in the literature. We compare brokerage commissions paid by institutional investors before and after a split, and relate the informativeness of institutional trading to brokerage commissions paid. We also compute realized institutional trading profitability net of brokerage commissions and other trading costs. Our results can be summarized as follows. First, both commissions paid and trading volume by institutional investors increase after a stock split. Second, institutional trading immediately after a split has predictive power for the firm's subsequent long-term stock return performance; this predictive power is concentrated in stocks which generate higher commission revenues for brokerage firms and is greater for institutions that pay higher brokerage commissions. Third, institutions make positive abnormal profits during the post-split period even after taking brokerage commissions and other trading costs into account; institutions paying higher commissions significantly outperform those paying lower commissions. Fourth, the information asymmetry faced by firms decreases after a split; the greater the increase in brokerage commissions after a split, the greater the reduction in information asymmetry. Overall, our results are broadly consistent with the implications of the information production theory.

JEL classification: G32, G24, G14
Keywords: Institutional Investors, Stock Splits, Brokerage Commissions, Information Production

1. Introduction

The benefits of stock splits for firms and investors are controversial. While it is well known that stock splits do not, by themselves, affect a firm's operating cash flows, several interesting effects have been documented in the financial markets around stock splits: two of these are positive abnormal announcement effects (see, e.g., Grinblatt, Masulis, and Titman (1984), Lamoureux and Poon (1987), or Brennan and Copeland (1988)) and positive abnormal long-term stock returns (see, e.g., Desai and Jain (1997) or Ikenberry and Ramnath (2002)). Two leading explanations that have been proposed for the economic effects of stock splits are the "optimal trading range hypothesis" and the "information production hypothesis." The optimal trading range hypothesis suggests that stock splits bring the splitting firm's share price to a preferred price range (see, e.g., Copeland (1979) or McNichols and Dravid (1990)), thereby improving the liquidity and marketability of the stock. In contrast, the information production hypothesis (see Brennan and Hughes (1991)) argues that stock splits increase the incentive of brokers (and affiliated analysts) to produce information about the splitting firm, thereby ensuring that the firm's stock is correctly priced. The empirical literature has so far predominantly focused on the trading range hypothesis, which primarily applies to trading by retail investors around stock splits. The objective of this paper is to directly test the information production hypothesis for the first time in the literature by studying the role of brokerage commissions and institutional investors in stock splits.

Institutional trading is a particularly appropriate context to analyze the economic rationale underlying stock splits for two reasons. The first reason is that the optimal trading range hypothesis applies primarily to retail rather than institutional investors. This is because, unlike retail investors, institutional investors do not face significant wealth constraints. Further, institutions face trading costs that are different from that of retail investors to the extent that institutions typically trade much larger positions, so that a lower stock price could cost institutions more in terms of brokerage commissions and other trading costs. In other words, this

transactions cost aspect of splits will, if anything, make stocks less desirable for institutional investors after a split. The second reason is that the information production hypothesis applies primarily to institutional rather than retail investors. As discussed before, the information production hypothesis of Brennan and Hughes (1991) argues that the dependence of the brokerage commission rate on share price increases the incentive of brokerage firms to produce information about firms after a split (since the split increases commissions paid to the brokerage firm), thus ensuring that the splitting firm's stock is priced closer to intrinsic value. Given that institutional investors have a long-term relationship with brokerage firms, institutional investors are likely to have significantly better access to the information produced by brokerage firms compared to retail investors. Irvine, Lipson, and Puckett (2007) present evidence that brokerage analysts provide information to some institutional investors before publicly releasing the information. Further, given that they possess economies of scale in the analysis and use of this information, institutional investors are likely to have better incentives and ability to process the above information appropriately compared to retail investors. Thus, an important prediction of the information production theory is that institutional investors will possess superior information compared to retail investors after a stock split.

The above discussion raises four sets of interesting empirical research questions about the role of brokerage commissions and institutional investors in stock splits. The first set of research questions pertains to whether brokerage commissions paid by institutional investors (commissions paid per dollar of trading as well as total commissions paid per period) indeed go up after a stock split. A related question is whether the volume of trading by institutional investors increases or decreases after a stock split: this is an empirical question, since, given that the brokerage commissions paid by them on a stock may increase after a split, the trading volume in the stock by institutions may in fact decrease after a split. The second set of research questions relates to whether institutions possess an informational advantage relative to retail investors after a split. If so, is the informational advantage possessed by institutional investors after a split

greater in stocks that generate higher brokerage commissions, as implied by the information production theory of Brennan and Hughes (1991)? A related question is whether institutions that pay higher brokerage commissions have a greater informational advantage (since they may obtain better access to the information produced by the brokerage firm and its analysts). The third set of research questions relates to the profitability of institutional trading in a stock after a split. In particular, are institutions able to realize superior profits net of brokerage commissions from trading in a stock post-split? This is an empirical question given that the informational advantage (if any) possessed by institutional investors post-split may potentially be dominated by any increase in the brokerage commissions and other trading costs paid by them. Further, do institutions paying higher brokerage commissions outperform or underperform those paying lower commissions? Clearly, this is also an empirical question, for reasons similar to those discussed earlier. The fourth set of research questions relates to the impact of the information possessed by institutional investors (if any) and their trading in the firm's equity using this information on the information asymmetry faced by the firm in the equity market. In particular, is this information asymmetry lower after a stock split? If so, is the reduction in information asymmetry after the split greater for the equity of firms generating a greater increase in brokerage commissions after the split, as implied by the information production theory?

In this paper, we make use of a large sample of transaction-level institutional trading data to answer many of the above questions. Our data include transactions over a seven-year period from January 1999 to December 2005. After proper filters, there are 601 sample institutions. For an average sample split, our sample institutions collectively account for 11 percent of total trading volume reported by CRSP within the first three months post-split. Notably, brokerage commissions for each transaction are recorded in this dataset. This enables us to directly study the information production theory of Brennan and Hughes (1991), in which brokerage commissions play a central role in stock splits, for the first time in the literature. We are able to compare brokerage commissions paid by institutional investors before and after a split, and relate

the informativeness of institutional trading to brokerage commissions paid. We are also able to compute realized institutional trading profitability net of brokerage commissions.[1]

Our paper provides a number of new results on the role of brokerage commissions and institutional investors in stock splits. We organize our empirical tests and results into four parts, corresponding to the four sets of research questions outlined above. First, we document, for the first time in the literature, that the commissions paid by institutional investors increase after a stock split. This is true regardless of whether the commissions are measured on a per dollar traded basis, or in terms of total amount of commissions paid. Further, the volume of trading by institutional investors (both the number of trades and dollar volume) increases after a stock split, despite the above increase in brokerage commissions.

Second, we study, for the first time in the literature, the informativeness of institutional trading immediately (one month) after the split about the firm's subsequent long-term (6 months and 1 year) abnormal stock return performance. We find that institutional trading immediately after a split indeed has considerable predictive power for the firm's subsequent long-term stock return performance. Further, this predictive power of institutional trading is concentrated in stocks which generate higher commission revenues for brokerage firms and institutions that pay higher brokerage commissions. These results are robust to controlling for various variables capturing publicly available information, such as the split factor. The above results are consistent with the information production hypothesis, since they indicate that brokerage firms (and their affiliated analysts) produce more information about stocks generating larger commissions for them after a split, and that this information is passed on to institutional investors, especially those paying higher brokerage commissions.

[1] In addition to brokerage commissions (which explicitly reduce realized profits), implicit trading costs such as implementation shortfall (Perold (1988)) could further reduce investors' realized profits. Our results account for both explicit and implicit trading costs, since we use actual transaction prices to calculate institutional investors' realized profits.

Third, we study the realized profitability of institutional trading after a split, using actual transaction prices and net of brokerage commissions. We find that institutions make positive abnormal profits during the post-split period even after taking brokerage commissions and other trading costs into account. This indicates that the informational advantage possessed by institutional investors after a split dominates the increase in brokerage commissions paid by them. Further, institutions paying higher commissions (measured in terms of commissions paid per dollar of trading principal) significantly outperform those paying lower commissions. This indicates that institutions paying higher commissions obtain better access to the information produced by analysts at brokerage firms, resulting in higher profitability even after accounting for the higher commissions paid by them.

Fourth, we study the impact of the information possessed by institutional investors and their trading in the firm's equity post-split on the information asymmetry faced by the firm in the equity market. We find that the information asymmetry faced by the firm decreases significantly after a split. In particular, the number of analysts covering the firm increases, and the analyst forecast error decreases after a split, supporting the predictions of the information production theory. Further, our multivariate analysis indicates that the greater the increase in brokerage commissions after a split, the greater the reduction in the information asymmetry faced by the firm. The above results again support the predictions of the information production theory.

As discussed before, the existing empirical literature on stock splits mainly focuses on the optimal trading range hypothesis. Baker and Gallagher (1980) suggest that companies split shares to lower the prices so that retail investors could afford to buy round lots. McNichols and Dravid (1990), Dyl and Elliott (2006), and Fernando, Krishnamurthy, and Spindt (2004) provide empirical evidence consistent with the above conjecture. Angel (1997) and Schultz (2000) argue that the increase in the relative spread subsequent to a stock split provides an incentive for brokers to make markets and promote the splitting stock to retail investors. In particular, Schultz finds that trading costs increase, costs of market making decrease, and the number of small buy

orders increases following a split. Since the optimal trading range theory is more applicable to retail investors, it does not have clear implications for the trading behavior of institutional investors and the informativeness of institutional trading. In addition, Lipson and Mortal (2006) examine whether the relation between stock splits and clientele is driven by binding tick sizes, and find that binding tick sizes are irrelevant in most regards. They conjecture that per share broker commissions pricing structure may be relevant (commission-induced sponsorship), consistent with Brennan and Hughes (1991).

A signaling model for stock splits was first proposed by Brennan and Copeland (1988). They develop a signaling model of stock splits in which stock splits serve as costly signals of managers' private information because trading costs increase as stock prices decrease. They, however, do not have any role for information production by outsiders. The theoretical paper most closely related to ours is Brennan and Hughes (1991), who develop a model in which stock split increase the incentive for brokers and their affiliated analysts to produce information about splitting firms, by increasing the amount of brokerage commissions paid by investors trading in the stock of these splitting firms. Throughout this paper, we refer to their theory as the information production hypothesis. We discuss this theory and related hypothesis in detail in Section 2. Brennan and Hughes (1991) also provide some empirical evidence that the number of analysts following a firm is negatively related to its share price. However, there is no direct empirical evidence on the information production theory in the literature.[2] Our paper therefore provides the first direct empirical evidence on the information production theory, and in particular, the role of brokerage commissions and institutional investors in stock splits.

The rest of this paper is organized as follows. Section 2 discusses related theories and develops testable hypotheses. Section 3 describes the data and sample selection procedures.

[2] In a paper distantly related to ours, Chen, Nguyen, and Singal (2005) show that stock splits accompanied by the greatest increase in the breadth of institutional ownership at the announcement quarter experience significantly higher post-split abnormal returns than those with the greatest decrease in the breadth of institution ownership.

Section 4 presents our empirical tests and results. Section 5 concludes with a discussion of our results.

2. Theory and Hypotheses

In this section, we first briefly discuss the information production hypothesis first put forward by Brennan and Hughes (1991) and extend it to incorporate the role of institutional investors in stock splits. While our objective in this paper is not to directly test any theoretical model, we base many of our testable hypotheses on the implications of the above theory. Brennan and Hughes (1991) develop a model in which the dependence of the brokerage commission rate on share price increases the incentive of brokerage firms (and affiliated analysts) to produce information about firms after a split, since the split increases the commissions paid to brokerage firms by investors and these commissions serve to compensate brokerage firms for their cost of information production. In this context, managers of higher intrinsic value firms facing information asymmetry in the equity market have an incentive to split their firm's shares in order to induce a greater amount of information production by brokerage firms about their firm, thus ensuring that their firm's equity is priced closer to its intrinsic value.

Even though Brennan and Hughes (1991) do not make such a distinction, we extend their theoretical argument by distinguishing between institutional and retail investors in the above setting. Given that institutional investors have a long-term relationship with brokerage firms, institutional investors are likely to have significantly better access to the information produced by brokerage firms compared to retail investors. Further, given that they possess economies of scale in the analysis and use of this information, institutional investors are likely to have better incentives and ability to process the above information appropriately compared to retail investors. Thus, an important prediction of this extended version of the information production theory is that institutional investors will possess superior information compared to retail investors after a

stock split. Figure 1 graphically illustrates this extended version of the information production theory.

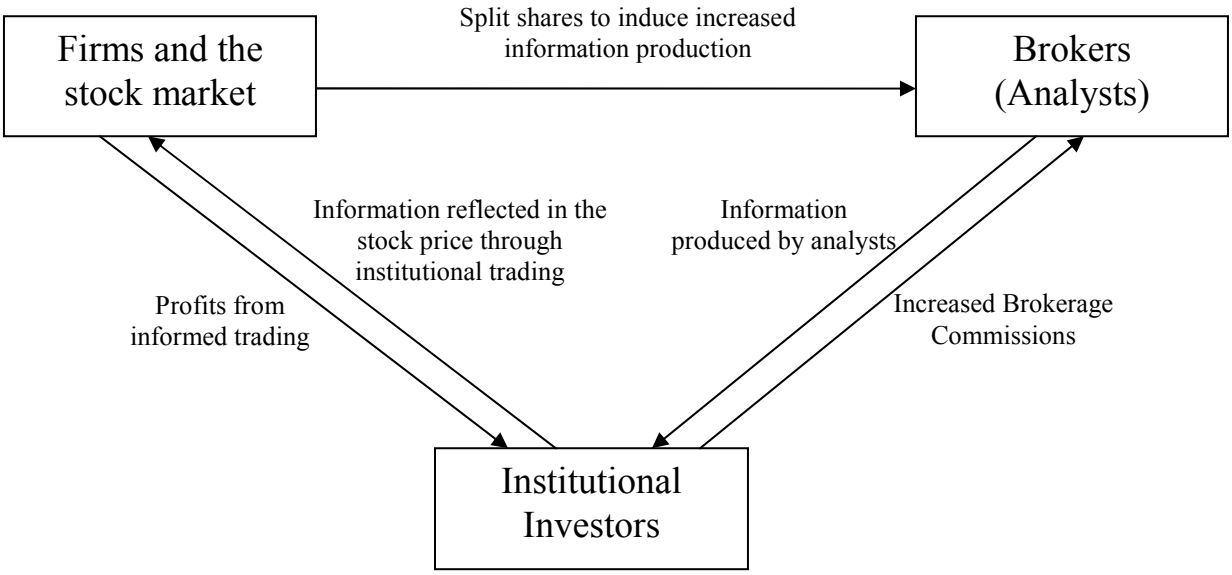

Figure 1: An Extension of Brennan and Hughes (1991)

Our first set of hypotheses deals with the brokerage commissions paid and trading volume by institutional investors around a split. In particular, does the commission rate (commissions per dollar traded) paid by institutional investors indeed increase after split, as assumed by the information production theory of Brennan and Hughes (1991) (**H1**)? Further, an increase in the commission rate and other trading costs may decrease the dollar trading volume by institutional investors after the split, absent other considerations (**H2A**). On the other hand, the increase in the informational advantage possessed by institutional investors after a split may dominate the effect of a higher commission rate and other trading costs, resulting in an increase in the dollar trading volume by institutional investors after a split (**H2B**). Finally, the combined effect of the commission rate and trading volume may result in either an increase (**H3A**) or a

decrease (**H3B**) in the total dollar amount of commissions paid by institutional investors after a split.

Our second set of hypotheses deals with the informational advantage (if any) possessed by institutional investors after a split. The information production theory predicts that brokerage firm analysts will produce more information about the firm after a stock split becomes effective (since the commission rate increases on this day). This, in turn, implies that institutional investors will possess an informational advantage about the splitting stock, so that institutional trading after the split ex-date will have predictive power for the long-term returns of the stock (**H4**). Further, the information production theory implies that the above informational advantage of institutional investors should be greater for stocks generating higher brokerage commissions, since the incentives of brokerage firms to produce information about such stocks are greater (**H5**). Finally, we expect institutions paying higher brokerage commissions to have better access to the information produced by brokerage firms and their analysts, so that their informational advantage after a split will be greater (**H6**).

Our third set of hypotheses deals with the realized profitability of institutional trading after a split. We would expect institutional investors to realize abnormal profits if the informational advantage they possess dominates any increase in the brokerage commissions and other trading costs paid by them after a split (**H7**). Further, if the greater informational advantage of institutions paying higher commissions dominates the effect of their increased commission cost, we would expect them to outperform institutions paying lower commissions (**H8**).

Our fourth and final set of hypotheses deals with the information asymmetry faced by the firm in the equity market after a split. Given the increase in information production about the splitting firm and trading by institutional investors using this information, the information production theory implies that the extent of information asymmetry faced by the firm will be lower after a split (**H9**). Further, since brokerage firms have greater incentives to produce information about stocks generating higher commissions, we would expect the above reduction in

information asymmetry to be greater for the equity of firms generating a greater increase in brokerage commissions (**H10**).

3. Data and Summary Statistics

In this section, we describe our data and sample selection procedures, and present summary statistics of our data. Section 3.1 describes our stock split sample and presents summary statistics. Section 3.2 describes our institutional trading data and presents summary statistics.

3.1. Stock Split Sample

We retrieve NYSE/AMEX/NASDAQ stock splits announced during the period from January 1999 to December 2005 from CRSP daily files. We require the split event to have a distribution code of 5523 and the splitting shares to be ordinary common shares (share code equals 10 or 11). There are 2122 splits retrieved from CRSP tape, of which 131 have a missing announcement date. We manually collect the announcement date by searching Factiva.[3] The sample with announcement date available has 2052 splits. After merging with Compustat, we have 1825 observations for which accounting information is available. Restricting that firms have positive book equity in the fiscal year before the announcement reduces the sample size to 1775. Our final sample includes 1701 splits for which the stock is traded by our sample institutions during the three-month period before the split announcement date.

Table 1 provides summary statistics of the 1701 splits traded by sample institutions. The most frequent type of split is 2 for 1 split. More than half of the splits are by firms with their

[3] We also double check the accuracy of split announcement dates that are reported by CRSP. There are some cases that the announcement date reported by CRSP is inconsistent with that by Factiva. For example, CRSP reports January 21, 1999 as the split declaration date for Emmis Communications Corp. (PERMNO: 80297), but the first date that the news appear in Factiva is December 21, 1999 in Associated Press Newswires. We correct these errors.

stocks traded on NASDAQ. The median days between the announcement date and the ex-date is 33 calendar days.

3.2. Institutional Trading Data

We obtain transaction-level institutional trading data from the Abel/Noser Corporation, a leading execution quality measurement service provider for institutional investors. The data are similar to those used by several microstructure studies on institutional trading costs, for example, Keim and Madhavan (1995), Conrad, Johnson, and Wahal (2001), and Jones and Lipson (2001). Recent studies such as Chemmanur, He, and Hu (2008) and Goldstein, Irvine, Kandel, and Wiener (2008) make use of the Abel/Noser data. This is the first paper to use institutional trading data to study institutional investors' trading behavior in stock splits.

The data cover equity trading transactions by a large sample of institutions from January 1999 to December 2005. For each transaction, the data include the date of the transaction, the stock traded (identified by both symbols and CUSIPs), the number of shares traded, the dollar principal traded, commissions paid by the institution, and whether it is a buy or sell by the institution. The data are provided to us under the condition that the names of all institutions are removed from the data. However, identification codes are provided enabling us to separately identify all institutions. Sample institutions are either investment managers or plan sponsors. Investment managers are mutual fund families such as Fidelity Investments, Putnam Investments, and Lazard Asset Management. Examples of pension plan sponsors include the California Public Employees' Retirement System (CalPERS), the Commonwealth of Virginia, and United Airlines.

In order to be included in our sample, an institution has to have trading data for at least 13 consecutive months around the split Ex-date. Also sample institutions must have traded in at least one sample split during the 13 months surrounding splits. 601 sample institutions satisfy the above criteria, 109 of which are investment managers and the remaining are plan sponsors.

Summary statistics of the institutional trading sample are presented in Table 2. The average Annualized Principal Traded is $8.86 billion, the average Annualized Shares Traded is 279.25 million, and the average Annualized Commissions Paid is $9.40 million. For an average split, our sample institutions collectively account for 11.25 percent of total trading volume reported in CRSP within the first three months post-split.

4. Empirical Tests and Results

In this section we discuss the empirical methodology used to test our hypotheses and report our results. Section 4.1 describes the pattern of institutional trading and brokerage commissions before and after the split. In Section 4.2, we present our empirical tests regarding the relationship between post-split institutional trading and the subsequent abnormal returns. We also link the predictability of institutional trading to brokerage commissions. Section 4.3 studies the profitability of institutional trading, net of commissions, after the split Ex-date. Section 4.4 examines the information asymmetry faced by the firm after a split and the relationship between changes in information asymmetry and changes in total commissions.

4.1. Pattern of Institutional Trading and Brokerage Commissions Before and After the Split

The information production model relies on the assumption that the aggregate brokerage commission increases after splits, which gives firms with favorable private information an incentive to split their shares to induce information production. As the first step of our empirical analyses, we examine the pattern of institutional trading and brokerage commissions before and after the split.

We use the three-month period before the split announcement date as the benchmark and compare institutional trading and brokerage commissions in the three-month period after the split ex-date with those in the pre-split period. Table 3 reports the summary statistics of total

commissions, as well as other commission measures and trading measures. Consistent with **H1**, we find that the average commission rate (commissions per dollar traded) paid by institutions increases significantly from 6.58 basis points in the pre-split period to 10.65 basis points in the post-split period.

Further, the number of trades and the dollar trading volume by institutional investors also goes up significantly after the split. The average dollar trading volume increases from $343.51 million in the pre-split period to $407.10 million in the post-split period. Figure 2 shows the pattern of institutional trading in the 12-months period around splits. In the 6 months after the split is accomplished, institutions collectively continue to trade large volumes, both on split-adjusted share basis and dollar basis. This evidence is inconsistent with **H2A**, but consistent with **H2B**, which suggests that informational effects might dominate transaction costs considerations for institutional trading.

The total dollar amount of commissions paid by institutional investors also increases dramatically after the split. The average total dollar amount of commissions in the post-split period is $252.12 thousand versus $139.94 thousand in the pre-split period. Given that there are 1701 splits in our sample, this means that, in total, brokerage firms increase their brokerage revenue by $190 million in the first three months after splits. Our evidence lends support to **H3A**, where the combined effect of the commission rate and trading volume results in an increase in the total dollar amount of commissions paid by institutional investors after a split, but refutes **H3B**.

Figure 3 shows the frequency distribution of total commissions in the pre-split period versus that in the post-split period. In particular, we compute total commissions for each splitting stock during the three-month period before the announcement of the split and during the three-month period after the split Ex-date. The Figure shows that the distribution of total commissions during the pre-split period is tilted toward low commissions, whereas that during the post-split period is heavily tilted toward high commissions. For example, during the post-split period,

7.72% of the splitting stocks generate commission revenues higher than $800,000, compared to 4.27% during the pre-split period.

The evidence that institutions continue to trade large amounts in splitting stocks after splits when trading costs have shot up significantly poses an interesting question: Do they trade for informational reasons? This is the focus of our empirical effort, to which we now turn.

4.2. Predictability of Institutional Trading

Under the information production story, the premium access to the information produced by brokerage houses and the superior information processing ability of institutions imply that institutional trading after the split ex-date have predictive power for the subsequent long-run returns of the stock (**H4**).

We aggregate institutional trading activities in the first month after the ex-date and test whether it has predictability for subsequent abnormal returns.[4] We consider two holding horizons, 6 months and 1 year, both starting from the first day immediately after the first month (21 trading days) following the split ex-date. We use both CAPM and Fama-French three-factor model to estimate benchmark expected returns.[5] The risk-adjusted buy-and-hold return is calculated as the difference between the realized buy-and-hold return and the expected return.[6] We control for a number of firm characteristics in the multivariate regression, such as split factors, firm size, book-to-market ratio, and dummies for financial firms, utility firms, technology firms, and firms with stock traded on NASDAQ.

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[4] Interestingly, we do not find significant predictability of institutional trading before the ex-date for subsequent returns. This strengthens our story that institutions receive information from brokerage analysts, who start to produce information after the split is accomplished and increases in brokerage commissions are realized.

[5] Market beta and Fama-French three-factor betas are estimated using a one-year window that ends 3 months before the split announcement date.

[6] There are 53 firms that become delisted in the 1-year period following the end of post-split first month, of which 45 are merger related. If a stock is delisted during a particular year, we fill the remaining months with the same size decile portfolio's returns.

Table 4 Panel A reports the predictability results for all institutions. Our interested variable is the coefficient in front of Net Buying, which is the aggregated trading of all institutions during the post-split first month. Notice that the coefficient obtained using either CAPM-adjusted returns or three factor-adjusted returns is positive and statistically significant, especially for the 1-year horizon. The economic impact of institutional trading is large as well. One standard deviation of institutional net buying in the first month after splits is 1.43. Thus, a two-standard deviation increase in institutional net buying during the post-split first month would predict a 9.23 (6.25) percentage point increase in abnormal returns adjusted by CAPM (3 factors). The evidence is consistent with institutions possess superior information during the post-split period (**H4**).

Panel B and Panel C summarizes the predictability results for investment managers and plan sponsors, respectively. An interesting pattern is that trading by investment managers has more predictive power for subsequent returns than plan sponsors. The coefficient of net buying by investment managers is positive and 1% significant in regressions using subsequent 1-year returns, either adjusted by CAPM or 3 factors, as the dependent variable. In contrast, the coefficient of net buying by plan sponsors is negative and insignificant in most cases.

Given that, on average, institutions possess some information during the post-split period, we divide our sample in three different ways to further examine the information production theory. First, we divide our sample *stocks* into a high- and a low-commission-generating group and examine whether institutional trading is more informative in the group of stocks which generate higher brokerage commissions (**H5**). Second, we divide our sample *institutions* into a high- and a low-commission-paying group and examine whether institutions paying higher commissions are better informed than their counterparts (**H6**). Last, we interact the two groups of stocks with the two groups of institutions and examine whether the high-commission-paying institutions are more informed about stocks that generate higher brokerage commissions.

Specifically, for the first test, we sort stocks into two groups by the percentage increase in the commission rate (commissions per dollar traded) in the post-split first month compared to pre-split period. Stocks with higher than the median increase in the commission rate are high-commission-generating stocks, and those below the median are low-commission-generating stocks. We lost some observations, because some stocks generate zero brokerage commission during the one-month period before the split. We test the hypothesis that institutional trading in high-commission-generating stocks is more informed than that in low-commission-generating stocks by pooling stocks into the two groups and running regressions for each group of stocks. Table 5 reports the results using subsequent 1-year risk-adjusted returns as the dependent variable. Results using subsequent 6-month abnormal returns are qualitatively similar. Consistent with **H5**, institutional trading is a significant predictor of subsequent 1-year abnormal returns for high-commission-generating stocks, whereas it becomes insignificant for low-commission-generating stocks.

For the second test, we divide our sample institutions into two groups based on the commission rate in the post-split first month that institutions pays for trading splitting stocks: institutions with higher than the median per dollar commissions are high-commission-paying institutions, and those below the median are low-commission-paying institutions.[7] Here, we use the full sample of splitting stocks, but the Net Buying variable is aggregated over the high- and the low-commission-paying institution group separately. Table 6 shows the results using both subsequent 6-month and 1-year risk-adjusted returns as the dependent variable. For high-commission-paying institutions (Panel A), their trading is significant in predicting both 6-month and 1-year abnormal returns, whereas trading by low-commission-paying ones (Panel B) show either no predictive power (for 6-month horizon), or negative predictive power (for 1-year horizon), for subsequent abnormal returns. This evidence is consistent with **H6** that institutions

[7] Using total commissions to partition institutions could potentially capture the effect of institutions' size because large institutions trade large quantities and pay more commissions. Thus, we only report results for classification using per dollar commissions. The results using total commissions are qualitatively similar.

that pay higher commissions have better access to the information produced by brokerage analysts, and thus their trading is more informative than those that pay low commissions.

To test whether high-commission-paying institutions trading in high-commission-generating stocks have the most predictive power for subsequent returns, we first aggregate the trading of high- and low-commission-paying institutions in each stock, then sort stocks into a high and a low group based on the percentage increase in the commission rate in the post-split first month compared to pre-split period. Table 7 summaries the results for the double sorting on institutions and stocks using subsequent 1-year risk-adjusted returns as the dependent variable. Results using subsequent 6-month abnormal returns are qualitatively similar. Panel A shows that net buying by high-commission-paying institutions is positive and statistically significant in predicting subsequent abnormal returns for high commission stocks, while their net buying is positive but insignificant in predicting those for low commission stocks. For low-commission-paying institutions (Panel B), their trading has no predictive power for either high or low commission stocks. The evidence strengthens our findings about **H5** and **H6**.

To summarize, our predictability results offer strong evidence that institutional trading is informative during the post-split period. The predictive power mainly comes from stocks with big increases in brokerage commissions and institutions that pay high commissions.

4.3. Profitability of Institutional Trading

In this subsection, we examine whether institutional investors realize abnormal trading profits in the post-split period after taking into account of commission costs (**H7**). This could arise when the informational advantage they possess dominates the increase in the commissions and other trading cost paid by them after a split. Further, we expect that institutions that pay higher commissions outperform institutions that pay lower commissions (**H8**), which provides an incentive for institutions to trade more, pay more commissions and in turn receive more information.

We track institutional trading in splitting stocks during the first month and first three months post-split to examine the profitability of secondary market trading. We calculate two return measures for post-split institutional trading, namely, return on buy principal and return on maximum investment. Return on buy principal is a simple and conservative measure, which is calculated by dividing total trading profits (raw or in current dollars) by total buy principal (raw or in current dollars). Return on maximum investment adjusts total investment (the denominator) by allowing the use of selling proceeds for later buying transactions instead of counting it as new investment. This measure more closely reflects the investment return from post-split institutional trading. To compute abnormal profits, we use Fama-French three factor model to adjust profits and investment amounts. Three factor-adjusted profits are calculated by discounting the raw profit back to the day before the split ex-date using the benchmark return from Fama-French 3 factor model; and the 3 factor-adjusted return on buy principal equals 3 factor-adjusted profits divided by 3 factor-adjusted buy principal. Similarly, the 3 factor-adjusted return on maximum investment equals the 3 factor-adjusted profits divided by the 3 factor-adjusted on maximum investment.

To test whether institutions that pay higher brokerage commissions end up with making more trading profits, for each split, we partition all institutions trading in the splitting stock into a high- and a low-commission-paying group based on the commission rate they pay. Table 8 presents results on the profitability of post-split institutional trading for all institutions, and for high- and low-commission-paying institutions as well. The unit of observation is split/institution pairs. Panel A shows the results for institutional trading during the first month after the split Ex-date. An average institution invests $3.35 million in purchasing each splitting stock during the first month following split ex-date and the raw return, net of commissions, is 1.51%. After adjusting for Fama-French 3 factors, the abnormal return on buy principal is 1.83%. Thus, institutions still make abnormal profits even after accounting for the commissions they paid. Interestingly, when we divide institutions into a high- and a low-commission-paying group, high-

commission-paying institutions significantly outperform their low commission counterparts. For example, they outperform by 58 basis points in raw returns, and 35 basis points in abnormal returns, using maximum investment as the denominator. Notice also that high-commission-paying institutions also trade more than low ones ($4.7 million versus $2.1 million in raw buy principal), even though they incur much higher commissions (15.0 bps versus 4.2 bps per dollar principal traded). The three-month results (Panel B) are similar to the one-month results.

In summary, the profitability of post-split institutional trading suggests that, overall, institutional investors have superior information about splits. In particular, institutions which trade more, pay higher commissions per dollar amount traded, outperform those with low commissions. The results are consistent with our hypotheses, **H7** and **H8**, that the informational advantage that institutions possess outweighs the increase in transaction costs and the more commissions they pay, the more trading profits they make.

4.4. Information Production by Brokerage Firms and Brokerage Commissions

A major prediction of the information production theory is that information asymmetry faced by the firm will decrease following a split (**H9**) and the change in information asymmetry is negatively associated with the change in brokerage commissions (**H10**). Brennan and Hughes test the latter prediction using change in split factor as a proxy for the increase in commissions and find that change in split factor is indeed a positive and significant predictor of increases in analyst coverage (an inverse measure of information asymmetry). In this subsection, we make use of our commission data to *directly* test this prediction. In addition, we consider information production from both quantity and quality perspectives. On the quantity side, there will be more analysts producing reports for the splitting stock after splits, because the commission increase enables brokerage firms to hire more analysts. On the quality side, we expect analysts to produce higher quality research about the firm after splits, especially for firms that experience a greater

increase in commissions. This arises because the increase in commissions could potentially provide monetary incentives for analysts to do a better job.

To test the relation between commission changes and the change in information environment after splits, we retrieve analyst earnings forecast data from I/B/E/S. Specifically, for each split event, we retrieve analyst earnings forecasts for the previous and the next fiscal year-end. If the next annual earnings announcement is within 6 months of the split Ex-date, we jump ahead to the following fiscal year. If the previous annual earnings announcement is within 6 months of the split Ex-date, we jump backward to the preceding fiscal year. We employ four measures for analyst forecasts. The first measure is the number of analysts following the firm. The following three measures are intended to capture the quality of analysts' information production. The second measure is the standard deviation of analyst forecasts. Our third measure is the error in the earnings forecast. We measure forecast error as the absolute difference between the average forecasted earnings and the actual earnings per share divided by the price per share at the end of the fiscal year. Our fourth measure is the coefficient of variation of analyst forecasts, which is defined as the ratio of standard deviation to the absolute value of the average of analyst forecasts. All measures are constructed using analysts' one-year ahead earnings forecast in the last six months of each fiscal year. We calculate the change in each measure by taking log of the ratio of the post-split value to the pre-split value of the measure.

Table 9 shows the univariate results on the informational measures in the pre-split period and the change. Notice that number of analysts increases by 31% after splits, and forecast errors decrease by 21%, both of which are consistent with our hypothesis (**H9**) that by splitting their shares, firms reduce the information asymmetry they face. The other two informational measures, standard deviation and coefficient of variation, have the opposite direction of change. This could be the case if the underlying (actual) earnings process of a firm becomes more volatile, thus making it harder for analysts to predict. Accordingly, we also consider a measure of historical earnings stability (i.e., standard deviation of quarterly earnings over the past two years).

As the low row of Table 9 shows, historical earnings stability increases by 43% after the split, suggesting that actual earnings become more volatile and harder to predict after splits. This suggests that it is important to control for the stability of actual earnings in the multivariate tests.

As a direct test of the effect of increases in commissions on information production, we regress changes in the information measures on changes in the total dollar amount of commissions paid by institutions and changes in historical earning stability. Table 10 reports the results. For changes in number of analysts, the coefficient in front of changes in total commissions is positive and highly significant. This suggests that the increase in commission revenues enables brokerage firms to put more analysts to work. For information quality measures, the coefficient in front of changes in total commissions is negative, and statistically significant in most cases. This provides direct evidence that the reduction in information asymmetry is greater for the equity of firms generating a greater increase in brokerage commissions (**H10**).

The information production results, combined with our predictability results shown in previous subsections, demonstrate that the increase in brokerage commissions after splits induces analysts to produce more information and more precise information about the stock, which in turn help institutions to trade more actively and make more trading profits.

5. Discussion of Results and Conclusion

In this paper, we have studied the role of brokerage commissions and institutional investors in stock splits, using a large sample of transaction-level institutional trading data. Making use of broker commissions recorded in the data, we were able to directly examine an extended version of Brennan and Hughes' (1991) information production theory of stock splits for the first time in the literature. We were able to compare brokerage commissions paid by institutional investors before and after a split, and relate the informativeness of institutional

trading to brokerage commissions paid. We were also able to compute realized institutional trading profitability net of brokerage commissions and other trading costs.

Our results can be summarized as follows. First, both commissions paid and trading volume by institutional investors increase after a stock split. Second, institutional trading immediately after a split has predictive power for the firm's subsequent long-term stock return performance. Further, this predictive power is concentrated in stocks which generate higher commission revenues for brokerage firms and is greater for institutions that pay higher brokerage commissions. Third, institutions make positive abnormal profits during the post-split period even after taking brokerage commissions and other trading costs into account. Further, institutions paying higher commissions significantly outperform those paying lower commissions. Fourth, the information asymmetry faced by the firm decreases after a split. Further, the greater the increase in brokerage commissions after a split, the greater the reduction in information asymmetry.

Overall, our results are consistent with the information production theory first proposed by Brennan and Hughes (1991), in which brokerage commissions play a central role in stock splits.

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Figure 2: Pattern of Institutional Trading Around Splits

This figure presents the pattern of institutional trading around splits. For each month during the six-month period before the split announcement and the six-month period after the split Ex-date, we plot the split-adjusted share volume (in millions, upper panel) and dollar volume (in $ millions, lower panel) by sample institutions. The horizontal line is the month relative to the split Ex-date for positive numbers and that relative to the announcement date for negative numbers.

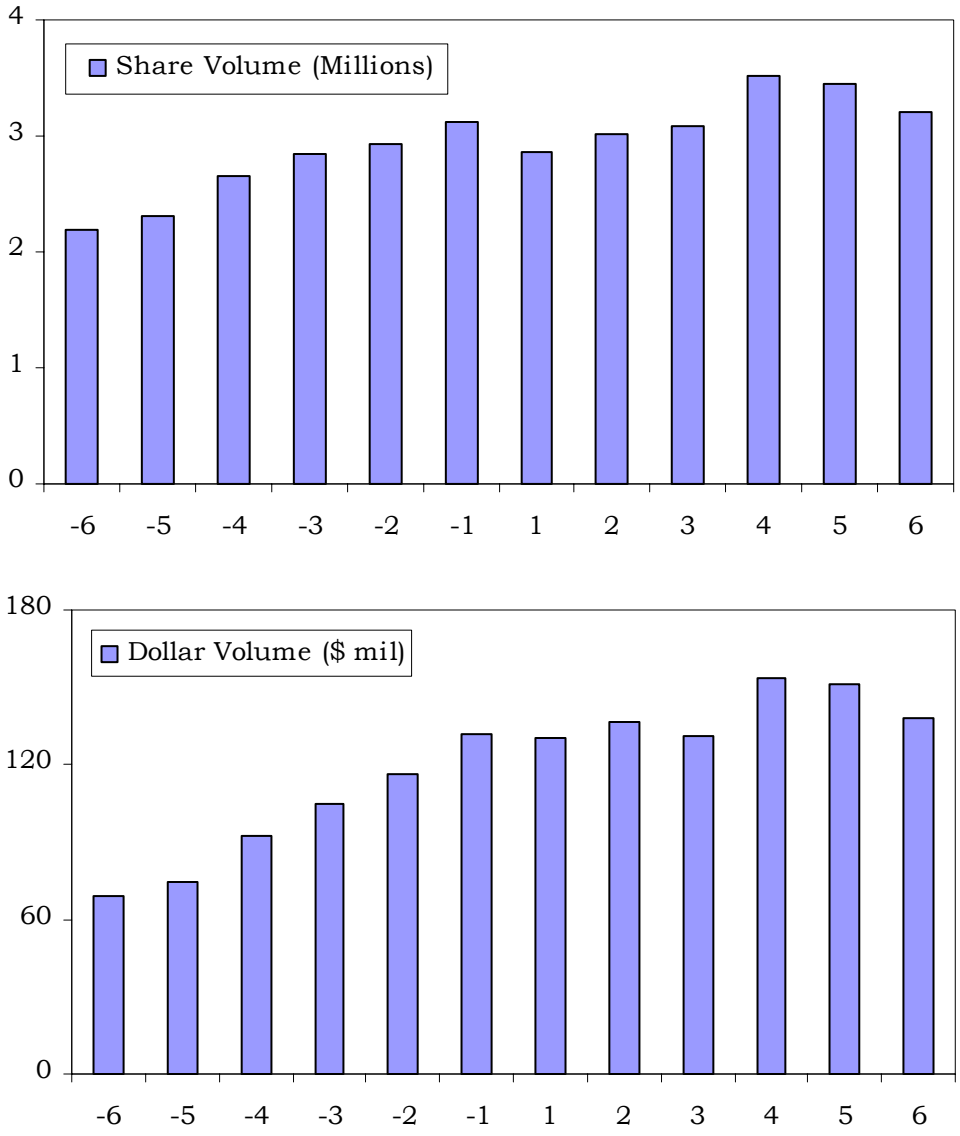

Figure 3: Institutional Commissions Before and After Splits

This figure presents the frequency distribution of total commissions paid by our sample institutions in the three-month period before split announcements (blue bars) versus that during the three-month period after split Ex-dates (purple bars). The horizontal line is the bins for total commissions (in dollars).

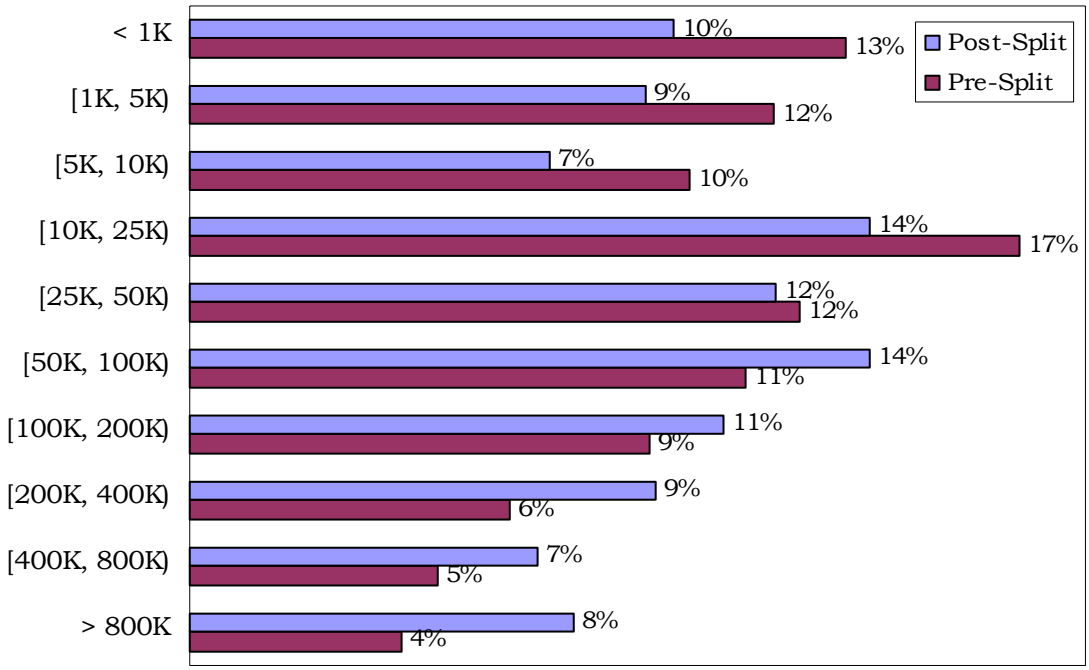

Table 1: Stock Splits by Year, Split Factor and Exchange

The table reports the number of stocks in the sample, by year and split factor (Panel A) and by year and stock exchange (Panel B) that announced a stock split from 1999 to 2005. All firms with common stocks traded on NYSE/Amex/Nasdaq and traded by our sample institutions before the split announcement are included in the sample.

Panel A. By Year and Split Factor

Year	<2-for-1	2-for-1	>2-for-1	Total
1999	118	215	16	349
2000	90	242	25	357
2001	98	64	2	164
2002	94	72	4	170
2003	111	75	7	193
2004	117	125	6	248
2005	96	122	2	220
Total	724	915	62	1701

Panel B. By Year and Stock Exchange

Year	NYSE	Amex	Nasdaq	Total
1999	111	9	229	349
2000	102	8	247	357
2001	60	2	102	164
2002	64	8	98	170
2003	65	9	119	193
2004	98	10	140	248
2005	97	6	117	220
Total	597	52	1052	1701

Table 2: Summary Statistics of Institutional Trading Sample

This table presents summary statistics of the institutional trading sample. We obtain institutional trading data from the Abel/Noser Corporation for the period of January 1999 to December 2005. There are 601 institutions in our sample. Sample mean, standard deviation, 25 percentile, median, and 75 percentiles are presented. Annualized Principal Traded, Annualized Shares Traded, and Annualized Commissions Paid are computed based on all U.S. domestic equity traded by institutions from January 1999 through December 2005. For these three variables, sample statistics are based on cross sections of sample institutions. For a given split, Fraction of Total Post-Split Trading is computed as the aggregate shares traded by sample institutions divided by the aggregate CRSP volume (NASDAQ volumes are adjusted for double counting by dividing CRSP reported volumes by two) within the first year post-IPO. For Fraction of Total Post-Split Trading, sample statistics are based on the cross section of sample IPOs.

	Mean	Std	25%	Median	75%
Annualized Principal Traded ($ million)	8,964.38	5,6071.12	146.84	473.13	1,730.84
Annualized Shares Traded (million)	279.25	1597.53	4.90	15.50	55.65
Annualized Commissions Paid ($ million)	9.40	54.15	0.18	0.53	1.93
Fraction of Total Post-Split Trading (%)	11.25	8.27	5.32	9.74	15.19

Table 3: Summary Statistics of Institutional Trading and Brokerage Commissions Before and After Splits

The table presents mean statistics for the trading activities of 601 institutional investors around splits. The pre-split period is the three-month period immediately before the split announcement and the post-split period is the three-month period immediately after the split ex-date. We first compute the mean statistics for each split. The table reports the cross-split average number of trades, turnover (shares traded divided by CRSP reported shares outstanding), share volume (shares traded), dollar volume (shares traded multiply closing price), per-dollar commission (dollar commission divided by dollar volume), total-dollar commission, and per-share commission (dollar commission divided by number of shares traded) during each three-month period. The last column reports *t*-statistics of the null that there is no difference between the pre-split and the post-split period. Significance on a 10% (*), 5% (**), or 1% level (***) is indicated.

	Pre-Split	Post-Split	*t*-statistics
Number of Trades	793	1031	5.00***
Share Volume (1,000s)	8,609.41	8,971.56	0.56
Dollar Volume ($ million)	343.51	407.10	2.11**
Turnover (%)	6.16	6.46	1.37
Per-Dollar Commission (0.01%)	6.58	10.65	5.86***
Total Commission (1,000$)	139.94	252.12	6.44***
Per-Share Commission (0.01$)	2.55	2.89	2.14**

Table 4: Institutional Trading After the Ex-Date and the Subsequent Abnormal Returns

The table reports regression results using abnormal buy-and-hold returns as the dependent variable. We consider four holding horizons: 6 months, 1 year, 2 years and 3 years. The abnormal buy-and-hold return is calculated using CAPM (first two columns) and Fama-French three-factor model (last two columns). We present predictability results separately for all institutions, investment managers, and pension sponsors. Net Buying is the institutional net buying in the first month immediately after the Ex-date. Split factor is the CRSP factor to adjust shares outstanding. Size is the market value of the equity of the splitting firm measured two months before the split announcement. Log(B/M) is the log of the ratio of book value of common equity to market value of common equity measured two months before the announcement. Financial is a dummy variable that equals 1 for financial firms (SIC code 6000-6999). Utility is a dummy variable that equals 1 for financial firms (SIC code 4000-4999). Hi-Tech is a dummy variable that equals 1 for firms in the high-tech industry (first two digits of SIC code: 35, 36, 38, 73, 87). Nasdaq is a dummy variable that equals 1 for firms with stocks traded on Nasdaq. The numbers in parentheses are *t*-statistics. Significance on a 10% (*), 5% (**), or 1% level (***) is indicated.

Panel A. All Institutions

	CAPM-Adjusted		3 Factor-Adjusted	
	6-month	1-year	6-month	1-year
Net Buying	1.160	3.228	0.663	2.184
	(1.65)*	(3.07)***	(1.04)	(2.20)**
Split Factor	0.600	2.509	-0.339	2.090
	(0.27)	(0.74)	(0.16)	(0.65)
Size	-0.444	0.092	1.009	2.724
	(0.61)	(0.09)	(1.52)	(2.65)***
Log(B/M)	-0.427	3.021	-0.950	0.385
	(0.31)	(1.47)	(0.76)	(0.20)
Financial	-2.067	-4.589	0.007	-1.477
	(0.75)	(1.11)	(0.00)	(0.38)
Utility	-1.696	-5.983	-0.472	-3.745
	(0.26)	(0.62)	(0.08)	(0.41)
Hi-Tech	0.453	-1.047	1.777	0.412
	(0.18)	(0.28)	(0.78)	(0.12)
Nasdaq	3.257	4.149	4.370	8.660
	(1.34)	(1.15)	(1.98)**	(2.53)**
Constant	5.315	8.250	-9.736	-22.373
	(0.95)	(0.99)	(1.91)*	(2.83)***
Year Dummy	Yes	Yes	Yes	Yes
Observations	1701	1701	1701	1701
R-squared	0.03	0.05	0.01	0.03

Panel B. Investment Managers				
	CAPM-Adjusted		3 Factor-Adjusted	
	6-month	1-year	6-month	1-year
Net Buying	1.467	3.986	0.916	2.955
	(1.98)**	(3.60)***	(1.36)	(2.82)***
Split Factor	0.596	2.496	-0.338	2.093
	(0.26)	(0.74)	(0.16)	(0.66)
Size	-0.448	0.081	1.008	2.720
	(0.62)	(0.07)	(1.52)	(2.65)***
Log(B/M)	-0.402	3.085	-0.932	0.443
	(0.29)	(1.50)	(0.74)	(0.23)
Financial	-2.104	-4.681	-0.023	-1.567
	(0.76)	(1.13)	(0.01)	(0.40)
Utility	-1.801	-6.245	-0.556	-4.001
	(0.28)	(0.65)	(0.09)	(0.44)
Hi-Tech	0.422	-1.108	1.741	0.308
	(0.17)	(0.30)	(0.77)	(0.09)
Nasdaq	3.269	4.187	4.376	8.680
	(1.35)	(1.16)	(1.99)**	(2.54)**
Constant	5.382	8.438	-9.698	-22.249
	(0.96)	(1.01)	(1.91)*	(2.81)***
Year Dummy	Yes	Yes	Yes	Yes
Observations	1701	1701	1701	1701
R-squared	0.03	0.05	0.02	0.03

Panel C. Plan Sponsors				
	CAPM-Adjusted		3 Factor-Adjusted	
	6-month	1-year	6-month	1-year
Net Buying	-3.513	-7.800	-3.543	-10.432
	(1.06)	(1.57)	(1.18)	(2.23)**
Split Factor	0.479	2.202	-0.431	1.806
	(0.21)	(0.65)	(0.21)	(0.57)
Size	-0.495	-0.033	0.969	2.603
	(0.68)	(0.03)	(1.46)	(2.53)**
Log(B/M)	-0.461	2.913	-0.959	0.346
	(0.33)	(1.41)	(0.77)	(0.18)
Financial	-1.961	-4.285	0.062	-1.290
	(0.71)	(1.03)	(0.02)	(0.33)
Utility	-1.381	-5.090	-0.306	-3.186
	(0.21)	(0.52)	(0.05)	(0.35)
Hi-Tech	0.909	0.148	2.095	1.414
	(0.37)	(0.04)	(0.93)	(0.40)
Nasdaq	3.353	4.385	4.449	8.902
	(1.38)	(1.21)	(2.02)**	(2.60)***
Constant	5.612	8.958	-9.472	-21.580
	(1.00)	(1.07)	(1.86)*	(2.73)***
Year Dummy	Yes	Yes	Yes	Yes
Observations	1701	1701	1701	1701
R-squared	0.03	0.05	0.01	0.03

Table 5: Institutional Trading after the Ex-Date and the Subsequent 1-Year Buy-and-Hold Abnormal Returns: High Commission vs. Low Commission Stocks

The table reports regression results using 1-year buy-and-hold abnormal returns as the dependent variable. The sample splits are partitioned into two groups based on commissions paid by the institutions. If the ratio of commissions in the first month immediately after the ex-date to that in the most recent month immediately before the announcement day is above median, then the split is in the High group, else it is in the Low group. We use two commission measures: one is the commission per dollar and the other is the total dollar amount of commissions. Net Buying is the institutional net buying in the first month immediately after the Ex-date. Split factor is the CRSP factor to adjust shares outstanding. Size is the market value of the equity of the splitting firm measured two months before the split announcement. Log(B/M) is the log of the ratio of book value of common equity to market value of common equity measured two months before the announcement. Financial is a dummy variable that equals 1 for financial firms (SIC code 6000-6999). Utility is a dummy variable that equals 1 for financial firms (SIC code 4000-4999). Hi-Tech is a dummy variable that equals 1 for firms in the high-tech industry (first two digits of SIC code: 35, 36, 38, 73, 87). Nasdaq is a dummy variable that equals 1 for firms with stocks traded on Nasdaq. The numbers in parentheses are *t*-statistics. Significance on a 10% (*), 5% (**), or 1% level (***) is indicated.

	CAPM-Adjusted		3 Factor-Adjusted	
	Low-Comm	High-Comm	Low-Comm	High-Comm
Net Buying	1.651	5.047	1.516	2.772
	(1.09)	(3.36)***	(1.10)	(1.88)*
Split Factor	-0.305	3.272	-0.649	3.102
	(0.04)	(0.83)	(0.09)	(0.80)
Size	1.826	-1.786	3.869	1.922
	(1.05)	(1.15)	(2.44)**	(1.26)
Log(B/M)	2.310	5.109	-3.444	4.433
	(0.72)	(1.81)*	(1.17)	(1.60)
Financial	-0.281	-11.858	3.488	-8.789
	(0.04)	(1.98)**	(0.60)	(1.49)
Utility	10.246	-17.111	1.653	-11.221
	(0.56)	(1.43)	(0.10)	(0.95)
Hi-Tech	1.256	-5.276	3.107	-4.122
	(0.22)	(1.02)	(0.60)	(0.81)
Nasdaq	6.926	5.248	10.701	10.132
	(1.26)	(1.04)	(2.13)**	(2.04)**
Constant	-7.294	28.428	-37.476	-8.660
	(0.56)	(2.24)**	(3.17)***	(0.69)
Year Dummy	Yes	Yes	Yes	Yes
Observations	809	810	809	810
R-squared	0.05	0.07	0.05	0.03

Table 6: Institutional Trading After the Ex-Date and the Subsequent Abnormal Returns: High-Commission vs. Low-Commission-Paying Institutions

The table reports regression results using abnormal buy-and-hold returns as the dependent variable. We consider four holding horizons: 6 months, 1 year, 2 years and 3 years. The abnormal buy-and-hold return is calculated using a market model. We aggregate the total dollar amount of commissions paid by each institution in the first month immediately after the ex-date and divide the sample institutions into two groups: institutions with a higher than median total commissions are the high-commission-paying institutions and those blow the median are the low-commission-paying ones. Net Buying is the institutional net buying in the first month immediately after the Ex-date. Split factor is the CRSP factor to adjust shares outstanding. Size is the market value of the equity of the splitting firm measured two months before the split announcement. Log(B/M) is the log of the ratio of book value of common equity to market value of common equity measured two months before the announcement. Financial is a dummy variable that equals 1 for financial firms (SIC code 6000-6999). Utility is a dummy variable that equals 1 for financial firms (SIC code 4000-4999). Hi-Tech is a dummy variable that equals 1 for firms in the high-tech industry (first two digits of SIC code: 35, 36, 38, 73, 87). Nasdaq is a dummy variable that equals 1 for firms with stocks traded on Nasdaq. The numbers in parentheses are *t*-statistics. Significance on a 10% (*), 5% (**), or 1% level (***) is indicated.

Panel A. High-Commission-Paying Institutions					Panel B. Low-Commission-Paying Institutions			
	CAPM-Adjusted		3 Factor-Adjusted		CAPM-Adjusted		3 Factor-Adjusted	
	6-month	1-year	6-month	1-year	6-month	1-year	6-month	1-year
Net Buying	1.284	3.489	0.789	2.429	-8.767	-17.128	-9.688	-17.414
	(1.81)*	(3.29)***	(1.22)	(2.42)**	(1.33)	(1.74)*	(1.62)	(1.87)*
Split Factor	0.597	2.498	-0.338	2.086	0.462	2.184	-0.454	1.825
	(0.26)	(0.74)	(0.16)	(0.65)	(0.20)	(0.65)	(0.22)	(0.57)
Size	-0.442	0.099	1.012	2.73	-0.468	0.025	0.996	2.679
	(0.61)	(0.09)	(1.53)	(2.66)***	(0.64)	(0.02)	(1.51)	(2.60)***
Log(B/M)	-0.425	3.023	-0.946	0.389	-0.512	2.808	-1.013	0.223
	(0.31)	(1.47)	(0.76)	(0.20)	(0.37)	(1.36)	(0.81)	(0.11)
Financial	-2.084	-4.627	-0.009	-1.51	-1.976	-4.311	0.044	-1.308
	(0.75)	(1.12)	(0.00)	(0.39)	(0.71)	(1.04)	(0.02)	(0.33)
Utility	-1.714	-6.01	-0.498	-3.782	-1.222	-4.771	-0.133	-2.84
	(0.26)	(0.62)	(0.08)	(0.41)	(0.19)	(0.49)	(0.02)	(0.31)
Hi-Tech	0.429	-1.089	1.749	0.365	0.853	0.005	2.047	1.174
	(0.17)	(0.29)	(0.77)	(0.10)	(0.34)	(0.00)	(0.91)	(0.33)
Nasdaq	3.26	4.161	4.37	8.666	3.348	4.361	4.449	8.837
	(1.35)	(1.15)	(1.98)**	(2.53)**	(1.38)	(1.20)	(2.02)**	(2.58)***
Constant	5.298	8.211	-9.749	-22.405	5.349	8.387	-9.742	-22.313
	(0.95)	(0.98)	(1.91)*	(2.83)***	(0.96)	(1.00)	(1.91)*	(2.82)***
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1701	1701	1701	1701	1701	1701	1701	1701
R-squared	0.03	0.05	0.01	0.03	0.03	0.05	0.02	0.03

Table 7: Institutional Trading after the Ex-Date and the Subsequent 1-Year Buy-and-Hold Abnormal Returns: Double Sorting

The table reports regression results using 1-year buy-and-hold abnormal returns as the dependent variable. The sample splits are partitioned into two groups based on commissions paid by the institutions. If the ratio of commissions in the first month immediately after the ex-date to that in the most recent month immediately before the announcement day is above median, then the split is in the High group, else it is in the Low group. We use two commission measures: one is the commission per dollar and the other is the total dollar amount of commissions. Net Buying is the institutional net buying in the first month immediately after the Ex-date. Split factor is the CRSP factor to adjust shares outstanding. Size is the market value of the equity of the splitting firm measured two months before the split announcement. Log(B/M) is the log of the ratio of book value of common equity to market value of common equity measured two months before the announcement. Financial is a dummy variable that equals 1 for financial firms (SIC code 6000-6999). Utility is a dummy variable that equals 1 for financial firms (SIC code 4000-4999). Hi-Tech is a dummy variable that equals 1 for firms in the high-tech industry (first two digits of SIC code: 35, 36, 38, 73, 87). Nasdaq is a dummy variable that equals 1 for firms with stocks traded on Nasdaq. The numbers in parentheses are *t*-statistics. Significance on a 10% (*), 5% (**), or 1% level (***) is indicated.

Panel A. High-Commission-Paying Institutions					Panel B. Low-Commission-Paying Institutions			
	CAPM-Adjusted		3 Factor-Adjusted		CAPM-Adjusted		3 Factor-Adjusted	
	Low-Comm	High-Comm	Low-Comm	High-Comm	Low-Comm	High-Comm	Low-Comm	High-Comm
Net Buying	2.007	5.382	1.716	3.073	-22.068	-5.759	-28.029	-4.249
	(1.33)	(3.51)***	(1.25)	(2.03)**	(0.63)	(0.35)	(0.87)	(0.33)
Split Factor	0.051	2.736	1.149	2.119	-5.062	9.515	-2.598	9.772
	(0.01)	(0.70)	(0.16)	(0.54)	(0.52)	(1.18)	(0.29)	(1.53)
Size	1.631	-1.373	3.997	2.169	0.188	-2.369	3.034	0.967
	(0.92)	(0.90)	(2.48)**	(1.43)	(0.08)	(1.19)	(1.39)	(0.61)
Log(B/M)	3.088	4.604	-2.504	3.824	4.846	3.055	-1.684	2.749
	(0.95)	(1.65)*	(0.85)	(1.39)	(1.20)	(0.79)	(0.45)	(0.90)
Financial	-0.005	-10.998	3.742	-7.637	2.771	-2.351	4.152	-3.536
	(0.00)	(1.85)*	(0.64)	(1.30)	(0.30)	(0.27)	(0.50)	(0.51)
Utility	11.068	-16.507	2.624	-10.648	9.464	-4.018	12.536	-12.607
	(0.59)	(1.40)	(0.16)	(0.91)	(0.46)	(0.25)	(0.66)	(0.98)
Hi-Tech	1.497	-4.939	3.613	-4.233	5.949	3.654	6.587	0.948
	(0.26)	(0.96)	(0.70)	(0.83)	(0.81)	(0.60)	(0.98)	(0.20)
Nasdaq	7.916	4.643	12.384	8.772	8.766	9.381	11.763	13.203
	(1.42)	(0.93)	(2.44)**	(1.78)*	(1.19)	(1.48)	(1.74)*	(2.64)***
Constant	-5.814	25.016	-39.375	-10.297	8.141	19.845	-30.937	-13.31
	(0.44)	(1.99)**	(3.31)***	(0.83)	(0.44)	(1.21)	(1.83)*	(1.02)
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	808	808	808	808	520	521	520	521
R-squared	0.04	0.07	0.04	0.03	0.06	0.05	0.05	0.05

Table 8: Profitability of Institutional Trading after Split Ex-Date

The table reports univariate results of the profitability of institutional trading in the three-month period post split Ex-date. For each stock split, we divide institutions that trade the stock during the three-month period into a high-commission-paying group and a low-commission-paying group based on per dollar commissions, i.e., the ratio of brokerage commissions to dollar principal. We use two measures to proxy the amount invested for post-split trading, namely, the Buy Principal and the Maximum Investment. Raw Buy Principal is the sum of the actual dollar amount of all the buy transactions including commissions spent by sample institutions during the 3-month post split. Raw Maximum Investment is the maximum dollar amount committed to trading the split firms' shares during the 3-month post split by sample institutions. Raw Profit is the total raw profit earned by institutions using actual transaction prices net of commissions, with the net position marked to market at the end of the three-month period. Raw Return is defined as the Raw Profit divided by the Raw Amount Invested. We use Fama-French three factor model to adjust profits and investment amount. For example, 3 Factor-Adjusted Profit is computed by discounting the raw profit back to the day before the split ex-date using the benchmark return from Fama-French 3 factor model; and 3 Factor-Adjusted Return on Buy Principal equals 3 Factor-Adjusted Profit divided by 3 Factor-Adjusted Buy Principal. The numbers in parentheses are *t*-statistics.

Panel A: Institutional Trading During the First Month Following Split Ex-Date

	All Institutions	High-Comm Institutions	Low-Comm Institutions	Difference (High-Low)
Panel A1: Amount Invested				
Number of Observations	47,789	23,365	24,441	
Per-Dollar Commission (0.01%)	11.69	15.03	4.18	10.86
				(17.89)
Raw Buy Principal ($ million)	3.35	4.69	2.07	2.63
				(11.70)
Raw Maximum Investment ($ million)	3.05	4.20	1.95	2.26
				(10.90)
3 Factor-Adjusted Buy Principal ($ million)	3.37	4.74	2.05	2.69
				(11.87)
3 Factor-Adjusted Max. Inv. ($ million)	3.06	4.24	1.94	2.30
				(11.07)
Panel A2: Profit				
Raw Return on Buy Principal (%)	1.51	1.79	1.24	0.55
	(21.98)	(18.17)	(12.97)	(3.97)
Raw Return on Maximum Investment (%)	1.57	1.87	1.29	0.58
	(22.35)	(18.44)	(13.20)	(4.09)
3 Factor-Adjusted Return on Buy Principal (%)	1.83	1.99	1.67	0.32
	(29.91)	(22.37)	(19.92)	(2.62)
3 Factor-Adjusted Return on Max. Inv. (%)	1.90	2.08	1.72	0.35
	(30.32)	(22.70)	(20.15)	(2.83)

Panel B: Institutional Trading During the First 3 Months Following Split Ex-Date

	All Institutions	High-Comm Institutions	Low-Comm Institutions	Difference (High-Low)
Panel B1: Amount Invested				
Number of Observations	76,667	38,259	38,436	
Per-Dollar Commission (0.01%)	14.59	16.36	4.73	11.63
				(21.72)
Raw Buy Principal ($ million)	5.60	7.58	3.63	3.95
				(12.25)
Raw Maximum Investment ($ million)	4.76	6.28	3.24	3.04
				(11.06)
3 Factor-Adjusted Buy Principal ($ million)	5.77	7.83	3.71	4.12
				(12.06)
3 Factor-Adjusted Max. Inv. ($ million)	4.86	6.43	3.30	3.13
				(10.88)
Panel B2: Profit				
Raw Return on Buy Principal (%)	1.63	2.13	1.14	0.99
	(21.67)	(20.28)	(10.54)	(6.59)
Raw Return on Maximum Investment (%)	1.83	2.35	1.30	1.05
	(23.14)	(21.16)	(11.63)	(6.66)
3 Factor-Adjusted Return on Buy Principal (%)	2.55	3.00	2.11	0.90
	(37.36)	(31.45)	(21.54)	(6.56)
3 Factor-Adjusted Return on Max. Inv. (%)	2.86	3.36	2.36	0.99
	(39.68)	(33.08)	(23.11)	(6.90)

Table 9: Information Production around Splits and Institutional Trading Commissions: Univariate Results

The table reports univariate results for information production and institutional commissions around splits. For each split event, we retrieve analyst earnings forecasts for the previous and the next fiscal year-end. If the next annual earnings announcement is within 6 months of the split Ex-date, we jump ahead to the following fiscal year. If the previous annual earnings announcement is within 6 months of the split Ex-date, we jump backward to the preceding fiscal year. We employ four measures for analyst forecasts. The first measure is the number of analysts following the firm. The second measure is the standard deviation of analyst forecasts. Our third measure is the error in the earnings forecast. We measure forecast error as the absolute difference between the average forecasted earnings and the actual earnings per share divided by the price per share at the end of the fiscal year. Our fourth measure is the coefficient of variation of analyst forecasts, which is defined as the ratio of standard deviation to the absolute value of the average of analyst forecasts. All measures are constructed using analysts' one-year ahead earnings forecast in the last six months of each fiscal year. We calculate the change in each measure by taking log of the ratio of the post-split value to the pre-split value of the measure. Δlog(Total Commission) is the natural logarithm of the total commissions paid by institutions in the fiscal year following the split ex-date divided by the total commissions in the fiscal year preceding the Ex-date. Historical Earnings Stability is measured as the volatility (standard deviation) of quarterly earnings over the past two years. The numbers in parentheses are *t*-statistics. Significance on a 10% (*), 5% (**), or 1% level (***) is indicated.

	Pre-Split	Log Change (%)	*t*-statistics
Number of Analysts	9.52	31.34	16.80***
Standard Deviation (%)	2.59	53.40	13.57***
Forecast Error (%)	0.27	-21.03	-3.11***
Coefficient of Variation	0.07	7.04	1.54
Commissions (1,000$)	352.35	141.29	27.25***
Historical Earnings Stability (%)	7.87	42.80	19.89***

Table 10: Information Production around Splits and Institutional Trading Commissions: Multivariate Results

The table reports regression results using change in different measures of analyst forecasts as the dependent variable. For each split event, we retrieve analyst earnings forecasts for the previous and the next fiscal year-end. If the next annual earnings announcement is within 6 months of the split Ex-date, we jump ahead to the following fiscal year. If the previous annual earnings announcement is within 6 months of the split Ex-date, we jump backward to the preceding fiscal year. We employ four measures for analyst forecasts. The first measure is the number of analysts following the firm. The second measure is the standard deviation of analyst forecasts. Our third measure is the error in the earnings forecast. We measure forecast error as the absolute difference between the average forecasted earnings and the actual earnings per share divided by the price per share at the end of the fiscal year. Our fourth measure is the coefficient of variation of analyst forecasts, which is defined as the ratio of standard deviation to the absolute value of the average of analyst forecasts. All measures are constructed using analysts' one-year ahead earnings forecast in the last six months of each fiscal year. We calculate the change in each measure by taking log of the ratio of the post-split value to the pre-split value of the measure. Δlog(Total Dollar Commission) is the natural logarithm of the total commissions paid by institutions in the fiscal year following the split ex-date divided by the total commissions in the fiscal year preceding the Ex-date. Historical Earnings Stability is measured as the volatility (standard deviation) of quarterly earnings over the past two years. The numbers in parentheses are *t*-statistics. Significance on a 10% (*), 5% (**), or 1% level (***) is indicated.

	Δlog(# Analysts)		Δlog(Std.Dev.)		Δlog(Forecast Err)		Δlog(Coeff. of Var.)	
Δlog(Commissions)	0.093	0.118	-0.050	-0.028	-0.120	-0.167	-0.067	-0.062
	(8.24)***	(9.37)***	(1.96)**	(0.98)	(2.78)***	(3.41)***	(2.24)**	(1.82)*
Δlog(Hist.E.Stab.)	0.041	0.043	0.422	0.386	0.485	0.473	0.242	0.200
	(1.50)	(1.58)	(6.92)***	(6.40)***	(4.68)***	(4.51)***	(3.36)***	(2.77)***
Constant	0.155	0.118	0.423	0.409	-0.244	-0.172	0.061	0.073
	(6.15)***	(4.46)***	(7.65)***	(7.09)***	(2.49)**	(1.66)	(0.94)	(1.06)
Year Dummies	No	Yes	No	Yes	No	Yes	No	Yes
Observations	912	912	809	809	867	867	809	809
R-squared	0.08	0.10	0.06	0.11	0.03	0.04	0.02	0.05