

The effect of stock splits on the ownership structure of firms ¹

Sandip Mukherji ^a, Yong H. Kim ^{b,*}, Michael C. Walker ^b

^a School of Business, Howard University, Washington, DC 20059, USA

^b College of Business Administration, University of Cincinnati, Cincinnati, OH 45221, USA

Abstract

Although several researchers have speculated that stock splits may affect the ownership structure of firms, there is very little empirical evidence available in this regard. We investigate a broad sample of stock splits by firms without confounding events, controlling for industry and size effects. Our results show that stock splits increase the numbers of both individual and institutional shareholders, and they do not affect the proportion of equity held by institutions. Further, changes in the numbers of individual and institutional shareholders are positively related to the split factor. Abnormal announcement returns are positively correlated with changes in the total number of shareholders. These findings support the signaling hypothesis.

JEL classification: G35; G32; G14; G2

Keywords: Stock splits; Ownership structure; Signaling

* Corresponding author. Tel.: +1-513-5567084; fax: +1-513-5564891; e-mail: yong.kim@uc.edu.

¹ This paper is based on part of the Ph.D. dissertation of Sandip Mukherji at the University of Cincinnati. Yong H. Kim gratefully acknowledges partial funding from the George Scull Fund through UC Foundation. We thank an anonymous referee, Kelly Brunarski, Hyuk Choe, Dosoung Choi, John Cook, Claire Crutchley, Manjeet Dhatt, Ki Han, Ken Lehn (editor), Moon Song, and participants at the 1992 Southern Finance Association and 1994 Financial Management Association meetings, for helpful comments and suggestions on different versions of this paper.

1. Introduction

Stock splits represent book entries which do not increase a firm's cash flows, but involve several costs². Yet, they continue to be popular with managers. Lakonishok and Lev (1987) note that, during 1963–1982, on average about 6% of the firms listed on the New York stock exchange (NYSE) or the American stock exchange (AMEX) split their stock each year. There is also evidence of positive market reactions around stock split announcements and ex-days (e.g., Grinblatt et al., 1984; Lamoureux and Poon, 1987). The rationale for stock splits remains unclear.

Several researchers have speculated that stock splits may alter the ownership structure of firms by increasing the number of individual shareholders and reducing institutional ownership. Lamoureux and Poon (1987) develop a tax-option hypothesis which predicts that stock splits will result in clientele shifts from institutional to individual shareholders. Lakonishok and Lev (1987) suggest that broadening the shareholder base may be a possible motive for stock splits by managers seeking to reduce takeover threats. Baker and Gallagher (1980) report that the primary motive for stock splits cited by managers is to reduce the stock price so that small investors can afford round lots, implying that the number of shareholders is expected to increase following a split.

Despite frequent speculation, the impact of stock splits on the ownership structure of firms has received scant attention from empirical researchers. The primary evidence in this regard is that stock splits result in an increase in the number of shareholders (e.g., Barker, 1956; Lamoureux and Poon, 1987). Some researchers, notably Lamoureux and Poon (1987), have suggested that the increase in the number of shareholders implies a decrease in institutional ownership. It is, however, possible that the increase in the number of shareholders is due to the lower stock price and larger number of shares available after a split and it does not reflect a decrease in institutional ownership. Consistent with this possibility, Lamoureux and Poon (1987) find that there is an increase in the number of transactions and a decrease in average transaction size after a split.

The impact of stock splits on the ownership structure of firms has implications for organizational control, monitoring and agency costs. If stock splits reduce institutional ownership or result in wider ownership of shares, as some researchers suggest, then they may enable managers to consolidate control over firms. Further, to the extent that institutional shareholders monitor managers' performance more closely than individual shareholders, splits may reduce monitoring and increase agency costs.

This study fills a gap in the literature on stock splits by conducting a detailed investigation of the effect of splits on the ownership structure of firms. Unlike

² The costs borne by shareholders include the administrative, printing and legal expenses of carrying out splits as well as increases in transaction costs, which are inversely related to stock prices.

previous researchers, we test a clean sample of firms without confounding events and control for industry and size effects. Our findings indicate that stock splits result in increases in the numbers of both institutional and individual shareholders³, and they do not affect the proportion of equity held by institutions.⁴ Contrary to the prediction of the tax-option hypothesis, the Tax Reform Act of 1986 does not have a significant impact on these ownership effects of stock splits. We also find that changes in the numbers of institutional and individual shareholders are positively related to the split factor. Further, abnormal returns around the split announcement are positively correlated with percentage changes in the total number of shareholders. Finally, splits do not affect ownership concentration, which is abnormally low for splitting firms both before and after the split. Overall, our results support the hypothesis that stock splits signal positive information about the firm.

The rest of the paper is organized as follows. Section 2 summarizes the existing evidence regarding the effects of stock splits on the ownership structure of firms. Section 3 discusses the hypotheses tested. Section 4 describes the data and methodology. Section 5 presents the results and Section 6 provides additional analyses. Section 7 offers the conclusions.

2. Existing evidence

There is evidence that stock splits result in an increase in the total number of shareholders. Barker (1956) tests a sample of 90 NYSE firms which split their stocks during 1951–1953 and have split factors between 1.00 and 2.00. He finds that, between the end of 1950 and 1953, the average number of shareholders increases by 30% in split firms, while it declines by 6% in control firms. Lamoureux and Poon (1987) study 41 firms with split factors of 1.5 and above. In the split year, the average number of shareholders increases by 35% in these firms, compared to a decrease of 2% in control firms. The authors interpret these findings as evidence of a clientele shift from institutional to individual investors, which is predicted by their tax-option hypothesis.

The findings of Maloney and Mulherin (1992), however, indicate that an increase in the number of shareholders does not imply a decrease in institutional ownership. For a sample of 384 stock splits by NASDAQ firms between 1985 and 1989, they find that, in the split year, the total number of shareholders increases by a median 18.8%, while the number of institutional shareholders increases by

³ Individual shareholders include managers and directors. Since Szewczyk and Tsetsekos (1993) show that stock splits do not affect managerial ownership, we do not examine the effects of stock splits on such shareholders separately.

⁴ We do not test separately for changes in the proportion of shares held by individuals. However, the absence of a significant change in the proportion of shares held by institutions indicates that individual holdings are also not significantly affected.

58.3% and the proportion of equity held by institutions rises by 29.2%. These results cannot, however, be interpreted as evidence that stock splits increase institutional ownership because the split firms are not compared to a control sample. The findings of this study may reflect the general trend towards increasing institutional ownership of corporate stocks.

The studies cited above do not exclude firms with confounding events, such as issues and repurchases of shares, which may increase or decrease, respectively, the number of shareholders. In addition, none of these studies controls for size effects, and only one (Lamoureux and Poon, 1987) controls for industry effects. Lakonishok and Lev (1987) note that split firms are substantially larger than average. The median market value of firms which split their stocks between 1963 and 1982 is \$160.2 million, compared to the median of \$55.8 million for all firms listed on the CRSP tape during those years. Asquith et al. (1989) observe that firms which split their stocks are in industries which perform well. It is therefore important to control for size and industry effects.

Further, the existing evidence for NYSE/AMEX firms only indicates an increase in the total number of shareholders for fairly small samples of firms that have large splits. Some researchers (e.g., Lamoureux and Poon, 1987) infer a decline in institutional ownership from this finding. As mentioned earlier, Maloney and Mulherin (1992) provide evidence for NASDAQ firms which prompts more cautious interpretation of such results. Our study examines a broad sample of split firms that do not have confounding events, controls for industry and size effects, and directly tests the effects of stock splits on the numbers of individual and institutional shareholders as well as the proportion of equity held by institutions.

3. Hypotheses tested

Existing rationales for stock splits and predictions of the different hypotheses regarding the effects of stock splits on the ownership structure of firms are discussed below. The predicted effects are also summarized in Table 1.

3.1. *Signaling hypothesis*

A common rationale for stock splits is provided by the signaling hypothesis. Grinblatt et al. (1984) observe that undervalued firms may split their stock to attract the attention of analysts and benefit from a reassessment of the firm's future cash flows. Brennan and Copeland (1988) develop a model based on the argument that the inverse relation between stock prices and transaction costs makes false signaling costly. They indicate that the number of shares outstanding after a split is a signal of managers' favorable private information about the firm's prospects. McNichols and Dravid (1990) suggest that a split may attract attention to the stock because the higher percentage commissions earned by brokers on lower-priced stocks give them an incentive to publicize splits.

Table 1

Effect of stock splits on the ownership structure of firms: Predictions of different hypotheses

Ownership structure variable	Predicted effect of stock split			
	signaling hypothesis	optimal trading range hypothesis	tax-option hypothesis	managerial entrenchment hypothesis
Number of individual shareholders	increase	increase	increase	increase
Number of institutional shareholders	increase	decrease	decrease	decrease
Proportion of equity held by institutions	no implied effect	decrease	decrease	decrease

Brennan and Hughes (1991) present a model in which managers with favorable private information announce stock splits to attract the attention of analysts and investors interpret splits as signals that managers have favorable information. Their signaling model predicts that a split will increase the number of shareholders as more investors learn about the firm (op. cit., p. 1676). This expectation is reinforced by their finding that the number of analysts following a stock is inversely related to the stock price and that it increases after a split.

According to the signaling hypothesis, the positive signal conveyed by a split should attract new investors to the firm. Since the signal is positive for *all* investors, a split should increase the numbers of both institutional and individual shareholders. Of course, for the number of shareholders to increase, some shareholders must sell shares and these shares must be purchased by a larger number of new investors. In spite of the positive signal, some shareholders may sell shares for liquidity purposes, while others may sell to rebalance portfolios, since a split is usually preceded by a runup in the stock price. Shares sold after the split may be purchased by a greater number of new investors because splits increase the number of round lots. The finding of Lamoureux and Poon (1987), that the number of trades increases and average transaction size decreases after a split, supports this scenario.

O'Brien and Bhushan (1990) find that changes in the number of institutional shareholders are positively related to the number of analysts following the stock. If institutional investors have more efficient mechanisms for collecting information than individuals, they may respond faster to signals contained in stock splits. Once the signal is fully revealed to all investors, however, the reaction of individuals should be similar to that of institutions.⁵ If both groups of shareholders respond

⁵ Reilly and Drzycimski (1981) observe that stock splits result in positive abnormal returns on both the announcement day and the following day, when the news is published in the Wall Street Journal. The trading volume of the splitting stocks is normal on the announcement day, but heavy on the publication day. The authors conclude that professional investors react to split announcements on the news services, but the general public does not react until the news is published.

equally positively to stock splits, then there should be no significant change in the proportion of equity held by institutions.

The signaling hypothesis therefore predicts that stock splits will increase the numbers of both institutional and individual shareholders, and there is no *a priori* reason to expect any effect on the proportion of equity held by institutions. This proportion will change significantly only if individual and institutional shareholders do not respond similarly to positive signals conveyed by stock splits, which is an empirical question.

3.2. *Optimal trading range hypothesis*

The optimal trading range hypothesis assumes that small investors are less likely than institutions to buy high-priced stocks in round lots, which have lower transaction costs than odd lots.⁶ According to this hypothesis, splits make round lots more affordable for small investors by reducing stock prices. A survey conducted by Baker and Gallagher (1980) shows that most managers believe splits keep stock prices within an optimal range, make it easier for small investors to buy round lots, and result in an increase in the number of shareholders. Lakonishok and Lev (1987) find evidence that reduction of the stock price to an acceptable level for comparable firms is a major motivation for stock splits.

The optimal trading range hypothesis predicts that the smaller investment required to purchase round lots will increase the number of individual shareholders after a split. Since institutional shareholders invest large amounts, they are not constrained by round lot investment requirements. On the contrary, they are adversely affected by the higher transaction costs on lower-priced stocks.⁷ The optimal trading range hypothesis therefore predicts that the number of institutional shareholders and the proportion of equity held by institutions will decline after a split.^{8, 9}

⁶ The relevance of this assumption may have been weakened by the growth of discount brokers, which has reduced the additional percentage cost of trading odd lots.

⁷ Edmister and Subramanian (1982), and Branch (1985) show that brokerage commissions are inversely related to stock prices.

⁸ Since institutional investors trade large blocks and have relatively low transaction costs, it may be argued that they consider liquidity more important than transaction costs. The empirical evidence, however, indicates that stock splits do not improve liquidity. In fact, Copeland (1979) finds that stock splits increase percentage bid-ask spreads and reduce trading volume. Conroy et al. (1990), however, report that stock splits do not affect long-term trading volume. Lakonishok and Lev (1987) show that trading volume is abnormally high before a split and declines to a normal level after the split. Finally, Murray (1985) finds that stock splits do not cause long-term changes in percentage bid-ask spreads.

⁹ Psychological factors may also influence individual investors' affinity for lower-priced stocks and institutional investors' preference for higher-priced stocks. For instance, lower-priced stocks may attract noise investors, predominantly individuals, who view such stocks as bargains. On the other hand, institutional investors may consider higher-priced stocks to be more reputable.

3.3. *Tax-option hypothesis*

Lamoureux and Poon (1987) propose a tax-option hypothesis, arguing that splits enhance the tax-option value of stocks by increasing the volatility of returns, thereby providing investors with greater opportunities to benefit from tax-timing options. In support of their hypothesis, the authors find that splits result in an increase in the volatility of returns¹⁰, which is directly related to abnormal announcement returns. In addition, splits are followed by an increase in the number of shareholders, which is positively related to excess returns around the ex-day.

The tax-option hypothesis suggests that a stock split will reduce the equilibrium expected return because high-tax-bracket investors will be willing to trade off the increased tax-option value of the stock against a decrease in the return. It therefore predicts a clientele shift from institutional shareholders, who are either tax-exempt or in low tax brackets, to individual shareholders, who are in higher tax brackets. According to this hypothesis, a stock split should increase the number of individual shareholders and reduce the number of institutional shareholders as well as the proportion of equity held by institutions.

3.4. *Managerial entrenchment hypothesis*

A managerial entrenchment hypothesis has been suggested by some researchers, although it has not been formally proposed or tested. Lakonishok and Lev (1987) note that managers concerned with a takeover threat may carry out stock splits in order to achieve a broad and heterogeneous shareholder base. “Institutional investors, it is believed, are primarily concerned with short-term portfolio performance and will therefore be quick to tender shares to a bidder. Many individual investors, on the other hand, may not even be aware of takeover bids, let alone respond to them quickly.” (op. cit., p. 916) Baker and Gallagher (1980) also indicate that the increasing share of institutional investors in total trading volume may motivate managers to split stocks in order to broaden the ownership base and reduce the percentage of shares held by a few institutions.

The managerial entrenchment hypothesis predicts that by lowering the stock price, a split will increase the number of individual shareholders, decrease the number of institutional shareholders, and reduce the proportion of equity held by institutions. These changes in the ownership structure are expected to make takeovers more difficult by increasing the proportion of individual shareholders and broadening the shareholder base.

¹⁰ Dubofsky (1991) suggests that the higher volatility observed after splits may reflect the effects of bid-ask spreads and minimum price changes of an eighth of a dollar.

3.5. *Predictions of different hypotheses*

It is evident that the predictions of the different hypotheses regarding the effects of stock splits on the ownership structure of firms are not mutually exclusive. In fact, all four hypotheses predict an increase in the number of individual shareholders. In addition, the optimal trading range, tax-option and managerial entrenchment hypotheses all predict that the number of institutional shareholders and the proportion of equity held by institutions will decline after a split.¹¹ The signaling hypothesis, however, predicts an increase in the number of institutional shareholders and does not expect any change in the proportion of equity held by institutions.

Although the optimal trading range, tax-option, and managerial entrenchment hypotheses predict similar effects on the ownership structure of firms, they offer different motivational premises for splits. According to the optimal trading range hypothesis, the rationale for a split is to lower the stock price so that small investors can afford to buy round lots. The lower price is expected to increase demand for the stock because it expands the pool of potential investors, which now includes small investors who could not afford a round lot before the split. The tax-option hypothesis does not attribute any particular motive to managers, but it indicates that, by increasing the volatility of returns, splits make stocks more attractive to high-tax-bracket investors and less attractive to low-tax-bracket investors. According to the optimal trading range and tax-option hypotheses, therefore, the expected change in ownership structure is a logical effect of the split, rather than the motive for it. By contrast, the managerial entrenchment hypothesis indicates that the primary motive for a split is to decrease the proportion of equity held by institutions, in order to reduce the threat of a takeover.

To determine the effect of stock splits on the ownership structure of firms, we test the null hypotheses that splits do not significantly affect the number of individual or institutional shareholders, or the proportion of equity held by institutions.

4. *Data and methodology*

Our initial sample consists of all stock splits of 25% or more by NYSE- and AMEX-listed firms, from 1984 through 1988. The test period is chosen to include

¹¹ It may be noted that these three hypotheses expect individual investors to respond favorably, and institutional investors to react negatively, to splits. Individual investors will therefore be net buyers whereas institutional investors will be net sellers. As a result, these hypotheses predict declines in both the number of institutional shareholders and proportion of shares held by institutions.

Table 2
 Characteristics of split and control firms ^a

Characteristic	Median values	
	split firms	control firms
Total assets	1,263	1,215
Total number of shareholders	10,618	10,745
Number of institutional shareholders	111	92
Number of individual shareholders	10,471	10,689
Proportion of equity held by institutions (%)	37.70	38.94

^a The total sample consists of 168 stock splits of 25% or more, during 1984–1988, by NYSE/AMEX firms that have a matching control firm, have data available on number of shareholders and proportion of equity held by institutions, and do not issue or repurchase shares in the year of the split. The control group is constructed by matching each split firm with a non-split firm, which has the same 4-digit SIC code and total assets within 25% of that of the split firm. The characteristic values are for the fiscal year before the split for split firms and the closest corresponding fiscal year for control firms. The number of individual shareholders is calculated by subtracting the number of institutional shareholders from the total number of shareholders.

adequate numbers of stock splits before and after the Tax Reform Act of 1986 so that we can determine whether this Act has any significant impact on the results, as predicted by the tax-option hypothesis. The stock market crash of October 1987 is not expected to affect our results, since we use a matched sample to control for market factors. Besides, our test sample of 168 stock splits includes only 3 announcements and 2 ex-dates occurring in October 1987.

Stock split announcement- and ex-dates during the test period are obtained from *Moody's Annual Dividend Record* ¹² and verified from the *Wall Street Journal Index*. A total of 728 stock splits are mentioned in both sources. We exclude 36 cases which have announcement- and ex-dates in the same month, so that the announcement and ex-day effects can be studied separately. Two other events are omitted because the stocks were first listed on the NYSE between the announcement and ex-dates. The usable sample thus consists of 690 firms.

Annual data on the number of shareholders are obtained from the annual Compustat tape and supplemented with information from Moody's manuals as well as 10 K reports filed by the companies. Monthly data on the number of institutional shareholders and the proportion of equity held by institutions are compiled from Standard and Poor's Security Owner's Stock Guides. ¹³

We ensure that the annual data are properly aligned by examining changes in the numbers of institutional and individual shareholders and the proportion of

¹² In those cases where the ex-date is not available in Moody's Annual Dividend Record, it is obtained from *Standard and Poor's Daily Stock Price Record*.

¹³ These institutional ownership data, which are obtained from Vickers Stock Research Corporation, New York, cover almost 4,500 institutions, including investment companies, banks, insurance companies, college endowments, and '13 F' money managers.

Table 3

Percentage changes in the number of shareholders in the fiscal year containing the split for split firms and in the closest corresponding fiscal year for control firms

Firms	Median change (%)	Wilcoxon significance level ^a	Percent positive
Panel A: Total shareholders			
Split	+ 3.41	0.0001	70.24
Control	– 3.21	0.0001	25.00
Differential change ^c (split-control)	+ 6.66	0.0001	76.79
Panel B: Individual shareholders ^b			
Split	+ 2.72	0.0001	70.83
Control	– 3.50	0.0001	25.00
Differential change ^c (split-control)	+ 6.54	0.0001	77.98
Panel C: Institutional shareholders			
Split	+ 21.83	0.0001	92.26
Control	+ 13.87	0.0001	77.38
Differential change ^c (split-control)	+ 7.60	0.0034	62.50

^a Significance levels are reported for the Wilcoxon signed-rank test.

^b The number of individual shareholders is calculated by subtracting the number of institutional shareholders from total number of shareholders.

^c The median differential change reported here is the median difference in changes between split and control firms, not the difference in the median changes of split and control firms.

equity held by institutions, in the same fiscal-year periods for which data on the number of total shareholders is available for each firm. For instance, if a firm announces a stock split in March 1984 and its fiscal year ends in October, then the percentage change in the total number of shareholders in the year of the split relates to the fiscal year ending in October 1984. For comparability, percentage changes in the numbers of institutional and individual shareholders and the proportion of equity held by institutions at the beginning and end of the split year are also calculated for the same fiscal-year period, ending in October 1984.

In order to control for industry and size effects, we compare split firms to a control group of similar non-split firms. The control sample is constructed by matching each split firm with a non-split firm, with the same 4-digit standard industrial classification (SIC) code and total assets ¹⁴ closest to that of the split firm. The SIC codes and book value of total assets at the end of the year before the

¹⁴ Lakonishok and Lev (1987) observe that total assets is a more reliable measure of size than market value, which generally increases substantially in the period before a split announcement. In addition, they report that the composition of a control sample based on market value of equity is very similar to that using total assets as the proxy for size. Brown et al. (1983) also observe a strong correlation between total assets and market value of equity, and conclude that results are not likely to be sensitive to the size variable used.

Table 4

Percentage changes in the proportion of equity held by institutions in relevant periods around stock splits

Period	Median change (%)	Wilcoxon significance level ^a	Percent positive
Panel A: Split firms			
Announcement month	+0.57	0.0136	58.93
Ex-day month	+0.24	0.1259	54.17
Announcement to ex-day month	+0.99	0.0752	58.93
Panel B: Control firms			
Announcement month	+0.40	0.1299	57.14
Ex-day month	+0.28	0.0382	52.98
Announcement to ex-day month	+1.81	0.0008	61.31
Panel C: Differential Change ^b (split firms-control firms)			
Announcement month	+0.05	0.8623	51.19
Ex-day month	−0.07	0.9035	48.21
Announcement to ex-day month	−0.76	0.0521	45.24

^a Significance levels are reported for the Wilcoxon signed-rank test.

^b Differential changes are calculated by subtracting percentage changes for control firms from percentage changes for corresponding split firms. The median differential change reported here is the median difference in changes between split and control firms, not the difference in the median changes of split and control firms.

split are obtained from the annual Compustat tape. To maintain the integrity of the control sample, only a firm with total assets within 25% of that of the corresponding split firm is considered a close enough match to be a control firm. This procedure yields 197 pairs of matched split and control firms ¹⁵ for which data on institutional ownership and number of shareholders are available for the relevant periods. The final sample consists of 168 pairs of split and control firms that do not issue or repurchase shares in the year of the split. ¹⁶ The 168 split firms in our test sample have 73 different 4-digit SIC codes. Five industries have more than 5 firms each; of these, one has 13 firms, one has 12 firms, two have 10 firms each, and one has nine firms. There are 39 industries with only one firm each. The sample firms are therefore spread across several industries.

Some relevant characteristics of the split and control firms are presented in Table 2. The median total assets are \$1,263 million for split firms and \$1,215

¹⁵ To ensure that there are no differences in the nature of the securities, units in limited partnerships, American Depositary Receipts, and stocks of foreign companies are not included in the split or control groups.

¹⁶ Of the 29 split firms excluded from the sample, 17 repurchase shares, 8 have public issues and 4 issue shares for acquisitions.

Table 5

Differences between split and control firms in the proportion of equity held by institutions at different points in the year of the split

Period	Median difference (%)	Wilcoxon significance level ^a	Percent positive
Beginning of split year	+ 1.67	0.1264	53.57
Beginning of announcement month	+ 2.55	0.0339	57.74
End of announcement month	+ 2.68	0.0458	57.74
Beginning of ex-day month	+ 1.99	0.1032	55.95
End of ex-day month	+ 2.39	0.1015	57.74
End of split year	+ 2.23	0.3545	55.95

^a Significance levels are reported for the Wilcoxon signed-rank test.

million for control firms. By contrast, the median total assets of all NYSE- and AMEX-listed firms on the Compustat tape during the corresponding period is \$324 million. These figures are consistent with Lakonishok and Lev's (1987) data, which indicate that split firms are about three times as large as the average firm. Although we match the firms only on the basis of industry and size, the data reveal that they are also well-matched in terms of the numbers of total, institutional and individual shareholders ¹⁷, as well as the proportion of equity held by institutions, in the fiscal year before the split.

Since means are influenced by extreme values and *t*-tests assume normal distributions, we report medians and use non-parametric Wilcoxon tests, which do not require normal distributions. The test used for matched samples (Tables 3–5 and 7) is the Wilcoxon signed-rank test, which is based on the signs and ranks of the differences between matched pairs. The test used for significant differences between two periods (Table 6) is the Wilcoxon rank sum test. ¹⁸

For the purpose of brevity, we report only the significance levels, without the related test statistics. In addition, we show the percentages of firms with increases/positive differences. In view of the reasonably large sample sizes for our tests firms, we consider a significance level of 5% to be evidence of significant changes/differences.

We recognize some limitations of the data. For instance, the institutional ownership data in the *Standard and Poor's Stock Guides* do not include all institutions. ¹⁹ Similarly, the data on number of shareholders from company

¹⁷ The number of individual shareholders is calculated by subtracting the number of institutional shareholders from the total number of shareholders.

¹⁸ For detailed discussions of the statistical tests used in this study, see Huntsberger et al. (1980).

¹⁹ Enquiries with Vickers Stock Research Corporation, which supplies the institutional ownership data to Standard and Poor's, however, indicate that no material class of institutions is left out and the institutions covered are consistent during our sample period. Further, the institutional ownership data do not include street-name holdings.

Table 6

Differences in differential changes ^a (split – control) between pre- and post-Tax Reform Act periods (1984/86–1987/88) ^b

Shareholder type	Difference in medians (%) ^c	Wilcoxon significance level ^d
Panel A: Percentage changes in the number of shareholders in year of split		
Total	+ 1.47	0.4326
Individual ^e	+ 2.28	0.3633
Institutional	– 2.36	0.1422
Panel B: Percentage changes in proportion of equity held by institutions		
Announcement month	– 0.56	0.2782
Ex-day month	+ 0.71	0.4670
Announcement to ex-day month	– 1.55	0.2475

^a Differential changes are calculated by subtracting percentage changes for control firms from percentage changes for corresponding split firms.

^b The total sample sizes are 105 in 1984–1986 and 63 in 1987–1988.

^c Differences in medians are calculated by subtracting median differential changes for the years 1987–1988 from median differential changes for 1984–1986.

^d Significance levels are reported for the Wilcoxon rank sum test.

^e The number of individual shareholders is calculated by subtracting the number of institutional shareholders from total number of shareholders.

records is not complete because those whose shares are held in street names are not included, whereas those who own different types of shares may be counted twice. Although completely accurate data are not available, we control for the effects of possible inaccuracies in two ways: (i) by comparing split firms to a matched sample, and (ii) by testing for differences in percentage changes. Since there is no reason to believe that there are systematic biases in the data for the split firms alone or, if there are such biases, that these change significantly over the test period, the results should be robust to the data limitations.

5. Discussion of results

Changes in the number of shareholders in the fiscal year of the split are shown in Table 3.

Panel A shows that, in the year of the split, the total number of shareholders increases by 3.49% in split firms and decreases by 3.17% in control firms. The median differential increase of 6.66% in split firms is significant at 1% level. Our result is similar to the mean annual differential increase of 8% indicated by Barker (1956) for NYSE firms, but it is much smaller than the differential increase of 32.54% found by Lamoureux and Poon (1987) for a small sample of NYSE/AMEX firms with large stock splits.

The results for individual shareholders in Panel B are similar to those for all shareholders, which is not surprising since most shareholders are individuals. The number of individual shareholders increases in split firms and decreases in control firms. There is a significant differential increase of 6.54% in split firms. Panel C shows that the number of institutional shareholders increases in both split and control firms.²⁰ The differential increase of 7.60% in split firms is significant at the 1% level.

As indicated in Section 3, we examine changes in the numbers of shareholders in the fiscal year of the split, because data relating to the total number of shareholders are available only for fiscal years. It is, however, possible that the increase in the number of institutional shareholders that we find actually occurs before the split announcement, because splits are usually preceded by a period of rising stock prices (see Lakonishok and Lev, 1987).

Since data on the number of institutional shareholders are available on a monthly basis, we investigate this possibility. Our results show that, in the period from the end of the fiscal year before the split until the end of the month before the announcement, the median differential change in the number of institutional shareholders is 0% and the significance level of the Wilcoxon test statistic is 0.2320. In the period from the end of the month before the announcement until the end of the fiscal year of the split, the median differential change in the number of institutional shareholders is 4.69%, which is significant at the 1% level. The result for the latter period, which is similar to that for the split year, indicates that the number of institutional shareholders increases after the split announcement.

Our findings suggest that stock splits increase the numbers of both individual and institutional shareholders. While the increase in the number of individual shareholders can be explained by all four hypotheses discussed in Section 2, the increase in the number of institutional shareholders is consistent only with the signaling hypothesis.

Changes in the proportion of equity held by institutions are examined in Table 4. Since the investment required for round lots falls and the volatility of stocks increases²¹ on the ex-day, according to the optimal trading range and tax-option hypotheses, individual ownership should increase in the ex-day month. If institutional shareholders react negatively to splits, as predicted by the optimal trading range, tax-option, and managerial entrenchment hypotheses, they may sell split stocks before the ex-date to avoid the higher transaction costs on lower-priced

²⁰ The significant increase in the number of institutional shareholders and decrease in the number of individual shareholders in the control firms is consistent with the general trend of rising institutional ownership and declining individual ownership of shares in recent years. This trend is also reflected in Table 4 (Panel B), which shows significant increases in the percentage of shares held by institutions in the control firms.

²¹ Ohlson and Penman (1985) find an increase in the standard deviation of daily returns after stock split ex-days.

stocks. As a result, the proportion of equity held by institutions may decline any time between the announcement- and ex-dates. We therefore investigate changes in the proportion of equity held by institutions in the announcement and ex-day months, as well as in the period from the beginning of the announcement month until the end of the ex-day month.

The results in panel C of Table 4 show that there is no significant differential change in the proportion of equity held by institutions in split firms in the announcement month, ex-day month and the period from the beginning of the announcement month until the end of the ex-day month.^{22, 23} Although these results indicate that splits do not affect the proportion of equity held by institutions, this proportion itself may be significantly different in split and control firms. This possibility is investigated next.

Table 5 shows that there is no significant difference between the proportion of equity held by institutions in split and control firms at the beginning of the split year. At the beginning and end of the announcement month, the proportion of equity held by institutions is higher in split firms than in control firms. There is, however, no significant difference between split and control firms in the proportion of equity held by institutions at the beginning and end of the ex-day month and at the end of the split year. These findings indicate that there is a temporary increase in the proportion of equity held by institutions in split firms before the split announcement and it returns to a normal level after the split. A possible explanation for this result may be selling of split stocks by institutional shareholders for rebalancing of portfolios.

6. Additional analyses

In this section, we examine whether the Tax Reform Act of 1986 has a significant impact on the ownership structure effects of stock splits, as predicted by the tax-option hypothesis. We also investigate the relations of increases in the numbers of institutional and individual shareholders with split factors, and the

²² There is weak evidence of a decline in the proportion of shares held by institutions in the period from the beginning of the announcement month until the end of the ex-day month; the significance level for this period is 0.0521. To verify the robustness of this result, we repeat this test for all pairs of firms that do not have confounding events, including those pairs that were excluded from our sample because of non-availability of data on number of shareholders. For this larger sample of firms, the significance level for this period is 0.1490. Using the larger sample does not materially alter any of the other results.

²³ These results indicate that the increase in percentage of shares held by institutions following a split, reported by Maloney and Mulherin (1992), may be explained by their failure to compare split firms to a control sample.

relation between abnormal announcement returns and changes in the number of shareholders. Finally, we determine the degree of ownership concentration in splitting firms and test whether it is affected by the split.

6.1. Impact of the 1986 tax reform act

By making the capital gains tax rate equal to the ordinary income tax rate, the 1986 Tax Reform Act (TRA) reduced the value of the major split-related tax option available to investors. According to the tax-option hypothesis, the clientele shift from institutional to individual investors should be reduced after 1986. We would therefore expect split firms to have a larger differential increase in the number of individual shareholders and larger differential decreases in the number of institutional shareholders and proportion of equity held by institutions before the TRA, compared to the period after it. To determine whether the TRA significantly affects the results, we divide the sample into pre- and post-TRA periods, i.e., 1984–1986 and 1987–1988, respectively.²⁴

Table 6 shows the differences between pre- and post-TRA periods in differential changes in the number of shareholders and proportion of equity held by institutions. The differential changes are obtained by subtracting percentage changes for control firms from percentage changes for corresponding split firms. The statistical tests investigate whether there are significant differences in the differential changes in the two periods, i.e., before and after the TRA. These tests are based on the Wilcoxon rank sum test for significant differences in the mean ranks of the two periods in the combined data set. For purely illustrative purposes, we also report differences in the medians of the two periods, which are obtained by subtracting median differential changes for the years 1987–1988 from median differential changes for 1984–1986.

Panel A indicates that differential changes in the numbers of total, individual and institutional shareholders in the split year are not significantly different between the two periods. Panel B reveals that the TRA does not have a significant effect on the differential change in proportion of equity held by institutions in any of the relevant periods. These results do not support the tax-option hypothesis since, contrary to the prediction of this hypothesis, the TRA does not have a significant impact on the effect of stock splits on the ownership structure of firms.

²⁴ The TRA was passed on September 26, 1986 and implemented on January 1, 1987. Since anticipated passage of the TRA might have influenced investor behavior starting some time in 1986, there is no clear break-point for bifurcation of the sample. However, because the major impact of the Act would be felt after its implementation, we treat 1987–1988 as the post-TRA period. As a sensitivity check, we repeat these tests, excluding the splits in 1986 and comparing the splits in 1984–1985 to those in 1987–1988. The results are similar to those reported in Table 6 and do not alter our conclusion.

6.2. Cross-sectional regressions of changes in the numbers of institutional and individual shareholders

Next, we conduct cross-sectional ordinary least squares regressions to determine whether the increases in the numbers of institutional and individual shareholders, found in Table 3, are significantly related to the split factor. A higher split factor results in a larger decrease in the stock price, implying a greater reduction in the amount required to buy a round lot, and larger increases in transaction costs as well as volatility of returns. The optimal trading range, managerial entrenchment, and tax-option hypotheses, therefore, predict that changes in the number of institutional shareholders will be negatively related to the split factor. According to the signaling hypothesis, however, changes in the number of institutional shareholders should be positively related to the split factor, which indicates the strength of the positive signal (see Grinblatt et al., 1984; Brennan and Copeland, 1988). All four hypotheses predict a positive relation between changes in the number of individual shareholders and the split factor.

Our regression of differential changes in the number of institutional shareholders yields the following result (*t*-values are shown in parentheses below the coefficient estimates):

$$\text{DIFINST} = -0.2347 + 0.2961 \cdot \text{SFACT} \quad (1)$$

(−2.18) (2.99)

$$F\text{-value: } 8.28 \quad \text{Adjusted } -R^2: 4.18\%$$

where:

DIFINST is the difference between the percentage changes in the number of institutional shareholders in splitting and control firms, from the end of the month before the split announcement until the end of the split year, SFACT is the split factor, defined as the percentage increase in the number of shares outstanding as a result of the split.

The coefficient of SFACT is significant at 1% level and indicates that a 100% increase in the number of shares due to a split results in a 29.61% differential increase in the number of institutional shareholders in splitting firms. The positive relation between the split factor and the number of institutional shareholders supports the signaling hypothesis, but is inconsistent with the optimal trading range, managerial entrenchment, and tax-option hypotheses.

Since data relating to total number of shareholders is available annually, changes in the number of individual shareholders can be computed only on an annual basis. Our regression for differential changes in the number of individual shareholders therefore uses annual data. The estimated model is:

$$\text{DIFIND} = 0.0455 + 0.0555 \cdot \text{SFACT} \quad (2)$$

(1.47) (1.88)

$$F\text{-value: } 3.52 \quad \text{Adjusted } -R^2: 1.49\%$$

where:

DIFIND is the difference between the percentage changes in the number of

individual shareholders in splitting and control firms, in the fiscal year of the split, and SFACT is as defined earlier.

The coefficient of SFACT has a p -value of 0.0622 and suggests that a 100% increase in the number of shares outstanding due to a split results in a differential increase of 5.55% in the number of individual shareholders. The positive relation between the split factor and the number of individual shareholders is consistent with all four hypotheses. The relatively weaker result in this regression may be due to our inability to determine changes in the number of individual shareholders from the beginning of the announcement month because data is available only for fiscal years.

6.3. *Relation of abnormal announcement returns with changes in number of shareholders*²⁵

As mentioned in Section 3.1, the signaling model of Brennan and Hughes (1991) suggests that a stock split conveys managers' favorable private information about the firm and attracts new investors to it. This model is therefore consistent with the empirical evidence that stock splits result in positive announcement returns (see Grinblatt et al., 1984; Lamoureux and Poon, 1987) and increases in the number of shareholders (e.g., Barker, 1956; Lamoureux and Poon, 1987). Since more positive signals should attract a larger number of new investors, the increase in the number of shareholders is expected to be positively related to abnormal announcement returns. We test this relation, which has not been investigated by previous researchers.

The market model of Brown and Warner (1985) is used to determine abnormal returns relative to the equally-weighted market index during an event window of eleven days, beginning five days before the split announcement and ending five days after it. The announcement day is the date reported in Moody's Annual Dividend Record or the day before the issue date of the Wall Street Journal carrying first mention of the split, whichever is earlier. The regression parameters are estimated over 150 days, beginning 155 days before the announcement. To ensure uniformity of the announcement period and reliability of the regression parameters, we delete stocks with a missing return on any of the three days surrounding the announcement date (days -1 , 0 and 1) and those which do not have at least 60 daily returns in the estimation period. These two conditions eliminate 3 stocks from our original sample of 168.

The test sample of 165 stocks has positive abnormal returns, significant at 1% level for the two-tailed t -test, on the announcement day and the following day

²⁵ We are grateful to an anonymous referee for suggesting this analysis.

(days 0 and 1). The 2-day cumulative mean abnormal return (CAR) is 1.44%.²⁶ This CAR has a Pearson correlation coefficient of 0.16 (significant at 5% level) with the percentage change in the total number of shareholders in split firms in the split year. To examine the robustness of this result, we test two alternative specifications.

First, we measure abnormal returns on the split stocks relative to the control stocks. This results in an almost identical 2-day CAR of 1.43% on announcement days 0 and 1; the abnormal returns are significant at 1% level on both days. The correlation between this CAR and the differential percentage change in total number of shareholders in the split year is 0.13 (significant at 10% level). Next, we use the market model to determine abnormal returns for split stocks that do not have any significant concurrent news in the Wall Street Journal Index on announcement days -1, 0 or 1. This clean sample of 52 stocks²⁷ also has significant abnormal returns on days 0 and 1; the 2-day CAR is 1.18%. This CAR has a correlation of 0.37 (significant at 1% level) with the percentage change in total number of shareholders in split firms.

These results indicate that announcement abnormal returns are positively related to percentage changes in the number of shareholders in the split year. The observed strength of this relation is sensitive to the specification used, perhaps due to the influence of confounding factors on the relation between short-term abnormal returns and long-term changes in the number of shareholders. Our findings, however, suggest a positive relation between the value of the private information signaled by managers through a split announcement and the increase in the number of shareholders in splitting firms, which is consistent with the signaling hypothesis.

*6.4. Differences and changes in ownership concentration*²⁸

Finally, we attempt to determine whether stock splits affect the concentration of equity ownership, which influences shareholders' incentives to monitor managers. We measure ownership concentration by the aggregate percentage of equity held by blockholders, i.e., those who hold 5% or more of the firm's equity.²⁹ The data on 5% ownership, based on 13G, 13D and 14D-1 SEC filings, are obtained from Spectrum 5, published by Computer Directions Advisors, Silver Spring, MD. We exclude 44 pairs of firms from this analysis because reliable data is not available

²⁶ The percentages of stocks with positive abnormal returns on days 0 and 1 are 68% and 58%, respectively, indicating that these results are not driven by outliers.

²⁷ The most common types of concurrent news are earnings and dividend announcements; stock splits are usually announced along with earnings.

²⁸ We thank Ken Lehn (editor) for motivating this investigation.

²⁹ Slovin and Sushka (1993) use this variable to measure ownership concentration in their study of the effects of changes in insider ownership concentration on firm value and corporate control activity.

Table 7

Differences between 124 pairs of split and control firms in aggregate 5% ownership (blockholdings) in the calendar year before and after the split, and changes in blockholdings in the year of the split

Variable	Split firms		Control firms		Wilcoxon significance level ^a
	mean	median	mean	median	
Blockholdings at beginning of split year (%)	8.13	0.00	12.61	6.45	0.0015
Change in blockholdings in split year (%)	−0.57	0.00	0.07	0.00	0.2601
Blockholdings at end of split year (%)	7.56	0.00	12.68	6.45	0.0015

^a Significance levels are reported for the Wilcoxon signed-rank test.

for either the split or control firm. Since shared voting authority and/or dispositive power is required to be reported, the data for some firms reflects multiple ownership of the same shares. We omit 35 pairs of firms, where either the split or control firm had multiple 5% owners with shared voting authority and/or dispositive power, and aggregating their holdings might have resulted in inflated estimates of total blockholdings.³⁰ We also delete pairs of firms if the data for either firm indicates that the percentage of shares owned by a blockholder is not available (6 cases), or it includes shares that had not been issued, but could be acquired in future (3 cases). The sample for these analyses therefore consists of 124 pairs of split and control firms for which aggregate 5% ownership could be reliably estimated.

The findings are reported in Table 7. Since the median blockholding in split firms is 0, we also show the mean, for illustrative purposes. The reported significance levels are, however, based on the non-parametric Wilcoxon signed-rank test.

The results show that, compared to control firms, the mean (median) ownership concentration in split firms is 4.48% (6.45%) lower before the split and 5.12% (6.45%) lower after the split. There is no significant change in ownership concentration in either split or control firms in the split year, and the differential change is also not significant. These findings indicate that splits do not affect ownership concentration, which is abnormally low in split firms. Since the lower ownership concentration in split firms suggests higher monitoring costs for shareholders (see Jensen and Meckling, 1976), managers of these firms may have greater incentives to signal favorable information through a split.

7. Conclusions

We test a broad sample of firms without confounding events and find that stock splits increase the numbers of both individual and institutional shareholders, but do

³⁰ In ten of these cases, aggregating the reported 5% ownership yields totals exceeding 100%.

not affect the proportion of equity held by institutions. The Tax Reform Act of 1986 does not have any significant impact on these results. Increases in the numbers of institutional and individual shareholders following splits are positively related to split factors. Further, abnormal announcement returns are positively correlated with percentage changes in the number of shareholders in split firms. We also find that splits do not affect ownership concentration, which is abnormally low in split firms both before and after the split. Overall, our results support the hypothesis that splits signal positive information about the firm.

References

- Asquith, P., P. Healy and K. Palepu, 1989, Earnings and stock splits, *Accounting Review* 44, 387–403.
- Baker, H.K. and P.L. Gallagher, 1980, Management's view of stock splits, *Financial Management* 9, 73–77.
- Barker, C.A., 1956, Effective stock splits, *Harvard Business Review* 34, 101–106.
- Branch, B., 1985, Low priced stocks: Discrimination in the brokerage industry, *American Association of Individual Investors* 7, 9–11.
- Brennan, M.J. and T.E. Copeland, 1988, Stock splits, stock prices, and transaction costs, *Journal of Financial Economics* 22, 83–101.
- Brennan, M.J. and P.J. Hughes, 1991, Stock prices and the supply of information, *Journal of Finance* 46, 1665–1691.
- Brown, P., A.W. Kleidon and T.A. Marsh, 1983, New evidence on the nature of size-related anomalies in stock prices, *Journal of Financial Economics* 12, 33–56.
- Brown, S.J. and J.B. Warner, 1985, Using daily stock returns: The case of event studies, *Journal of Financial Economics* 14, 3–31.
- Conroy, R.M., R.S. Harris and B.A. Benet, 1990, The effect of stock splits on bid-ask spreads, *Journal of Finance* 45, 1285–1295.
- Copeland, T.E., 1979, Liquidity changes following stock splits, *Journal of Finance* 34, 115–141.
- Dubofsky, D.A., 1991, Volatility increases subsequent to NYSE and AMEX stock splits, *Journal of Finance* 46, 421–431.
- Edmister, R.O. and N. Subramanian, 1982, Determinants of brokerage commission rates for institutional investors: A note, *Journal of Finance* 37, 1087–1093.
- Grinblatt, M.S., R.W. Masulis and S. Titman, 1984, The valuation effects of stock splits and stock dividends, *Journal of Financial Economics* 13, 461–490.
- Huntsberger, D.V., D.J. Croft and P. Billingsley, 1980, *Statistical Inference for Management and Economics* (Allyn and Bacon, Boston, MA).
- Jensen, M.C. and W.H. Meckling, 1976, Theory of the Firm: Managerial behavior, agency costs, and ownership structure, *Journal of Financial Economics* 3, 305–360.
- Lakonishok, J. and B. Lev, 1987, Stock splits and stock dividends: Why, who, and when, *Journal of Finance* 42, 913–932.
- Lamoureux, C.G. and P. Poon, 1987, The market reaction to stock splits, *Journal of Finance* 42, 1347–1370.
- Maloney, M.T. and J.H. Mulherin, 1992, The effects of splitting on the ex: A microstructure reconciliation, *Financial Management* 21, 44–59.
- McNichols, M. and A. Dravid, 1990, Stock dividends, stock splits, and signaling, *Journal of Finance* 45, 857–879.
- Murray, D., 1985, Further evidence on the liquidity effects of stock splits and stock dividends, *Journal of Financial Research* 8, 59–67.

- O'Brien, P.C. and R. Bhushan, 1990, Analyst following and institutional ownership, *Journal of Accounting Research* 28, 55–76.
- Ohlson, J.A. and S.H. Penman, 1985, Volatility increases subsequent to stock splits: An empirical aberration, *Journal of Financial Economics* 8, 59–67.
- Reilly, F.K. and E.F. Drzycimski, 1981, Short-run profits from stock splits, *Financial Management* 10, 64–74.
- Slovin, M.B. and M.E. Sushka, 1993, Ownership concentration, corporate control activity, and firm value: Evidence from the death of inside blockholders, *Journal of Finance* 48, 1293–1321.
- Szewczyk, S.H. and G.P. Tsetsekos, 1993, The effect of managerial ownership on stock-split induced abnormal returns, *Financial Review* 28, 351–370.