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Keywords: Stock split, behavioral signaling, nominal price illusion, loss aversion

JEL Classifications: G35, G40, G41

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1. Introduction

Stock splits have been a puzzling corporate phenomenon for a long time. As a seemingly cosmetic corporate action, stock splits have no real effect on firms' cash flows and fundamentals, yet are frequently associated with positive announcement returns (Fama et al., 1969; Grinblatt et al., 1984; Lamoureux and Poon, 1987). The positive market reaction to stock splits does not seem to be driven by investors' overreaction or attention-driven price pressure, as studies document positive long-run return drifts following split announcements (Ikenberry, Rankine and Stice, 1996; Ikenberry and Ramnath, 2002).

Two leading explanations have been proposed to explain the positive announcement returns associated with stock splits. First proposed by Fama et al. (1969) and Grinblatt et al. (1984), the "signaling" explanation argues that stock splits could convey managers' (private) favorable information regarding firms' future performance to outside investors. Evidence supporting the signaling explanation is documented by Asquith et al. (1989), Mcnichols and Dravid (1990), and Louis and Robinson (2005), who find that splits are associated with better future firm fundamentals such as earnings and profitability. However, the exact channel through which signaling works is unclear in those studies. Unlike other corporate actions, splits are almost costless and firms without favorable information could mimic splitting firms and send false signals to the market.[1]

The second explanation, the "optimal trading range" hypothesis (Lakonishok and Lev, 1987; Dyl and Elliott, 2006), also finds mixed evidence in the literature. The idea is that a firm with a high share price can improve the liquidity and marketability of its stock by lowering the price through splits, as many small retail investors are constrained to purchase low-priced stocks only. In an incomplete capital market (Merton, 1987), broadening the shareholder base of a stock can effectively reduce the discount rate demanded by investors and increase firm value. However, empirical evidence for the "optimal trading range" hypothesis is inconclusive.[2] Some studies even find that splits increase bid-ask spreads (Copeland, 1979;

[1] Exceptions include Brennan and Copeland (1988a) and Ikenberry, Rankine and Stice (1996a; 1996b). Brennan and Copeland (1988a) argue that splits are costly because the fixed component of brokerage commissions increases the per-share trading costs for low-priced stocks. Ikenberry, Rankine and Stice (1996a; 1996b) argue that stock splits reduce firms' financial flexibility.

[2] Lamoureux and Poon (1987) and Maloney and Mulherin (1992) document that splits increase the number of stockholders and the number of trades, but there is little evidence that splits lead to increased trading volume (Lakonishok and Lev (1987), Lamoureux and Poon (1987), Conroy et al. (1990)).

Conroy et al., 1990) and return volatility (Ohlson and Penman, 1985; Koski, 1995), suggesting that splits may have a negative effect on liquidity. Baker and Gallagher (1980) claim that managers use splits to increase ownership by individual investors, but Szewczyk and Tsetsekos (1995) report that institutional ownership increases after a split.

In this paper, we propose a behavioral signaling explanation for stock splits, similar in spirit to Baker, Mendal, and Wurgler (2015). The key difference between the standard signaling and behavioral signaling approaches is that the former relies on destroying real firm value ex ante for the signal to be credible, which is roundly rejected by firm managers in the survey of Brav et al., 2005. Under the behavioral signaling framework, a signal can be credible without destroying real value. As long as there are ex post psychological costs imposed on investors when firms engage in false signaling, the signal could be credible.

In our behavioral signaling framework, investors believe that low-priced stocks have higher growth potentials than high-priced stocks. This may be because investors suffer from nominal price illusion (Birru and Wang, 2015; 2017), and/or confuse stock splits with cash dividends. Due to loss aversion, however, investors will also be particularly disappointed when the firms' realized performance falls short of expectation. Firm managers, with an objective to maximize weighted-average of short-run stock prices and long-run firm value, trade off the costs and benefits when deciding whether to split shares. A stock split can boost investors' expectation of the firm's growth potential and short-run stock price, but may also cause disproportionally larger price declines if the firm underperforms in the future. In equilibrium, only managers with favorable private information about firm fundamentals conduct stock splits, and investors correctly infer splits as a signal of positive information. A separating equilibrium can be sustained because firms engaging in splits without favorable information have a higher likelihood of falling short of investors' expectation, which will lead to significantly lower stock returns in the future. Simply put, investors' psychological costs due to loss aversion prevent low-quality firms from mimicking high-quality firms through stock splits.

We test our behavioral signaling explanation using a comprehensive sample of stock split events in China from 1998 to 2017. Several institutional features of the Chinese stock market make it particularly suitable for testing the behavioral signaling explanation. First, unlike the U.S. market where institutional investors dominate, the Chinese stock market has a large

proportion of retail investors (Carpenter, Lu, and Whitelaw, 2018), who are arguably more subject to behavioral biases such as nominal price illusion and loss aversion. Thus, the underlying assumptions of our behavioral signaling story are more likely to hold in China. Second, brokerage commissions in the Chinese stock market are a fixed percentage of transaction value and are independent of the nominal share prices. Third, capital loss is not allowed to offset taxable income in China. These two features do not exist in the U.S. market and can help rule out alternative explanations for stock splits (detailed below). Last but not the least, while the frequency and importance of stock splits is declining in the U.S. stock market (Minnick and Raman, 2014), the Chinese market has recently experienced a boom in stock splits, which is worth investigating on its own.

We first document a significantly positive announcement effect for stock splits in the Chinese stock market. On average, stock splits are associated with a three-day cumulative abnormal return of 1.8%. The three-day window likely underestimates the magnitude of the announcement return as there is a price run-up of more than 2% before the announcement.

As stock splits in China are commonly announced in firms' profit distribution plans and concurrent with their semi-annual or annual reports, we examine whether the announcement returns of stock splits are due to confounding events such as earnings or dividends announcements. After controlling for the change of earnings and dividends, firm characteristics, event date and firm fixed effects, we still find significantly positive announcement returns in the range of 2.5% to 4%. This result suggests that stock splits may convey new information beyond that contained in earnings and dividends announcements.

After establishing the robustness of positive announcement returns of stock splits, we test several predictions of the behavioral signaling explanation: (1) because of retail investors' nominal price illusion and/or confusion of stock splits with cash dividends, a higher split ratio should be associated with a larger announcement return; (2) splitting firms have better future operating performance because the psychological costs of disappointing investors prevent firms with poor expected performance from conducting stock splits; (3) when the future performance is poor, splitting firms experience larger stock price declines than non-splitting firms; (4) the positive market reactions associated with stock splits are weaker for firms with higher institutional ownership and firms with higher pre-split prices. The empirical evidence is

broadly consistent with these predictions.

Finally, we conduct several tests to rule out alternative explanations for the stock splits puzzle. First, the positive announcement returns do not seem to be driven by investor overreaction or attention-driven price pressure (Seasholes and Wu 2007; Barber and Odean 2008). The post-announcement cumulative abnormal returns over different windows are either significantly positive or indifferent from zero. Using both a buy-and-hold abnormal return (BHAR) approach and the calendar-time portfolio approach, we find a significant return drift in the three years following stock splits. In other words, investors appear to underreact to the favorable information conveyed by stock splits, which is consistent with the findings based on the U.S. sample (Ikenberry and Ramnath, 2002). Second, the signaling model of Brennan and Copeland (1988a) argue that stock splits are costly in the U.S. because the fixed cost element of brokerage commissions increases the per-share trading costs of low-priced stocks. We can easily rule out this explanation using our setting because brokerage commission in China is a fixed percentage of transaction value, and independent of stock prices. Third, Lamoureux and Poon (1987) propose an explanation based on tax option value. However, stock splits in China are unlikely to be associated with tax option as capital loss is not allowed to offset taxable income in China. Fourth, the "optimal trading range" hypothesis argues that by restoring price to a normal trading range, stock splits can improve liquidity and marketability, thus increasing firm value. To rule out this alternative, we control for the change of stock liquidity and investor visibility around splits, and find similar announcement effects.

The contributions of our paper are twofold. First, we provide a new explanation for the stock split puzzle, which is different from the traditional signaling explanation and the optimal trading range explanation. Our behavioral signaling explanation squares well with the Chinese stock split setting. Although it may not be completely generalizable to other markets, it still offers a new way of rationalizing this puzzle.

Second, our paper extends the behavioral signaling framework of Baker and Wurgler (2013) and Baker, Mendel and Wurgler (2015) to stock splits, another important corporate event. Baker, Mendel and Wurgler (2015) propose a behavioral signaling theory to explain the dividend stickiness puzzle. However, unlike stock splits, cash payout is a costly corporate action and thus harder to differentiate with traditional signaling theories. In addition, the Chinese stock

market offers a better laboratory than the U.S. market to test behavioral signaling theories as less sophisticated investors dominate the Chinese market. Our findings that the stock splits puzzle can be well explained by the behavioral signaling model show the promise of applying the same framework to other settings.

The rest of the paper proceeds as follows. Section 2 describes the institutional background of stock splits in China. Section 3 presents the basic facts of stock splits in China. Section 4 tests whether existing theories can explain the stock split puzzle in China. Section 5 outlines a simple behavioral signaling explanation for stock splits and tests the empirical predictions. Section 6 rules out several alternative explanations and conduct robustness checks. Section 7 concludes.

2. Institutional Background

2.1 Stock Splits in China

In China, except for very few special cases, the par value of all tradable stocks is 1 RMB per share, and it is a convention that a firm keeps the par value unchanged after being publicly listed. Therefore, unlike in the U.S., listed firms in China do not split shares directly; instead, they employ two indirect methods. The first is to pay stock dividends out of retained earnings, and the second is to issue new shares out of capital surplus. Under both methods, the outcome is the same as a direct stock split, with an increased number of shares outstanding and reduced nominal share prices. The implementation costs of both methods are trivial. For each newly issued share, typically 1 RMB would be deducted from retained earnings or capital surplus as the par value of most stocks in China is 1 RMB per share. The main difference between the direct and indirect splits is the accounting treatment. For direct stock splits, no accounting treatment is needed. For indirect stock splits, either retained earnings or capital surplus is deducted to increase the capital stock. However, just like direct stock splits, neither stock dividends nor converting capital surplus into new shares has any real effects on the firm's fundamentals, because the accounting treatment of indirect splits only involves adjustments among several sub-categories of the shareholders' account.

2.2 Investors' Misperceptions about Stock Splits

Unlike major developed markets, the Chinese stock market is dominated by retail investors without sufficient finance and accounting knowledge. As of the end of 2016, retail investors owned more than 99% of all brokerage accounts and conducted more than 85.65% of trading in terms of transaction value (Shanghai Stock Exchange Statistical Annual, 2017). These retail investors have various misperceptions about stock splits.

First, retail investors are likely to treat low-priced stocks as lotteries (Kumar, 2009) because they tend to overestimate the upside potential of such stocks (Birru and Wang, 2016).

Second, retail investors often view stock splits as a form of profit distribution similar to cash dividends, although nothing is actually paid out of the firm with stock splits. For example, according to Baidu Baike, China's version of Wikipedia, stock splits are described as a form of corporate payouts. Popular financial websites, such as Sina Finance and Hexun.com,[3] often categorize both stock splits and cash dividends as payouts and present them side by side.

The timing a company announces stock split may further exacerbate this misperception. In practice, both cash dividends and stock splits are disclosed in the annual or semi-annual profit distribution proposals, which gives investors the impression that stock splits and cash dividends are equivalent means of distributing profits. The terminology a firm uses to describe the stock split is sometimes misleading. For example, on April 1, 2015, Meters Bonwe, a Chinese listed company, declared that for every 10 outstanding shares, an investor would get five new bonus shares (stock dividends from retained earnings), cash dividends of one RMB, nine new shares from capital surplus and another one new share from surplus reserve (stock dividends from retained earnings too). This kind of statement conveys illusive information to Meters Bonwe's shareholders that their stock investments earned lucrative profits, although only 0.1 RMB per share was the actual profit distributed to them. We provide detailed information about Meters Bonwe's 2014 annual profit distribution in Appendix B.

Although investors' bias associated with stock splits may stem from a variety of reasons, a clear prediction is that all of them lead to more optimistic expectation about firms' future performance after stock splits.

[3] Both Sina Finance and Hexun.ccom are leading financial portal websites in China.

3. Empirical Facts of Stock Splits

We use a comprehensive sample of stock split events in China's A-share market from 1998 to 2017 to conduct empirical analysis. Chinese firms announce stock splits in profit distribution proposals, and in most cases profit distribution proposal is a section of financial report. Table 1 presents a summary of the stock splits events year by year from 1998 to 2017. Except for 2003, there are more than 150 A-share listed firms conducting share splits each year, and such firms on average, account for 10% to 30% of the total number of listed companies. Table 1 also shows that most of the stock splits are announced in the annual profit distribution proposals. The majority of stock splits are bundled together with the release of annual or semi-annual reports as firms are required to disclose their profit distribution plans in these reports. The major source of new shares comes from capital surplus, especially in recent years, and the split ratio is gradually rising over time.

Annual and semi-annual profit distribution proposals differ in importance and formality, and there are much more stock splits announcements in annual proposals.[4] To be consistent, we only consider annual profit distribution proposals for our analysis in this section. Our initial sample includes all annual profit distribution proposals from all publicly listed companies in the Shanghai Stock Exchange and Shenzhen Stock Exchange. We then exclude firms listed for less than 6 months and firms in the financial industry. To avoid the confounding effects of other corporate events, we further exclude observations when stock trading is suspended in any day during the [-1, 1] event window.[5] We also exclude observations with missing values in regression variables. Except for stock returns and the split ratio, we winsorize all continuous variables at their 1st and 99th percentiles to mitigate the influence of outliers. All financial data are retrieved from the CSMAR and Wind databases.

Panel A of Table 2 presents the summary statistics of the main variables used in our regression analyses. *CAR*[-10, -2], *CAR*[-1, 1], *CAR*[-10, 1], and *CAR*[2, 10] are cumulative abnormal returns over the event window in brackets, where the abnormal return is the raw return adjusted by size and book-to-market ratio. *Split Dummy* equals 1 if a firm conducts stock

[4] In our sample period, there are 34,451 annual profit distribution proposals with 20,836 proposals announcing cash dividends and 6,086 proposals announcing splits. Meanwhile, there are 32,236 semi-annual proposals in total, but only 744 and 856 proposals announce cash dividends and stock splits, respectively.

[5] Chinese firms often suspend stock trading if they encounter major corporate events. Our results are unchanged if this restriction is relaxed.

splits and 0 otherwise. *Split Ratio* is the ratio of newly issued shares from stock splits as a fraction of the initial number of shares outstanding. *ΔDividends* is the difference of current fiscal year cash dividends and the prior fiscal year cash dividends scaled by the prior fiscal year end total market capitalization. *ΔEarnings* is the difference of the current 4th quarter earnings and the 4th quarter earrings in the preceding fiscal year scaled by the preceding fiscal year end total market capitalization.[6] *Annual Report* is a dummy variable that equals one if the profit distribution proposal is disclosed with the annual report. *LnSize* is the natural logarithm of market capitalization of the firm's tradable shares. *LnBM* is the natural logarithm of book-to-market ratio. *Ret*[-12, -2] is the cumulative stock returns over the past 11 months, skipping the most recent month. The above control variables *LnSize*, *LnBM* and *Ret*[-12, -2] are all lagged by one month if the profit distribution proposal is announced during the second half of the month, and will be lagged for an additional month if the proposal is announced in the first half of the month. Detailed variable definitions are given in Appendix A.

Panel B divides the full sample into the share splitting group and non-splitting group. It shows that share splitting firms tend to have lower book-to-market ratios, and experience a larger increase in stock price, earnings, and cash dividends. The comparison implies that it is important to account for the differences between splitting and non-splitting firms.

Figure 1 shows the cumulative abnormal returns of stock splits events starting from 20 trading days before the announcement date. Similar to the pattern in the U.S. (Grinblatt, Masulis and Titman, 1984; Lamoureux and Poon, 1987; Mcnichols and Dravid, 1990; Ikenberry, Rankine and Sitce, 1996; Rankine and Stice; 1997a; 1997b), stock splits in China is on average associated with significantly positive market reactions. As shown in this figure, the stock price begins to rise several days before the announcement day and has a significant price jump at the announcement day. Figure 2 illustrates that there is no return reversal after split announcements. Instead, there is an upward post-event return drift.

Table 3 reports the short-term market reactions to split announcements by various adjusting methods. In the first three columns, we report daily abnormal returns from one day before the announcements to one day after the announcements. On average, stock splits lead to 0.7%, 0.9%

[6] Chinese A-Share listed firms were required to disclose quarterly financial report after 2002. Therefore, before 2003, we define *ΔEarnings* as half of the difference of current 2nd half-year-earnings and the 2nd half-year-earrings in the preceding year divided by the past fiscal year end total equity capitalization

and 0.1%~0.2% of abnormal returns on date -1, 0 and 1, respectively. The market reactions to stock splits are robust and comparable under different expected return models. Summing up the abnormal returns over the [-1, 1] event window, stock splits are associated with close to 1.8% cumulative abnormal returns. Consistent with Figure 1, stock price starts to rise before the announcement day, as both the [-10, -2] window and the [-5, -2] window are associated with significant positive cumulative abnormal returns. This indicates the possibility of information leakage about stock splits ahead of the formal announcement. The findings are generally consistent with Titman, Wei and Zhao (2017).

The last two columns of Table 3 report the post-event cumulative abnormal returns. In some specifications, we find significant positive CARs; in other cases, abnormal stock returns are indistinguishable from zero. These findings are consistent with the post-announcement pattern we have observed in Figure 1.

Both stock splits and cash dividends in China are disclosed in the profit distribution proposal, and in most cases concurrent with firms' annual or semi-annual reports. To rule out the possibility that the short-term price impact of stock splits is driven by cash dividends or earnings announcements, we regress cumulative abnormal returns on the stock split dummy (*Split Dummy*) and control for potential confounding factors.

The results are reported in Table 4. For brevity, we only use the CARs (size and book-to-market adjusted) in the pre-event window [-10, -2], event window [-1, 1] and post-event window [2, 10] in the regression analysis. In columns (1) to (3), we conduct regressions with event date and firm fixed effects but without other controls. The results are generally consistent with the univariate analysis in Table 3. The stock price starts to rise before the stock splits announcement, and does not reverse in the subsequent trading days. The price impact of stock splits during the event window [-1, 1] is about 2.4% (*t*-statistic=23.28).

In columns (4) to (6), we add dividend growth (*ΔDividends*) and the 4th quarter earnings growth (*ΔEarnings*) to better isolate stock splits effects from confounding factors such as dividend growth and earnings growth.[7] To take account of the possible difference between financial-report-bundled and unbundled profit distribution proposals, we also add into the regression a dummy variable, *Annual Report*, which equals 1 when the stock split is disclosed

[7] Both dividends and earnings changes are deflated by total market capitalization at the previous fiscal year end.

in the annual report and 0 otherwise.[8] The corresponding results are qualitatively similar.

In columns (7) to (9) of Table 4, we further control for a set of variables, including *LnSize*, *LnBM* and *Ret*[-12, -2], which are associated with cross-sectional stock returns and may be correlated with stock splits decisions. When the dependent variable is *CAR*[-1, 1] or *CAR*[2, 10], we also include *CAR*[-10, -2] as another control variable to account for possible information leakage. After adding the aforementioned control variables, the economic magnitude and statistical significance of *Split Dummy* are generally unaffected.

4. Existing Explanations for the Positive Market Reactions to Stock Splits

The findings in Section 3 show that stock splits in China are on average associated with positive announcement returns. Prior literature has proposed several explanations for the positive market reactions to stock splits. This section briefly reviews the leading explanations and discusses their limitations in our setting.

4.1 Traditional Signaling Theories

Fama, Fisher, Jensen and Roll (1969) argue that firms employ stock splits to communicate the information of future increase in dividends. However, Grinblatt, Masulis, and Titman (1984) find that the announcement returns of stock splits cannot be explained by imminent increase in dividends, and they provide evidence supporting the signaling role of stock splits. Lakonishok and Lev (1987), Asquith et al. (1989), Mcnichols and Dravid (1990), and Louis and Robinson (2005) find that splits are associated with better firm fundamentals such as earnings and profitability in the future. However, as the implementation cost of stock splits is trivial, standard signaling models often have a difficult time to explain what makes stock splits a credible signal.

One potential explanation is based on transaction costs. Brennan and Copeland (1988a) argue that the commission rate of per dollar transaction is inversely related to nominal share price, which makes splits a credible signal. Brennan and Hughes (1991) develop a model in which the dependence of brokerage commission on share price provides incentives for financial analysts to supply information. Chemmanur, Hu and Huang (2015) document evidence supporting the information production theory. However, the transaction cost argument is

[8] When *Annual Report* takes value of 1, *ΔEarnings* is defined as the earnings growth rate; when *Annual Report* takes value of 0, *ΔEarnings* is set as 0. Our results are qualitatively unchanged if *ΔEarnings* is not dependent on *Annual Report*

unlikely to explain stock splits in China, since brokerage commissions are usually a fixed percentage of the transaction value and are independent of the nominal share price.

Rankine and Stice (1997a; 1997b) propose a financial flexibility hypothesis for stock splits. They notice that the accounting treatment of stock splits in the U.S. reduces a firm's financial flexibility, since debt covenants often impose restrictions on firms' ability to pay cash dividends out of retained earnings. Consistent with this hypothesis, Rankine and Stice (1997a; 1997b) find that stock splits are associated with larger market reactions when the accounting rules governing stock splits are more stringent. However, the financial flexibility hypothesis is unlikely to hold in China for the following reasons. First, in China the new shares generated by stock splits mainly come from capital surplus, not from retained earnings, as shown in Table 1. Since year 2000, capital surplus contributes to more than 70% of the new shares. The accounting rule for transferring capital surplus is more lenient than it is for retained earnings.[9] Second, unlike retained earnings, capital surplus cannot be used to pay cash dividends in China, so firms' financial flexibility should not be hampered by stock splits.

4.2 The Optimal Trading Range Hypothesis

The optimal trading range hypothesis states that a firm with a high nominal share price can improve the liquidity and marketability of its stock by lowering the share price through stock splits. This is because small retail investors often have limited investment capital, and they are unable to hold high-priced stocks in their portfolios.

Merton (1987) points out that in an incomplete capital market, broadening the shareholder base of a stock could effectively reduce the discount rate demanded by investors and increase firm value. Using a unique setting in Japan, Amihud, Mendelson and Uno (1999) find that when a stock become more available to investors, the firm value increases with a broadening investor base. Muscarella and Vetsuypens (1996) identify the liquidity improvement effect of stock splits using a sample of ADR splits. Lin et al. (2009) find trading continuity improves following stock splits, and the reduction in liquidity risk explains the positive announcement returns of stock splits.

However, there is also empirical evidence against this hypothesis. For example, several

[9] Firms usually have abundant capital surplus because the IPO offering prices are usually much higher than the par value of a stock. For example, if the IPO price of a firm is 21 RMB, then the newly issued shares in the IPO process make it possible to issue a 20 for 1 split.

studies find that stock splits impede liquidity because brokerage commissions and bid-ask spread increase after stock splits (Copeland, 1979; Brennan and Copeland, 1988a; Conroy, Harris and Benet, 1990), which make trading costlier.

4.3 Tax Option Value Explanation

Stock returns tend to become more volatile after share splitting (Ohlson and Penman, 1985; Lamoureux and Poon, 1987; Brennan and Copeland, 1988b; Sheikh, 1989; Dubofsky, 1991; Koski, 1998; Shue and Townsend, 2018). Constantinides (1984) proposes a theory of optimal trading rules under personal taxes and points out that volatile stock prices are more appealing as such stocks have larger tax option value. Based on the above empirical patterns and the theory of Constantinides (1984), Lamoureux and Poon (1987) rationalize the stock splits puzzle by treating stock splits as a tool to manage volatility and tax option value. Therefore, according to this theory, the positive announcement returns of stock splits come from the anticipated increase in tax option value.[10] However, the tax option value explanation is not applicable in China, as capital losses in stock trading are not allowed to deduct income taxes in China.

5. A Behavioral Signaling Explanation for Stock Splits

5.1 A Behavioral Signaling Explanation

Motivated by Baker and Wurgler (2013) and Baker, Mendel and Wurgler (2015), we propose a behavioral signaling explanation for the positive market reactions to stock splits. In Appendix C, we build a simple model to illustrate the key idea and empirical predictions of behavioral signaling.

The behavioral signaling explanation has two key elements. Firstly, investors, especially retail investors, have misperceptions (introduced in section 2.2) about stock splits. In this paper, we do not attempt to identify the exact sources of investors' biases associated with stock splits. In fact, investors' misperceptions about stock splits can result from many reasons, and they

[10] In U.S., the personal tax rate on long term capital gains and capital losses is about half the short term tax rate, Constantinides (1984) gives an example about the tax timing option. "Suppose an investor bought a stock one year ago, if the stock price declined, he optimally sells the stock and repurchase it to realize the short term capital loss immediately, if the stock price has increased instead, the investor optimally defers the realization of a short term capital gain and one day later faces two alternatives. First, he may defer the realization of the long term gain. Second, he may sell the stock and repurchase it, realizing a long term gain and reestablishing the favorable short term status, in order to realize future capital losses at the short term rate".

need not to be mutually exclusive. For example, if investors believe low-priced stocks have more upside potentials (Birru and Wang, 2016), they would have higher price appreciation expectation after stock splits. If investors view stock splits and cash dividends as equivalent means of payouts, share splits are naturally associated with better fundamentals in investors' mind. The consequences of these misperceptions is that investors' expectation about firms' future performance should increase upon split announcements.

The second element of our behavioral signaling explanation is the psychological costs to prevent low-quality firms from mimicking high-quality firms through stock splits. We assume that investors' preference is reference-dependent so that if splitting firms' realized operating performance fall short of investors' high expectation, investors will be very disappointed.

With these two elements in place, as we show in Appendix C, a separating equilibrium can be sustained. Firm managers, with an objective to trade off the benefits of boosted short-term stock prices and the potential costs of disappointing investors later, will decide an optimal stock split ratio to convey private information to the market.

An important distinction between the behavioral signaling and traditional signaling models is that the former does not rely on destroying real firm value ex ante to make the signal credible (Baker, Mendal, and Wurgler, 2015). This feature makes the behavioral signaling explanation more applicable for stock splits, which do not affect firm cash flow and are almost costless to implement. In contrast, the traditional signaling framework has difficulties in explaining why a seemingly cosmetic corporate action with minimum costs could credibly convey information to investors.

5.2 Empirical Tests of the Behavioral Signaling Explanation

This section tests several key predictions of the behavioral signaling explanations.

5.2.1 Split Ratio and the Announcement Returns of Stock Splits

If the stock splits are used by managers to convey private information, we should observe larger market reactions to those splits with higher split ratios in equilibrium. We test this prediction by regressing the short-run announcement returns of stock splits on split ratios. We include both splitting and non-splitting firms in the regression and use the same set of controls variables as in Table 4.

Table 5 reports the regression results of cumulative abnormal returns (CARs) on split

ratios. Column (1) shows that the variable *Split Ratio* is positively associated with the three-day CAR with a *t*-statistic as large as 21.60. As we have learned from Figure 1 and Table 3, stock prices rise significantly several days before stock splits announcements. To account for the potential information leakage, we use *CAR*[-10, 1] to measure the stock splits announcement effects in column (2). The corresponding result shows that the effect is even larger after taking into account the information leakage. Economically, the coefficient of *Split Ratio* is 0.069 when the dependent variable is the CAR over the [-10, 1] window, indicating that a two-for-one split (*Split Ratio* equals 1) on average leads to a CAR of 6.9%. This finding is consistent with the equilibrium prediction of our behavioral signaling explanation, as firms with differential degrees of private information choose different split ratios to separate from each other.

To isolate the effect of share splitting from concurrent dividend and earnings growth information, columns (3) and (4) include *ΔDividends*, *ΔEarnings* and *Annual Report* as control variables in the the regressions of CARs on split ratios. We find that the coefficient of *Split Ratio* remains significantly positive and its economic magnitude is qualitatively unchanged. This result implies that the positive relationship between split ratios and announcement returns is not driven by dividend or earnings growth. In the last two columns of Table 5, we add all the control variables used in Table 4 and the results are similar.

The coefficients of most control variables are in line with prior studies. For example, *ΔDividends* and *ΔEarnings* are positively related to the announcement returns in columns (3) to (6), indicating that both dividends change and earnings change have information contents. The significant coefficients of *LnSize* and *LnBM* are consistent with the well-known size effects and value effects in the Chinese stock market. The coefficient of *CAR*[-10, -2] is significantly negative, suggesting that investors are less thrilled by stock splits announcements when there is more information leakage.

We also employ alternative model specifications to examine the robustness of the above findings and obtain consistent results (presented in Table D1 of Appendix D).

5.2.2 The Fundamentals of Firms Conducting Stock Splits

Our behavioral signaling explanation predicts that in equilibrium, only firms with favorable fundamentals would split shares. This implies that splitting firms should have better

operating performance than non-splitting firms in the post-split periods. To test this prediction, we compare the operating performance of splitting firms with non-splitting firms in the same industry following stock splits.[11] Specifically, we regress various measures of operating performance including the return on assets (*ROA*), earnings growth and sales growth on stock splits variables (*Split Dummy* or *Split Ratio*), and control for firm fixed effects, industry × year fixed effects, and several firm characteristics including size, book-to-market ratio, past profitability, dividend change, and earnings change. The results are reported in Table 6.

Panel A examines the return on assets in the year of, one year after, and two years after stock splits. In all regressions, the variable for stock splits (*Split Dummy* or *Split Ratio*) is significantly positive, indicating that splitting firms are more profitable than their non-splitting counterparts in the years following the splits. Panel B and Panel C examine earnings growth and sales growth and show that splitting firms experience faster earnings and sales growth after the splits. These findings are consistent with Asquish, Healy and Palepu (1989), who find that stock split conveys information about the growth of firm fundamentals in the future. Importantly, we control for past profitability in the regressions so the result is not driven by splitting firms being persistently more profitable.

Overall, the findings suggest that firms conducting stock splits have better operating performance than non-splitting firms in the same industry do, both concurrently and several years into the future. The results hold for both stock splits variables, *Split Dummy* and *Split Ratio*, which is consistent with signaling motives that managers with more favorable private information choose larger split ratios to differentiate with others.

5.2.3 Stock Splits and Investor Optimism

An important assumption underlying the behavioral signaling explanation is that unsophisticated retail investors naively view stock splits as good news and become more optimistic about splitting firms' future performance. The difficulty in testing this assumption is that investors' beliefs are usually unobservable. In this section, we use several indirect measures for investors' beliefs to test this assumption.

5.2.3.1 Stock Splits and Retail Investors' Trading Behavior

[11] For example, if a firm announced stock split in its 2013 annual profit distribution proposal, year 2013 is coded as year 0, and 2014 and 2015 coded as year +1 and +2, respectively.

Retail investors would buy splitting stocks if they view stock splits as good news, and this would lead to an increase in the number of shareholders. This prediction is testable as the China Securities Regulatory Commission requires every listed firm to report its number of shareholders at the last trading day of each quarter.

Specifically, we examine whether a firm's shareholder base widens when it announces stock splits by regressing the change of the number of shareholders around the profit distribution announcement on *Split Dummy* or *Split Ratio*. We remove observations if a firm's profit distribution announcement date and its corresponding ex-day are in the same quarter, so that the impact of stock splits on the number of shareholders is unlikely due to stocks becoming more accessible after the ex-day.[12] Besides the control variables used in the previous regressions, we also control for several attention-grabbing indicators (Seasholes and Wu 2007; Barber and Odean 2008). These are absolute quarterly returns, *Max(0, Quarterly Return)* and *Max(0, -Quarterly Return)*, the number of trading days that a stock reaches its daily 10% price limit, *10% Price Limit* and *-10% Price Limit*, and the abnormal trading volume relative to prior four quarters, *Abnormal Volume*.

As shown in Table 7, the regression coefficients of *Split Dummy* in columns (1) to (3) are all significantly positive. These findings suggest that retail investors become more optimistic after stock splits, which leads to a net increase in the number of shareholders of the splitting firm. Similarly, the coefficients of *Split Ratio* are all positive and significant in columns (4) to (6), indicating that retail investors view stock splits with larger split ratios more favorably.

Our results in this section are consistent with Titman, Wei and Zhao (2017), who use transaction-level data and find that small investors are net buyers after split announcements.

5.2.3.2 Stock Splits and Retail Investors' Sentiment

If retail investors become more optimistic after stock splits, they are likely to post positive comments on online discussion forums. To that end, we use the data from the CNRDS database that covers two popular investor discussion forums in China, Sina Guba and East Fortune Guba.[13] The data provider classifies retail investors' posts into three categories, positive, neutral, and negative based on machine learning algorithm, and summarizes the number of

[12] We can do this because on average there are 75 days between the profit distribution announcement date and the ex-day.
[13] Sina Guba and East Fortune Guba have investor discussion forum for each listed stocks in the Chinese A-share stock market.

posts in each category for each stock at daily frequency.

We define *Retail Investor Sentiment* [t_1, t_2] as the number of positive posts minus the number of negative posts over the sum of positive and negative posts from day t_1 to day t_2, and regress *Retail Investor Sentiment* [t_1, t_2] on stock splits variables. If retail investors view stock splits as good news, both *Split Dummy* and *Split Ratio* should be significantly positive.

We report the results based on the [0, 1] and [0, 10] window in Table 8.[14] In Panel A of Table 8, *Split Dummy* is significantly and positively associated with retail investor sentiment on the discussion forums, and this positive relation holds after we control for firm characteristics and firm and event date fixed effects. In Panel B of Table 8, we find that retail investors' sentiment on the discussion forums become more positive when firms announce larger stock splits. This finding provides supporting evidence that retail investors become more optimistic about firms' future performance after stock splits.

5.2.3.3 Analysts Forecast Revision around Stock Splits

We also examine whether stock splits could raise investors' expectation by looking at analyst forecast revisions around stock splits. To be clear, our behavior signaling explanation does not rely on professional investors such as financial analysts having misconceptions about stock splits as unsophisticated investors do. However, under separating equilibrium, stock splits do covey managers' private information, so sophisticated investors should also raise their expectations for splitting firms' future fundamentals.

To test this prediction, we use the revision of analysts' consensus forecasts (*Forecast Revision*) of earnings for fiscal year t+1 around the split announcement day to infer investors' belief updating. The results are reported in Table 9. Consistent with our behavioral signaling explanation, stock splits indeed raise analysts' expectations about firms' future earnings. Columns (1) to (3) shows that *Split Dummy* is positively related to analysts' forecast revisions of earnings, and this finding is robust when we use *Split Ratio* in Columns (4) to (6).

5.2.4 Long-term Stock Performance When Splitting Firms Fall Short of Expectation

Another key assumption underlying our behavioral signaling explanation is that investors have reference-dependent preference and will be particularly disappointed when splitting firms'

[14] We find similar results if we use windows identical to the 2 event return windows, or we use alternative windows such as the single event date 0, [0,5] and [-5, 5].

future performance falls short of their expectation. To test this assumption, we examine whether the long-run stock returns of splitting firms are lower when they have subpar performance below investors' expectation after the splits.

We first select all listed firms with analyst coverage and compute the difference between realized earnings and analysts' median earnings forecast for the following fiscal year. Then in each year, we sort stocks into quartiles based on the difference between realized earnings and analysts' median forecasts, and define a dummy variable *Underperform* that equals one if the firm falls into the lowest quartile. We then regress the 12-month buy-and-hold abnormal returns (size and book-to-market ratio adjusted),[15] *BHAR*[1, 12], on *Split Dummy* (or *Split Ratio*), *Underperform*, and *Split Dummy* × *Underperform* (or *Split Ratio* × *Underperform*).

The first three columns in Panels A of Table 10 show that the interaction term *Split Dummy* × *Underperform* are always significantly negative under different regression specifications. The coefficient on *Underperform* itself is significantly negative, suggesting firms with poor earnings performance have worse stock performance. The negative coefficient of *Split Dummy* × *Underperform* indicates that splitting firms experience even lower long run returns when they have poor performance post splits, compared with similarly underperforming firms without undergoing stock splits. In columns (4) to (6) of Panel A of Table 10, we combine event-month returns and post-event returns and use *BHAR*[0, 12] as the dependent variable. The corresponding results show that *Split Dummy* × *Underperform* is also significantly negative, which means that the positive announcement returns following stock splits would be offset by the lower long-run returns when the performance of splitting firms falls short of investors' expectation. In the Panel B of Table 10, we replace *Split Dummy* by *Split Ratio* and find similar results.

The findings of Table 10 serve as the key mechanism preventing low-quality firms from mimicking high-quality firms by using stock splits in our behavioral signaling framework.

5.2.5 Cross-sectional Heterogeneity

In this section, we test several cross-sectional predictions of our behavioral signaling explanation.

[15] We also use market portfolio and industry portfolios as return benchmark, and obtain similar results.

5.2.5.1 Institutional Holdings

If stock splits convey credible information to investors, then in equilibrium, the announcement effects of stock splits should be more pronounced when investors are more optimistic about stock splits. The reason is that when investors are very optimistic about stock splits, only firms with very good fundamentals can manage to not disappoint investors ex-post and conduct large ratio stock splits. For this reason, we predict that the market reaction to stock splits should be greater if more retail investors hold the firm, as optimism associated with stock splits should be more prevalent among retail investors.

We use the fraction of shares held by institutional investors (*Institutional Holdings*) to proxy for investor composition and regress the split announcement returns *CAR*[-1, +1] or *CAR*[-10, +1] on the interaction of *Institutional Holdings* with *Split Ratio*. The above prediction implies that the coefficient of the interaction term is negative. The regression results are reported in Table 11. Consistent with the prediction, the coefficients of the interaction term of *Split Ratio* with *Institutional Holdings* are significantly negative in all regressions.

5.2.5.2 Pre-split Stock Price

Investors suffering from nominal price illusion believe that low-priced stocks have higher growth potential than high-priced stocks (Birru and Wang, 2016). Under the behavioral signaling explanation, this implies that the positive market reactions to stock splits should be stronger for firms with lower pre-split stock prices.

To test this prediction, we add the natural logarithm of the pre-split share price *LnPrice* (measured as the closing price in the previous month if profit distributions are announced in the second half of a month, and lagged for an additional month if profit distribution announcements happen in the first half of the month) into the regression, and interact this variable with *Split Ratio*. Consistent with our prediction, Table 12 shows that the interaction terms are significantly negative in all specifications.

This result also helps rule out the "optimal trading range" hypothesis (Baker and Gallagher, 1980; Baker and Powell, 1993). According to this explanation, stock splits can restore high-priced stocks to a normal trading range, and hence improve its marketability to small investors. If our findings are mainly driven by the (perceived) improvement in post-split marketability, the market reactions to stock splits should be more positive for stocks with higher pre-split

share prices, as such stocks would benefit more from the improvement in marketability by splitting to a lower trading range. Our evidence is contradictory to this prediction of the "optimal trading range" hypothesis.

6. Ruling out Alternative Explanations

6.1 Attention-Driven Price Pressure

Under our behavioral signaling explanation, stock splits are credible signals of firms' future performance and prices rise after stock splits to reflect the market's updated expectation of splitting firms' prospects. However, it is possible that the positive announcement returns associated with stock splits are driven by investor over-reaction.

For example, stock splits may attract retail investors' attention and lead to net purchasing from these investors (Barber and Odean, 2008). However, as shown by Figure 1, Figure 2 and Table 3, there is no significant price reversal in the subsequent trading days, suggesting that it is unlikely driven by thre short-term price pressure from investors' attention.[16]

Given that the price pressure could be long-lived,[17] we rule out this alternative explanation by examining the long-run stock performance following stock splits. If the positive announcement returns are due to investors' overreaction to split events, the long-run stock performance should be significantly negative.

We examine the long-run stock performance following splits using both the buy-and-hold abnormal return approach and the calendar-time portfolio approach. The results are reported in Table D2 of Appendix D. Neither approach shows any return reversal in the long-run; on the contrary, there is some evidence for positive price drift.

6.2 Stock Splits and Financial Flexibility

Rankine and Stice (1997a; 1997b) propose that the magnitude of the split announcement effect should depend on the accounting treatment of stock splits, and should be larger when the new shares are funded by retained earnings. Their argument is that a reduction in retained earnings restricts firms' financial flexibility in paying cash dividends and makes debt covenants

[16] Seasholes and Wu (2007) use the setting of price limits on the Chinese stock market to proxy for attention-grabbing events, and document price reversal within a week.
[17] For instance, Loughran and Ritter (1995) find that IPO and SEO stocks underperform matched stocks in the subsequent 5 years.

more likely to be violated, so it increases the cost of stock splits and makes them more credible signals.

This financial flexibility explanation, however, is unlikely to hold in China. First, unlike the accounting treatment in the U.S., firms in China only need to transfer the par value of a share from retained earnings into capital stock when they conduct stock splits. The par value of almost every listed stock in China is one RMB, and in most of time is far below the stock price. As a result, even if firms use their retained earnings to fund stock splits, their financial flexibility would not be severely restricted as the U.S. firms do. Second, Table 1 shows that the majority of new shares issued in stock splits are funded by capital surplus. In China, capital surplus is not allowed to be paid out as dividends, and capital surplus is also not related to past performance.

To further rule out the financial flexibility channel, we consider stock splits funded by retained earnings and capital surplus separately. To do this, we define *Split from Retained Earnings*, which is the ratio of new shares funded by retained earnings as a fraction of the initial total outstanding share and *Split from Capital Surplus*, which is the ratio of new shares funded by capital surplus. The result after adding *Split from Retained Earnings* and *Split from Capital Surplus*, reported in Column (1) of Table 13, shows that the announcement effect of stock splits continues to be significantly positive, regardless of how the stock splits are funded.

6.3 Stock Splits and Liquidity

Whether stock splits improve or impede liquidity is still inconclusive. Prior studies document that stock splits are associated with higher commission fees (Copeland, 1979; Brennan and Copeland, 1988a; Brennan and Hughes, 1991) and wider bid-ask spread (Copeland, 1979; Conroy et al., 1990), which would increase transaction costs. However, according to the survey of Baker and Gallagher (1980) and Baker and Powell (1993), firm managers believe that stock splits help make stocks more marketable. Lin et al. (2009) also find that trading continuity increases while liquidity risks decreases following stock splits.

The test on the pre-split share price in Table 12 has partially ruled out the liquidity channel. To further mitigate the concern that the expected liquidity improvement drives our results, we add into the baseline regression two variables, $\Delta Illiquidity$ and $\Delta Turnover$, measured as the change of the Amihud (2002) illiquidity ratio and the turnover ratio from the pre-announcement

date to the post ex-date.[18] We multiply the raw value of *ΔIlliquidity* by 10^8 and present the results in Column (2) of Table 13.

The coefficient of *ΔIlliquidity* is significantly negative and the coefficient of *ΔTurnover* is significantly positive, implying that the improvement in stock liquidity after splits may also contribute to the positive announcement effect. However, our main finding is not affected as the coefficient of *Split Ratio* is still positive and highly significant.

6.4 Stock Splits and Return Volatility

Prior studies find that stocks become more volatile following splits (Ohlson and Penman, 1985; Lamoureux and Poon, 1987; Brennan and Copeland, 1988b; Sheikh, 1989; Dubofsky, 1991; Koski, 1998; Shue and Townsend, 2018). Constantinides (1984) argues that volatility is valuable as volatile stocks have tax option value. Lamoureux and Poon (1987) find evidence that the incremental value in the tax timing option determines the stock splits announcement effect.

However, the tax option value mechanism is not applicable in China, as capital loss cannot be used to deduct income taxes under China's tax law. To further account for the influence of volatility change, column (3) of Table 13 controls for *ΔVolatility*, measured as the difference of return volatility between the [11, 70] post ex-date window and the [-70, -11] pre-announcement window.[19] The coefficient estimate of *Split Ratio* is not sensitive to the inclusion of *ΔVolatility*.

6.5 Stock Splits and Shareholder Base

Merton (1987) and Amihud, Mendelson, and Uno (1999) predict that stock splits could increase firm value if they broaden shareholder base, which enables better risk sharing among investors and reduces discount rates. Mukherji, Kim, and Walker (1997) find that the announcement returns of stock splits are positively correlated with changes in the total number of shareholders.

To account for this possibility, column (4) of Table 13 controls for *ΔShareholders*,

[18] *Illiquidity* post ex-date is the average daily Amihud (2002) illiquidity in the [11, 70] post ex-date window, the illiquidity pre-announcement is the average illiquidity in the [-70, -11] pre-announcement window. If a firm does not make ex-right price adjustment, we assume the pseudo ex-date is 75 days after the profit distribution proposal announcement date, which is the averaged time lag between the announcement date and ex-date. *Turnover* is defined similarly.

[19] If a firm does not make ex-right price adjustment, we assume the ex-date is 75 days after the profit distribution proposal announcement date, which is the averaged time lag between the announcement date and the ex-date.

measured as the change of the number of shareholders around stock splits scaled by market capitalization. [20] Consistent with the shareholder base argument, the coefficient of *ΔShareholders* is positive and significant. Nevertheless, this does not affect the main results as the coefficient of *Split Ratio* continues to be significantly positive and the economic magnitude is similar to the baseline result.

6.6 Stock Splits and Information Production

According to the information production theory of Brennan and Hughes (1991), stock splits could motivate information intermediaries such as analysts to produce more information because brokerage commissions are inversely related to the nominal share price in the U.S. This explanation does not apply to the stock splits of Chinese listed companies since brokerage commissions in China are proportional to the total transaction amount and independent of share prices. Nevertheless, to address such a concern, column (5) of Table 13 adds into the baseline regression an additional control variable *ΔCoverage*, which is the change of analyst coverage around the stock split scaled by the market capitalization (in millions). While *ΔCoverage* enters the regression positively and significantly as predicted by the information production theory, the main results are qualitatively similar.

Finally, in the last column of Table 13, we add all the aforementioned variables from section 6.2 to section 6.3 in the regression, and the corresponding result is unchanged.

7. Conclusion

In this paper, we propose and test a behavioral signaling explanation in the spirit of Baker, Mendel, and Wurgler (2015) to understand the puzzling announcement effects of stock splits. There are two key behavioral ingredients in our model. First, investors believe low-priced stocks to have greater price appreciation potential and have optimistic expectation about stocks of splitting firms. Second, investors have reference-dependent preference and will be particularly disappointed when the firm's ex-post performance falls short of expectation. In equilibrium, only managers with favorable private information use stock splits to signal their

[20] Data on the number of shareholders are available only after 2003 and are in quarterly frequency, so the shareholder number change is the number of shareholders at the end of the 2nd quarter minus the number at the end of the 4th quarter in the prior year, and the sample used here starts from 2004.

information.

We test the novel predictions of the behavioral signaling explanation using a comprehensive sample of stock splits in China over the period of 1998 to 2017. Our empirical evidence is largely consistent with behavioral signaling explanation. First, splitting firms have better fundamentals compared with non-splitting firms after splits. Second, the market reacts positively to the announcements of stock splits and the announcement returns increase with the split ratio. Third, the announcement effect is more pronounced among firms mainly held by retail investors and with low pre-split share prices. We also find that splitting firms with subpar ex-post performance experience lower returns, compared with similarly underperforming firms without undergoing splits. Overall, our paper shows the promise of applying the behavioral approach to shed light on certain corporate events that are otherwise difficult to rationalize under rational framework.

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Appendix A: Variable Definitions

Variables	Definitions
CAR[t_1, t_2]	Cumulative abnormal returns over [t_1, t_2], where t_1 and t_2 refer to the t_1^{th} and t_2^{th} trading days relative to the event date (t=0). In regression analysis, abnormal returns are raw returns adjusted by size and book-to-market ratio
Split Dummy	A dummy variable equals one for firms conducting stock splits and zero otherwise
Split Ratio	The ratio of newly issued shares from stock splits as a fraction of the original number of shares outstanding.
LnCoverage	Natural logarithm of 1 plus the total number of analysts who issue analyst reports for the firm.
ΔEarnings	After 2003 (including 2003), ΔEarnings is the difference of the current 4^{th} quarter earnings and the preceding fiscal year 4^{th} quarter earrings deflated by prior year market capitalization. Before 2002, ΔEarnings is half of the difference of current 2nd half-year-earnings and the preceding year 2nd half-year-earrings deflated by prior year market capitalization.
ΔDividends	The cash dividends change relative to the prior year deflated by prior year market capitalization
Annual Report	A dummy variable that equals one if the profit distribution proposal is disclosed together with the annual report and zero otherwise
LnSize	Natural logarithm of previous month total market capitalization if the firm's profit distribution plan is disclosed in the second half of the month, and will be lagged by an additional month if the firm's profit distribution plan is disclosed in the first half
LnBM	Natural logarithm of the book-to-market ratio, where book value is the last fiscal year end total book equity, market value is the previous month total equity capitalization if the firm's profit distribution plan is disclosed in the second half of the month, and will be lagged by an additional month if the firm's profit distribution plan is disclosed in the first half
Ret[-12, -2]	Cumulative stock returns over past 11 months during [-12, -2] if the firm's profit distribution plan is disclosed in the second half of the month, and will be lagged by an additional month if a firm's profit distribution plan is disclosed in the first half (cumulative returns over [-13, -3])
ROA	Operating income deflated by total assets
ΔSales	Sales growth rate relative to the last year
ΔShareholder[21]	The difference of the number of registered shareholders in the current quarter end relative to the last quarter deflated by equity capitalization
Max(0, Quarterly Return)	Absolute value of quarterly stock return if the current quarter return is positive
Max(0, - Quarterly Return)	Absolute value of quarterly stock return if the current quarter return is negative
10% Price Limit	The number of trading days that reach the 10% price limit in the current quarter
-10% Price Limit	The number of trading days that reach the -10% price limit in the current quarter
Abnormal Volume	Quarterly RMB trading volume relative to the average trading volume in the prior 4 quarters

[21] Referring to the dependent variable used in the Table 7

Retail Investor Sentiment[t_1, t_2]	the number of positive posts minus the number of negative posts deflated by the sum of positive and negative posts over [t_1, t_2]
Daily Return[-10, -1]	Daily cumulative stock returns over [-10, -1]
Forecast Revision	The revision of analyst consensus forecast of the earnings before and after the profit distribution announcement deflated by prior year market capitalization
LnCoverage	Natural logarithm of the number of analysts who issue analyst reports for the firm
Earnings Volatility	Standard deviation of earnings in the past three years deflated by prior year market capitalization
Underperform	In each year for each analyst covered stock, we compute the difference between the next-year-realized net income and analysts' median forecast and sort the difference into 4 quartiles. Underperform is a dummy variable which equals 1 if a firm belongs to the lowest quartile and equals 0 otherwise
Institutional Holdings	The proportion of shares held by institutional investors
LnPrice	Natural logarithm of the stock's previous month closing price if a firm's profit distribution plan is disclosed in the second half of the month, and will be lagged by an additional month if a firm's profit distribution plan is disclosed in the first half of the month
Split from Retained Earnings	The ratio of newly issued shares funded by retained earnings as a fraction of the initial number of shares outstanding
Split from Capital Surplus	The ratio of newly issued shares funded by capital surplus as a fraction of the initial number of shares outstanding
ΔIlliquidity	The difference of averaged post-ex-day [10, 70] and pre-announcement [-70, -10] Amihud(2002) illiquidity measure, for firms without a true ex-day, the day 75 days after the profit distribution announcement date is defined to be the pseudo ex-day
ΔTurnover	The difference of averaged post-ex-day [10, 70] and pre-announcement [-70, -10] daily stock turnover ratio, for firms without a true ex-day, the day 75 days after the profit distribution announcement date is defined to be the pseudo ex-day
ΔVolatility	The difference of averaged post-ex-day [10, 70] and pre-announcement [-70, -10] return volatility, for firms without a true ex-day, the day 75 days after the profit distribution announcement date is defined to be the pseudo ex-day
ΔCoverage	The change of analyst coverage before and after stock splits
ΔShareholder[22]	The change of shareholder number before stock splits announcement and after stock splits implementation

[22] Referring to the variable used in the Table 13

Appendix B: Stock Splits in China, an Example of Meters Bonwe

In this section, we use Meters Bonwe's 2014 annual distribution proposal to illustrate how Chinese listed companies disclose stock splits and why this common practice easily leads to investors' misperception about stock splits.

Meters Bonwe is a Shenzhen stock exchange listed company (stock code 002269) in the apparel industry. Meters Bonwe declared a 3 for 2 stock splits (split ratio 1.5) in its 2014 annual distribution proposal on April 1, 2015 combined with the firm's 2014 annual report.

Meters Bonwe posted its 2014 annual distribution proposal under "Important Notes", which belongs to the 1st section and is in the first page of the firm's 2014 annual report. Meters Bonwe declared the following information

"Our company's annual profit distribution proposal approved by the board of directors is: "Based our company's total outstanding shares, 1,011,000,000 in the end of December 2014, for every 10 outstanding shares, an investor would get 5 shares from retained earnings, 1 RMB cash dividends, 9 shares from capital surplus and 1 shares from surplus reserve[23]"

In the director's report, which is the 4th section of Meters Bonwe's 2014 annual report, Meters Bonwe also has a specific part for its distribution proposal, and provides the following table

New shares from Retained Earnings for every 10 outstanding shares	5
Cash dividends for every 10 outstanding shares	1
New shares from capital surplus and surplus reserve for every 10 outstanding shares	10
Total shares outstanding	1,011,000,000
Total cash dividends	101,100,000
Total distributable net income	145,640,513.00

[23] Surplus reserve is part of retained earnings.

Appendix C: Behavioral Signaling Model

Our toy model contains two players, a manager, who want to trade off the short term and long-term stock prices, and a representative naïve investor who has biased expectations about splitting stocks and are loss averse. The manager manages a firm with an uncertain value V that is realized in the second period. The manager also receives a private signal e about V in the first period, but this signal is only partially informative, and an unobservable shock ε will affect V. For simplicity, we assume that V is determined by adding up e and ε.

$$V = e + \varepsilon \quad (1)$$

Here e is the manager's private information about firm value, unobservable to outside investors, so the manager needs to choose a stock split ratio s to convey his private information. In our model, both e and ε are random variables from outside investors' perspective, with probability functions f_e and f_ε defined over support $[0, \bar{e}]$ and $[0, \bar{\varepsilon}]$, respectively. F_e and F_ε are the corresponding cumulative density functions for e and ε.

For various reasons we discussed above, the naïve investor believes splitting firms have higher growth potential and better fundamentals. Whenever he sees a stock split event, he raises the expectation of the splitting firm's value by as, where a (a>0) is a parameter used to measure the degree of this naïve investor's optimism about stock splits.

The representative investor has a non-standard utility function, where utility is defined not with respect to the level of wealth but relative to a reference point. In addition, the investor is loss averse so that a given loss generates larger utility loss than an equivalent gain. Specifically, the investors' utility function is taking the form of the following equation:

$$U_i = V + b\,(V - V^E)\,I\,(V < V^E) \quad (2)$$

In the above formula, I (.) is an indicator function that takes the value 1 if the condition in

the bracket is satisfied and 0 if not. b is a positive constant reflecting the asymmetry of gain and loss on utility. V^E is investors' expectation of firm value after seeing stock splits, and it is an increasing function of the split ratio s. Without loss of generality, we use the simple linear function to reflect the impact of stock splits on the investors' expectation.

$$V^E = as \quad (3)$$

Manager's utility is determined by both the current stock price and the future stock price. Given his private information e, the manager chooses a split ratio s to maximize the weighted average shareholder value. Baker, Mendel and Wurgler (2015) use a similar method to model the manager's optimization problem when deciding dividends payout.

$$s = argmax_s \, E[\alpha \, \mu(s) + \beta \, U_i \mid e] \quad (4)$$

where $\mu(s)$ is investors' expectation of firm value conditional on receiving the stock split signal s. Plug (2) and (3) into (4), we could get the following formula:

$$\begin{aligned} s &= argmax_s \; \alpha\mu(s) + \beta b \int_0^{as-e} (e + r - as) \, f_\varepsilon(r) \, dr \; I(as - e > 0) \\ &= argmax_s \; M\mu(s) + \int_0^{as-e} (e + r - as) \, f_\varepsilon(r) \, dr \; I(as - e > 0) \quad (5) \end{aligned}$$

In (5), M is a simplified parameter equals $\frac{\alpha}{b\beta}$, which ensures the equivalence of the optimization problem.

We use Perfect Bayesian equilibrium (henceforth PBE) as the equilibrium concept. In PBE, the following two conditions must be satisfied at the same time:

(1) Given manager's private information e, belief function $\mu(s)$ and the effect of splits on naïve investor's utility U_i, s maximizes manager's utility.

(2) Belief consistency. In equilibrium, the market makes a correct conjecture, in other words, $e = \mu(s)$.

Lemma 1. In equilibrium, $\mu(s)$ is a weakly increasing function of the split ratio s.

We prove Lemma 1 by contradiction. Suppose not, if there are splitting ratios s_1 and s_2, with $s_1 < s_2$, but $\mu(s_1) > \mu(s_2)$. Denoting e_1 and e_2 as the firms' private information with corresponding split ratios s_1 and s_2, then according to incentive comparability condition, the following two inequalities must hold.

$$M\mu(s_1)+\int_0^{as_1-e_1}(e_1+r-as_1)\,f_\varepsilon(r)\,dr\;I(as_1>e_1)\geq M\mu(s_2)+\int_0^{as_2-e_1}(e_1+r-as_2)\,f_\varepsilon(r)\,dr\;I(as_2>e_1)$$

$$M\mu(s_2)+\int_0^{as_2-e_2}(e_2+r-as_2)\,f_\varepsilon(r)\,dr\;I(as_2>e_2)\geq M\mu(s_1)+\int_0^{as_1-e_2}(e_2+r-as_1)\,f_\varepsilon(r)\,dr\;I(as_1>e_2)$$

However, the second one could not be true. On the one hand, by assumption we have $\mu(s_1) > \mu(s_2)$, on the other hand, since $s_1 < s_2$, to make the inequality plausible, the following inequity $\int_0^{as_2-e_2}(e_2+r-as_2)\,f_\varepsilon(r)\,dr\;I(as_2>e_2) > \int_0^{as_1-e_2}(e_2+r-as_1)\,f_\varepsilon(r)\,dr\;I(as_1>e_2)$, must be true. However, because for any e, the function $\int_0^{as-e}(e+r-as)\,f_\varepsilon(r)\,dr\;I(as>e)$ is not increasing in s, which leads to a contradiction, so $\mu(s)$ cannot be decreasing in s. That explains why a firm has the incentive to do stock splits because, in the short run, the firm could be recognized by the market as a higher type if the split ratio is larger.

As $\mu(s)$ is weakly monotonic, we could take the derivative with respect to s in manager's utility maximization problem and derive the following first-order condition:

$$M\mu'(s)-aF(as-e)\,I(as>e)=0 \quad (6)$$

Plugging in the belief consistency condition $e = \mu(s)$ into the above equation, we could get the following differential equation:

$$Me'-aF(as-e)\,I(as>e)=0 \quad (7)$$

It is easy to show that when the indicative function $I(as > e)$ takes different values, the differential equation has different forms of solutions.

When the split ratio s is lower compared to e, and $as < e$, then $\mu(s)$ is a constant. This

result is reasonable because when s is smaller than $\frac{e}{a}$, share splitting is not a credible signal, as it incurs no cost.

When the split ratio s is large enough satisfying $s \geq \frac{e}{a}$, equation (7) has a linear solution, and our following analysis will focus on this particular solution.

Equilibrium. For a manager with private information e, his choice of split ratio s is given by

$$s(e) = e / a + c \quad (8),$$

where c is a constant that solves $F_{\varepsilon}(c) = \frac{M}{a^2}$. Equation (8) provides the separating equilibrium of the behavioral signaling model.

The separating equilibrium predicts that stock splits with larger share splitting ratio should be associated with larger stock returns, because a firm with more favorable private information would select a larger share splitting ratio to separate itself from other firms.

Another empirical prediction of the behavioral separating equilibrium is that when we regress stock splits event returns on stock splits ratio, the regression coefficient would be larger if unsophisticated investors have more optimistic misconceptions about stock splits (larger a). The reason is that when unsophisticated investors are very optimistic about stock splits, only firms with very good fundamentals can manage to not disappoint investors ex-post and conduct large ratio stock splits. In other words, the information content for a given stock splits ratio should be larger if the parameter a is larger.

Appendix D: Additional Results

D1. Alternative Model Specifications

To assure the robustness of the empirical evidence documented in Table 5, in this section, we conduct several additional tests using different samples and different model specifications and report the corresponding results in Table D1. In Column (1) and (2), we repeat the regression analysis with controls and fixed effects used in Table 5 but using a PSM matched sample. In each year, we use the propensity score matching procedure to find a non-splitting firm that is similar to the splitting firm in a set of observable characteristics.[24] When we use the matched sample, *Split Ratio* continues to be significantly positive and the magnitudes are similar to those of the full sample. In Column (3) and (4), we adopt the Fama-Macbeth (1973) procedure and run cross-sectional regressions year by year, the regression coefficient of *Split Ratio* on cumulative abnormal returns remains to be significantly positive. Ultimately, in the last two columns of Table D1, we only keep stock splitting firms in the regression sample, the positive association between *Split Ratio* and market reaction is unchanged.

D2. Long-term Event Study of Stock Splits

In this section, we conduct long-term event study for stock splits to examine whether the short-term price impact would be reversed in the long run.

As there is no consensus optimal method to compute long-run post event stock performance in literature, we use both the buy-and-hold abnormal returns (BHAR) and calendar-time portfolio approaches to examine the long-term market reaction to stock splits.

The key idea of BHAR approach is to compare a stock's long-run performance to the performance of a benchmark portfolio. This method more closely reflects investors' true investing experience. Following the literature, we compute the buy-and-hold abnormal returns for every splitting stock according to the following equation:

$$BHAR_i^{[s,s+\tau]} = \Pi_{t=s}^{s+\tau}\left(1+R_{i,t}\right) - \sum_1^{n_s} \omega_{j,s} \Pi_{t=s}^{s+\tau}\left(1+R_{j,t}\right) \quad (1)$$

where i indicates splitting stock, j indicates the benchmark portfolio to which stock i is compared. The superscript $[s, s+\tau]$ indicates that splitting stocks are held for τ months, from the beginning of the month s to the end of the month $s+\tau$. For every splitting stock, we choose

[24] The firm characteristics include *LnSize*, *LnBM*, *LnPrice* (the natural logarithm of last month's closing price), *ΔEarnings*, *ΔDividends*, *Split Capacity* (capital surplus plus retained earnings per share, which determines the maximal split ratio), *ROA* (return on asset), *Age* (number of years that a firm has been listed), and industry affiliations (22 industries based on the industry classification of China Securities Regulatory Commission).

a benchmark portfolio that is not periodically rebalanced to avoid rebalancing bias (Barber and Lyon, 1997). n_S is the number of stocks in the benchmark portfolio, $\omega_{i,s}$ is each stock's weight in the benchmark portfolio. We compute the mean $\overline{BHAR}$ across all the splitting stocks according to the following equation, where N is the total number of split events.

$$\overline{BHAR}=\sum_1^N BHAR_i \quad (2)$$

Since the BHAR is the difference of a τ month buy-and-hold return between a stock and a benchmark portfolio, the distribution of BHAR is often highly skewed and does not have a zero mean (Barber and Lyon, 1997). We follow the method of Brock, Lakonishok and LeBaron (1992), Ikenberry, Lakonishok and Vermaelen (1995), Ikenberry, Rankine, and Stice (1996), and draw statistical inference based on an empirically generated distribution.

For every stock announcing split at event month t, we randomly select a non-splitting stock with similar observable characteristics (for example, same industry, size, and book-to-market ratio depending on the benchmark portfolio we use) in the same month. This process continues until every splitting stock is matched by a non-splitting stock. We then form a pseudo portfolio constructed using non-splitting stocks and estimate the $\overline{BHAR^P}$ in the same way as we do for the splitting stocks.[25] The above procedure is repeated for 1,000 times so as to derive 1,000 $\overline{BHAR^P}$ s, and hence the empirical distribution of $\overline{BHAR}$ under the null of no abnormal returns. The null hypothesis tested is that the event $\overline{BHAR}$ equals the mean long-run abnormal return for the 1,000 pseudo-event portfolios.

The Panel A of Table D2 reports the results of BHAR approach and Figure D1 reports the empirical distribution. We use the value-weighted market return, 22 industry portfolio returns, and 25 size and B/M ratio sorted portfolio returns as the expected returns, and look at a three-year holding period [1, 36] as well as three one-year holding period BHARs. The statistic we use is p-value, which is the fraction of $\overline{BHAR^P}$ s from the empirical distribution that are larger than $\overline{BHAR}$. y_h and y_l are the 95th and 5th percentile of $\overline{BHAR^P}$ of the empirical distribution, respectively. If $\overline{BHAR}$ is lower (higher) than y_l (y_h), then splitting stocks significantly

[25] For example, if we want to compare the long-run performance of splitting and non-splitting firms in the same industry, the benchmark portfolios used are the 22 valued-weighted industry portfolios. The pseudo stock for each event stock is randomly selected from the same industry. Similarly, if we want to compare the long-run performance of split and non-splitting stocks with comparable size and book-to-market ratio, we use the 25 value-weighted size and book-to-market ratio independently sorted portfolios as the benchmarks, and the pseudo stock for each event stock is randomly picked from the size and book-to-market matched portfolio.

underperform (outperform) non-splitting stocks in the long run at the 5% significance level.

The result of Table D2 Panel A shows that splitting stocks significantly outperform the benchmark portfolio over the subsequent 36 months. This finding is consistent with evidence from the US (Ikenberry, Rankine and Stice, 1996; Desai and Jain, 1997; Ikenberry and Ramnath, 2002), indicating that investors to some extent under-react to the information contained in stock splits. The result also reveals that the return differences between splitting stocks and the benchmark portfolio is largest during the first year post-split and gradually decline over time.

We also use the calendar-time portfolio approach as this method naturally addresses the cross-sectional correlation in stock returns (Fama, 1998). Under this method, the long-run performance of stock splits could be inferred from the alphas estimated from the time-series regression of portfolio returns on asset pricing factors.

Specifically, in each month, we select all the stocks announcing splits in the previous 36 months and form a portfolio containing all such stocks. We then hold this portfolio for 1 month and rebalance monthly to include stocks that just conducted splits in the last month and remove stocks whose most recent splits occurred more than 36 months ago.

Table D2 Panel B reports the calendar-time portfolio results, with the upper part showing the equal-weighted portfolio returns, and the lower part showing the value-weighted portfolio returns. Column (1) shows that the equal-weighted portfolio earns 1.5% excess returns per month, significant at the 5% level. In the following four columns, we estimate alphas using standard asset pricing models including the CAPM, the Fama-French 3 factor model (Fama and French, 1993), the Carhart 4 factor model (Carhart, 1997), and the Fama-French 5 factor model (Fama and French, 2015). While alpha estimates are sensitive to the factor models used, they are never significantly negative. In Column (6), we follow Liu, Stambaugh and Yuan (2019) and use the CH-3 factors as the pricing model, and document a significant positive alpha. [26]In the second to the fourth row, we select stocks conducting splits in the previous [1, 12] months, [13, 24] months and [25, 36] months, respectively. The results show that when we examine the long-run performance year by year, we do not find any evidence of return reversal. The results for the value-weighted returns are qualitatively similar as shown in the bottom part of Table D2 Panel B.

[26] We thank Jianan Liu for providing the data to us.

Figure 1. Market Reaction to Stock Splits Announcement over [-20, 20] 41 trading days

This figure plots the average cumulative abnormal returns of stock splits announcements of China's listed firms over the [-20, 20] event window. Stock returns are adjusted by size and book-to-market ratio.

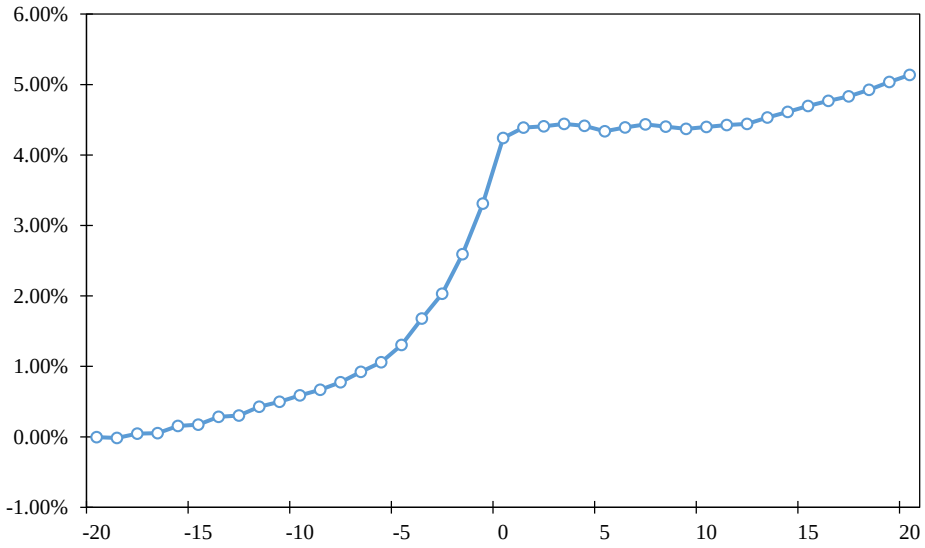


Figure 2. Market Reaction to Stock Splits Announcement over [-20, 91] 121 trading days

This figure plots the average cumulative abnormal returns of stock splits announcements of China's listed firms over the [-20, 90] event window. Stock returns are adjusted by size and book-to-market ratio.

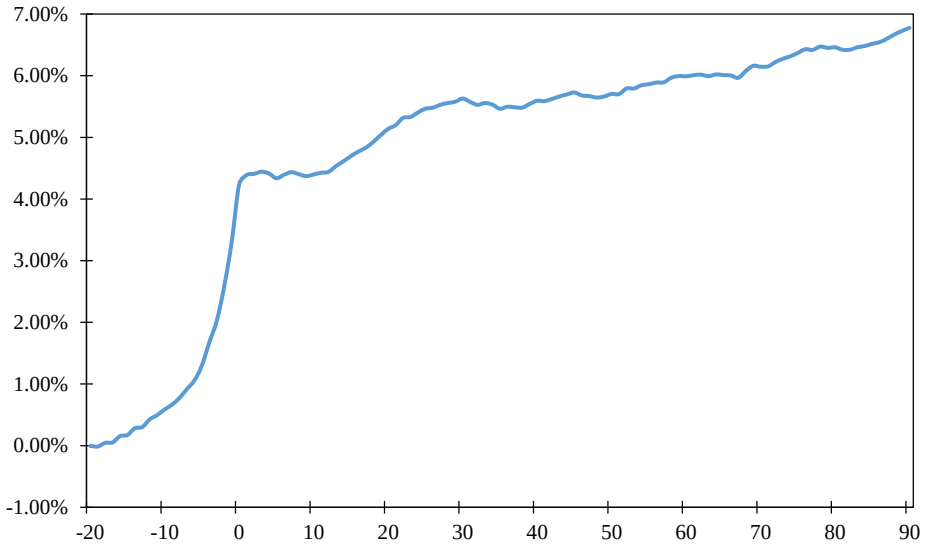


Table 1. Yearly Distribution of Stock Splits in China

This table reports the distribution of stock splits of China's listed firms for each year from 1998 to 2017.

Year	Splitting Events	Splitting Firms	Percentage of Splitting Firms	Splitting Events in Annual and Semi-annual Distribution Proposals						Mean Splitting Ratio	Source of New Shares	
				Annual			Semi-Annual				Retained Earnings	Capital Surplus
				Splitting Events	In Annual Report		Splitting Events	In Semi-Annual Report				
					Yes	No		Yes	No			
1998	262	258	31.46%	206	185	21	56	51	5	0.423	48.11%	51.89%
1999	233	227	24.62%	176	110	66	57	25	32	0.466	40.91%	59.09%
2000	178	178	16.76%	131	114	17	47	41	6	0.48	29.74%	70.26%
2001	197	190	16.74%	159	152	7	38	32	6	0.466	28.18%	71.82%
2002	165	158	13.16%	134	124	10	31	31	0	0.365	22.88%	77.12%
2003	148	147	11.62%	124	118	6	24	23	1	0.461	18.50%	81.50%
2004	236	233	17.21%	196	191	5	40	38	2	0.533	16.07%	83.93%
2005	170	168	12.43%	159	157	2	11	11	0	0.452	12.01%	87.99%
2006	187	185	12.90%	153	147	6	34	34	0	0.463	16.32%	83.68%
2007	219	211	13.84%	180	173	7	39	39	0	0.470	23.42%	76.58%
2008	404	402	25.31%	371	368	3	33	32	1	0.563	20.49%	79.51%
2009	236	234	13.36%	221	219	2	15	15	0	0.489	18.76%	81.24%
2010	381	375	17.81%	341	335	6	40	35	5	0.545	21.19%	78.81%
2011	615	611	26.11%	563	543	20	52	47	5	0.658	11.77%	88.23%
2012	575	573	23.20%	542	439	103	33	22	11	0.649	6.31%	93.69%
2013	460	456	18.15%	430	317	113	30	18	12	0.659	6.93%	93.07%
2014	510	505	18.50%	465	313	152	45	13	32	0.724	6.13%	93.87%
2015	741	716	24.50%	566	380	186	175	70	105	0.947	6.19%	93.81%
2016	588	581	18.06%	532	359	173	56	24	32	1.042	4.93%	95.07%
2017	478	475	13.22%	437	312	125	41	31	10	0.768	4.45%	95.45%

Table 2. Descriptive Statistics

This table reports the summary statistics of the main variables used in regression analyses. *CAR*[-10, -2], *CAR*[-1, 1], *CAR*[-10, 1], and *CAR*[2, 10] are cumulative abnormal returns over the event windows in brackets, respectively, where abnormal returns are raw returns adjusted by size and book-to-market ratio. *Split Dummy* equals one for firms conducting stock splits and zero otherwise. *Split Ratio* is the ratio of newly issued shares from stock splits as a fraction of the original number of shares outstanding. *ΔDividends* is the cash dividends change relative to the prior year deflated by prior year market capitalization. *ΔEarnings* is the seasonal earnings change deflated by prior year market capitalization. *Annual Report* is a dummy variable that equals one if the profit distribution proposal is disclosed together with the annual report and zero otherwise. *LnSize* and *LnBM* are the natural logarithm of total market capitalization and the book-to-market ratio, respectively. *Ret*[-12, -2] is the compounded 11-month returns over [-12, -2]. The sample period is from 1998 to 2017. ***, ** and * indicate statistical significance at 1%, 5% and 10%, respectively.

Panel A. Summary Statistics

Variable	N	Mean	Std. dev	P25	P50	P75
CAR[-10, -2]	28771	0.006	0.071	-0.032	-0.001	0.037
CAR[-1, 1]	28771	-0.002	0.049	-0.030	-0.005	0.021
CAR[-10, 1]	28771	0.005	0.084	-0.043	-0.003	0.042
CAR[2, 10]	28771	0.002	0.072	-0.037	-0.006	0.031
Split Dummy	28771	0.179	0.383	0	0	0
Split Ratio	28771	0.110	0.289	0	0	0
ΔDividends	26913	0.001	0.009	-0.001	0	0.002
ΔEarnings	26590	0.002	0.030	-0.004	0	0.005
Annual Report	28771	0.962	0.191	1	1	1
LnSize	28572	14.572	1.215	13.653	14.526	15.399
LnBM	28407	-1.155	0.651	-1.567	-1.13	-0.706
Ret[-12, -2]	28771	0.163	0.619	-0.240	0.009	0.382

Panel B. Differences between Splitting Firms and Non-Splitting Firms

	Non-splitting Firm			Splitting Firm			Difference	
Variables	Mean	Median	Std. dev	Mean	Median	Std. dev	in Means	*t* Value
CAR[-10, -2]	0.003	-0.003	0.070	0.022	0.014	0.074	-0.019***	(-17.06)
CAR[-1, 1]	-0.006	-0.008	0.046	0.018	0.012	0.06	-0.024***	(-32.58)
CAR[-10, 1]	-0.003	-0.009	0.08	0.040	0.03	0.091	-0.043***	(-33.93)
CAR[2, 10]	0.002	-0.006	0.072	0.000	-0.006	0.072	0.001	(1.32)
ΔDividends	0.000	0.000	0.009	0.001	0.000	0.01	-0.001***	(-4.55)
ΔEarnings	0.002	0.000	0.031	0.005	0.001	0.018	-0.003***	(-5.44)
Annual Report	0.989	1	0.105	0.839	1	0.367	0.149***	(53.28)
LnSize	14.57	14.53	1.223	14.58	14.511	1.177	-0.010	(-0.55)
LnBM	-1.123	-1.088	0.658	-1.305	-1.292	0.593	0.182***	(18.24)
Ret[-12, -2]	0.132	-0.013	0.601	0.307	0.142	0.678	-0.176***	(-18.55)

Table 3. Market Reaction to Stock Splits: Univariate Analysis

This table reports the cumulative abnormal returns (CAR) around split announcements in various windows. We exclude observations when stock trading is suspended during [-1, 1] to mitigate the impact of other major corporate events. The row labels correspond to different expected return models used in computing CARs. ER is the excess return relative to risk-free rate. MKT is the abnormal return in excess of value-weighted market index. IND is the abnormal return in excess of firm's corresponding value-weighted industry portfolio. CHA is the abnormal return in excess of the firm's matched value-weighted 5×5 size and book-to-market ratio portfolio. CAPM, FF-3, and FF-5 represent risk-adjusted abnormal returns, where we use CAPM, Fama-French (1993) 3-factor model and Fama-French (2015) 3-factor model to compute expected returns, respectively. Parameters in CAPM, FF-3 and FF-5 approach are all estimated within the [-120, -21] pre-announcement window. The sample period is from 1998 to 2017, the numbers reported in parentheses are t statistics with standard error clustered by firm and event date, ***, ** and * indicate statistical significance at 1%, 5% and 10%, respectively.

	-1	0	1	[-10, -2]	[-5,-2]	[-1, 1]	[2, 5]	[2, 10]
ER	0.007***	0.009***	0.002***	0.033***	0.018***	0.018***	0.004***	0.01***
	(14.96)	(15.41)	(4.15)	(24.17)	(19.90)	(19.04)	(4.93)	(7.46)
MKT	0.007***	0.009***	0.001***	0.025***	0.017***	0.017***	0.000	0.003***
	(16.24)	(16.03)	(3.45)	(22.53)	(21.29)	(19.92)	(0.59)	(2.64)
IND	0.007***	0.009***	0.001***	0.023***	0.016***	0.018***	0.000	0.001
	(17.31)	(16.58)	(3.30)	(21.28)	(21.38)	(20.74)	(-0.23)	(1.27)
CHA	0.007***	0.009***	0.001***	0.021***	0.015***	0.018***	-0.001	0.000
	(18.22)	(16.89)	(3.58)	(20.64)	(21.06)	(21.50)	(-0.75)	(0.09)
CAPM	0.007***	0.009***	0.002***	0.028***	0.018***	0.018***	0.001	0.005***
	(16.91)	(16.53)	(3.97)	(23.39)	(22.36)	(20.82)	(1.87)	(4.88)
FF-3	0.007***	0.010***	0.001***	0.021***	0.016***	0.018***	-0.001	0.001
	(17.84)	(16.87)	(3.40)	(18.75)	(20.55)	(21.22)	(-1.07)	(1.22)
FF-5	0.007***	0.009***	0.001***	0.023***	0.015***	0.018***	0.001	0.001
	(15.18)	(15.28)	(3.11)	(17.51)	(16.35)	(18.68)	(0.77)	(1.06)

Table 4. Market Reactions to Stock Splits: Regression Analysis

This table reports regression analyses of short-run market reaction to stock splits. The dependent variables (*CAR[-10, -2]*, *CAR[-1, 1]* and *CAR[2, 10]*) are cumulative abnormal returns over [-10, -2], [-1, 1] and [2, 10], respectively. *Split Dummy* equals one for firms conducting stock splits and zero otherwise. *ΔDividends* is the cash dividends change relative to the prior year deflated by prior year market capitalization. *ΔEarnings* is the seasonal earnings change deflated by prior year market capitalization. *Annual Report* is a dummy variable that equals one if the profit distribution proposal is disclosed together with the annual report and zero otherwise. *LnSize* and *LnBM* are the natural logarithm of total market capitalization and the book-to-market ratio, respectively. *Ret*[-12, -2] is the compounded 11-month returns over [-12, -2]. The sample period is from 1998 to 2017, the numbers reported in parentheses are t statistics with standard error clustered by firm and event date, ***, ** and * indicate statistical significance at 1%, 5% and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
CAR	[-10, -2]	[-1, 1]	[2, 10]	[-10, -2]	[-1, 1]	[2, 10]	[-10, -2]	[-1, 1]	[2, 10]
Split Dummy	0.017***	0.024***	-0.002	0.016***	0.023***	-0.001	0.017***	0.025***	-0.000
	(12.61)	(23.28)	(-1.61)	(10.76)	(20.27)	(-0.73)	(11.31)	(21.51)	(-0.29)
ΔDividends				0.181***	0.072**	-0.053	0.209***	0.105***	-0.020
				(3.58)	(2.13)	(-1.00)	(4.35)	(3.13)	(-0.37)
ΔEarnings				0.123***	0.034***	-0.001	0.130***	0.054***	0.002
				(6.57)	(3.11)	(-0.03)	(6.68)	(4.69)	(0.11)
Annual Report				0.003	-0.012***	0.002	0.002	-0.013***	0.001
				(0.66)	(-3.99)	(0.44)	(0.50)	(-4.22)	(0.23)
LnSize							-0.007***	-0.004***	-0.006***
							(-6.86)	(-4.90)	(-4.99)
LnBM							0.003**	0.001	0.004***
							(2.26)	(0.90)	(2.76)
CAR[-10, -2]								-0.069***	-0.009
								(-9.10)	(-0.89)
Ret[-12, -2]							0.003*	-0.003**	0.002
							(1.68)	(-2.50)	(1.10)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Event Date Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.037	0.086	0.019	0.045	0.084	0.017	0.048	0.092	0.019
Observations	28312	28312	28312	25941	25941	25941	25193	25193	25193

Table 5. Short-term Market Reactions to Stock Splits with Different Split Ratios

This table reports regression analyses of short-run market reaction to stock splits with different share splitting ratio. The dependent variables (*CAR[-1, 1]* and *CAR[-10, 1]*) are cumulative abnormal returns over [-1, 1] and [-10, 1]. *Split Ratio* is the ratio of newly issued shares from stock splits as a fraction of the original number of shares outstanding. *ΔDividends* is the cash dividends change relative to the prior year deflated by prior year market capitalization. *ΔEarnings* is the seasonal earnings change deflated by prior year market capitalization. *Annual Report* is a dummy variable that equals one if the profit distribution proposal is disclosed together with the annual report and zero otherwise. *LnSize* and *LnBM* are the natural logarithm of total market capitalization and the book-to-market ratio, respectively. *CAR*[-10, -2] is cumulative abnormal returns over [-10, -2]. *Ret*[-12, -2] is the compounded 11 monthly returns over [-12, -2]. The sample period is from 1998 to 2017, the numbers reported in parentheses are t statistics with standard error clustered by firm and event date, ***, ** and * indicate statistical significance at 1%, 5% and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
CAR	[-1, 1]	[-10, -1]	[-1, 1]	[-10, -1]	[-1, 1]	[-10, -1]
Split Ratio	0.039***	0.069***	0.037***	0.069***	0.041***	0.072***
	(21.60)	(23.54)	(18.12)	(20.94)	(19.40)	(22.34)
ΔDividends			0.065*	0.239***	0.099***	0.289***
			(1.91)	(4.22)	(2.96)	(5.32)
ΔEarnings			0.033***	0.155***	0.054***	0.173***
			(3.02)	(7.61)	(4.64)	(7.94)
Annual Report			-0.006*	0.004	-0.006**	0.002
			(-1.94)	(0.71)	(-1.98)	(0.46)
LnSize					-0.004***	-0.011***
					(-5.09)	(-8.45)
LnBM					0.001	0.003**
					(0.80)	(2.15)
CAR[-10, -2]					-0.074***	
					(-9.58)	
Ret[-12, -2]					-0.003***	-0.001
					(-2.63)	(-0.37)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Event Date Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.093	0.080	0.089	0.082	0.098	0.090
Observations	28312	28312	25941	25941	25193	25193

Table 6. Fundamentals of Splitting Firm

This table reports the fundamental performance of splitting firms in the year of and two years after the split. The dependent variable used in Panel A is *ROA*, defined as the operating income deflated by total assets. The dependent variable in Panel B is *ΔEarnings*, defined as earnings change relative to the earnings in year t-1and in Panel C is *ΔSales*, defined as sales growth rate relative to the sales in year t-1. *Split Dummy* equals one for firms conducting stock splits and zero otherwise. *Split Ratio* is the ratio of newly issued shares from stock splits as a fraction of the original number of shares outstanding. *ΔDividends* is the cash dividends change relative to the prior year deflated by prior year market capitalization. *ΔEarnings* is the seasonal earnings change deflated by prior year market capitalization. *LnSize* and *LnBM* are the natural logarithm of total market capitalization and the book-to-market ratio, respectively. The sample period is from 1998 to 2017, the numbers reported in parentheses are t statistics with standard error clustered by firm, ***, ** and * indicate statistical significance at 1%, 5% and 10%, respectively.

Panel A. Stock split and ROA

	(1)	(2)	(3)	(4)	(5)	(6)
	ROA_t	ROA_{t+1}	ROA_{t+2}	ROA_t	ROA_{t+1}	ROA_{t+2}
Split Dummy	0.015***	0.013***	0.007***			
	(21.12)	(12.05)	(4.93)			
Split Ratio				0.016***	0.015***	0.009***
				(17.19)	(10.51)	(4.10)
ΔDividends	0.013***	-0.002	-0.023***	0.013***	-0.002	-0.023***
	(15.81)	(-1.46)	(-13.26)	(15.86)	(-1.43)	(-13.27)
ΔEarnings	-0.013***	-0.041***	-0.058***	-0.013***	-0.041***	-0.058***
	(-11.48)	(-24.72)	(-23.74)	(-11.47)	(-24.68)	(-23.73)
LnSize	0.356***	0.399***	0.275***	0.358***	0.401***	0.276***
	(27.61)	(21.51)	(11.35)	(27.78)	(21.65)	(11.41)
LnBM		0.535***	0.365***		0.530***	0.361***
		(13.98)	(8.43)		(13.83)	(8.36)
ROA_{t-1}		0.365***	0.184***		0.368***	0.185***
		(18.88)	(8.62)		(18.99)	(8.68)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.499	0.466	0.402	0.496	0.464	0.402
Observations	26230	25393	25343	26230	25393	25343

Panel B. Stock split and Earnings Growth

	(1)	(2)	(3)	(4)	(5)	(6)
	$\Delta Earnings_t$	$\Delta Earnings_{t+1}$	$\Delta Earnings_{t+2}$	$\Delta Earnings_t$	$\Delta Earnings_{t+1}$	$\Delta Earnings_{t+2}$
Split Dummy	0.011***	0.008***	0.003**			
	(15.98)	(7.52)	(2.16)			
Split Ratio				0.013***	0.010***	0.006***
				(11.86)	(7.35)	(2.86)
ΔDividends	0.011***	-0.004***	-0.020***	0.011***	-0.004***	-0.020***
	(14.35)	(-3.57)	(-12.20)	(14.39)	(-3.57)	(-12.24)
ΔEarnings	-0.010***	-0.031***	-0.040***	-0.010***	-0.031***	-0.040***
	(-9.18)	(-21.52)	(-19.09)	(-9.18)	(-21.54)	(-19.10)
LnSize	-0.495***	-0.368***	-0.499***	-0.493***	-0.366***	-0.499***
	(-41.20)	(-24.95)	(-25.28)	(-41.00)	(-24.82)	(-25.26)
LnBM		0.767***	0.612***		0.763***	0.609***
		(13.88)	(9.96)		(13.81)	(9.91)
ROA_{t-1}		0.732***	0.558***		0.733***	0.558***
		(25.96)	(18.10)		(26.03)	(18.12)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.221	0.344	0.291	0.219	0.343	0.291
Observations	25907	25393	25343	25907	25393	25343

Panel C. Stock split and Sales Growth

	(1)	(2)	(3)	(4)	(5)	(6)
	$\Delta Sales_t$	$\Delta Sales_{t+1}$	$\Delta Sales_{t+2}$	$\Delta Sales_t$	$\Delta Sales_{t+1}$	$\Delta Sales_{t+2}$
Split Dummy	0.104***	0.161***	0.188***			
	(9.78)	(7.37)	(5.73)			
Split Ratio				0.139***	0.239***	0.427***
				(8.69)	(7.44)	(9.02)
ΔDividends	0.041***	-0.061***	-0.335***	0.041***	-0.062***	-0.019
	(4.81)	(-2.96)	(-9.00)	(4.77)	(-3.02)	(-1.08)
ΔEarnings	-0.108***	-0.402***	-0.771***	-0.108***	-0.402***	-0.476***
	(-8.57)	(-13.50)	(-14.33)	(-8.57)	(-13.52)	(-13.74)
LnSize	-1.673***	-2.108***	-2.962***	-1.656***	-2.081***	-1.965***
	(-13.68)	(-7.31)	(-6.80)	(-13.58)	(-7.23)	(-5.86)
LnBM		6.642***	6.989***		6.545***	9.563***
		(8.92)	(6.87)		(8.81)	(8.98)
ROA_{t-1}		3.518***	3.782***		3.531***	5.215***
		(8.20)	(6.36)		(8.25)	(8.53)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.054	0.130	0.174	0.054	0.130	0.072
Observations	26201	25367	25307	26201	25367	25479

Table 7. Stock Split and the Number of Shareholders

This table reports the impact of stock splits on number of shareholders. The dependent variable *ΔShareholder* is the difference of the number of registered shareholders in the current quarter end relative to the last quarter deflated by equity capitalization. *Split Ratio* is the ratio of newly issued shares from stock splits as a fraction of the original number of shares outstanding. *ΔDividends* is the cash dividends change relative to the prior year deflated by prior year market capitalization. *ΔEarnings* is the seasonal earnings change deflated by prior year market capitalization. *LnSize* and *LnBM* are the natural logarithm of total market capitalization and book to market ratio, respectively. *Max(0, Quarterly Return)* / *Max(0, -Quarterly Return)* is the absolute value of quarterly stock return if the current quarter return is positive / negative. *10% Price Limit* / *-10% Price Limit* counts how many trading days reach the 10% / -10% price limit in the current quarter. *Abnormal Volume* is the quarterly RMB trading volume relative to the average trading volume in the prior 4 quarters. We exclude observations if the distribution proposal announcement date and its corresponding ex-right date are belonging to the same quarter. The sample period is from 2003 to 2017, the numbers reported in parentheses are t statistics with standard errors clustered by stock and year × quarter. ***, ** and * indicate statistical significance at 1%, 5% and 10%, respectively.

ΔShareholder	(1)	(2)	(3)	(4)	(5)	(6)
Split Dummy	0.043***	0.043***	0.043***			
	(5.13)	(5.28)	(6.25)			
Split Ratio				0.083***	0.084***	0.078***
				(7.27)	(7.54)	(7.48)
ΔDividends		0.321*	0.290*		0.280*	0.259
		(1.95)	(1.80)		(1.70)	(1.63)
ΔEarnings		0.155**	0.181***		0.155***	0.182***
		(2.71)	(2.84)		(2.74)	(2.85)
LnSize			0.024***			0.024***
			(3.88)			(3.79)
LnBM			0.007			0.007
			(1.24)			(1.23)
Max(0, Quarterly Return)			-0.262***			-0.266***
			(-5.68)			(-5.74)
Max(0, - Quarterly Return)			0.411***			0.416***
			(4.67)			(4.70)
10% Price Limit			0.025***			0.025***
			(5.09)			(5.07)
-10% Price Limit			0.014			0.014
			(1.64)			(1.58)
Abnormal Volume			0.068***			0.067***
			(9.47)			(9.43)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year × Quarter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.052	0.053	0.171	0.055	0.057	0.174
Observations	18518	18315	17511	18518	18315	17511

Table 8. Stock Splits and Retail Investor Sentiment

This table reports the impact of stock splits on retrial investor sentiment. The dependent variables *Retail Investor Sentiment* [0, 1] and *Retail Investor Sentiment* [0, 10] are measured as the number of positive posts minus the number of negative posts deflated by the sum of positive and negative posts within the [-1, 1] or [-10, 1] window around firms' distribution proposal announcement. The data of Investor discussion forum are retrieved from CNRDS dataset. CNRDS classifies each investor discussion post as into positive, negative and neutral posts by machine learning algorithm. *Split Dummy* equals one for firms conducting stock splits and zero otherwise. *Split Ratio* is the ratio of newly issued shares from stock splits as a fraction of the original number of shares outstanding. *ΔDividends* is the cash dividends change relative to the prior year deflated by prior year market capitalization. *ΔEarnings* is the seasonal earnings change deflated by prior year market capitalization. *Annual Report* is a dummy variable that equals one if the profit distribution proposal is disclosed together with the annual report and zero otherwise. *LnSize* and *LnBM* are the natural logarithm of total market capitalization and book to market ratio, respectively. *Daily Return*[-10, -1] is pre-event 10 days cumulative stock returns. *Ret*[-12, -2] is the compounded 11 monthly returns over [-12, -2]. The sample period is from 2009 to 2017, the numbers reported in parentheses are t statistics with standard errors clustered by stock and event date. ***, ** and * indicate statistical significance at 1%, 5% and 10%, respectively.

Panel A	(1)	(2)	(3)	(4)	(5)	(6)
	Retail Investor Sentiment [0, 1]			Retail Investor Sentiment [0, 10]		
Split Dummy	0.064***	0.067***	0.062***	0.049***	0.049***	0.047***
	(7.89)	(7.33)	(6.60)	(10.35)	(9.57)	(8.98)
ΔDividends		0.577	0.647*		0.066	0.068
		(1.58)	(1.78)		(0.31)	(0.33)
ΔEarnings		0.483***	0.513***		0.208***	0.234***
		(4.64)	(4.88)		(3.35)	(3.70)
Annual Report		0.030	0.016		-0.001	-0.006
		(1.28)	(0.69)		(-0.08)	(-0.45)
LnSize			0.013			-0.008
			(1.61)			(-1.34)
LnBM			0.009			0.001
			(0.89)			(0.22)
Daily Return[-10, -1]			0.169***			0.070***
			(3.75)			(2.59)
Ret[-12, -2]			0.012			0.009*
			(1.43)			(1.75)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Event Date Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.220	0.221	0.226	0.499	0.500	0.505
Observations	17237	15915	15367	17323	15996	15445

Panel B	(1)	(2)	(3)	(4)	(5)	(6)
	Retail Investor Sentiment [0, 1]			Retail Investor Sentiment [0, 10]		
Split Ratio	0.074***	0.077***	0.068***	0.056***	0.057***	0.053***
	(7.44)	(6.79)	(5.78)	(9.33)	(8.32)	(7.57)
ΔDividends		0.571	0.648*		0.064	0.070
		(1.56)	(1.77)		(0.30)	(0.34)
ΔEarnings		0.485***	0.514***		0.209***	0.235***
		(4.66)	(4.90)		(3.36)	(3.70)
Annual Report		0.039*	0.023		0.006	-0.000
		(1.66)	(0.93)		(0.43)	(-0.02)
LnSize			0.012			-0.008
			(1.55)			(-1.40)
LnBM			0.008			0.001
			(0.82)			(0.12)
Daily Return[-10, -1]			0.165***			0.067**
			(3.67)			(2.46)
Ret[-12, -2]			0.012			0.010*
			(1.51)			(1.83)
Firm Effect	Yes	Yes	Yes	Yes	Yes	Yes
Event Date Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.219	0.220	0.225	0.498	0.499	0.504
Observations	17237	15915	15367	17323	15996	15445

Table 9. Stock Splits and Analyst Forecast Revisions

This table reports the association between stock splits and analyst forecast for future performance. The dependent variable *Forecast Revision* is the revision of analyst consensus forecast of the earnings before and after the profit distribution announcement. *Split Dummy* equals one for firms conducting stock splits and zero otherwise. *Split Ratio* is the ratio of newly issued shares from stock splits as a fraction of the original number of shares outstanding. *ΔDividends* is the cash dividends change relative to the prior year deflated by prior year market capitalization. *ΔEarnings* is the seasonal earnings change deflated by prior year market capitalization. *LnSize* and *LnBM* are the natural logarithm of total market capitalization and book to market ratio, respectively. *Ret*[-12, -2] is the compounded 11 monthly returns over [-12, -2]. *LnCoverage* is natural logarithm of the number of analysts who issue analyst reports for the firm. *Earnings Volatility* is the standard deviation of past three years' earnings scaled by prior year market capitalization. The sample period is from 2004 to 2017, the numbers reported in parentheses are t statistics with standard errors clustered by stock and event date. ***, ** and * indicate statistical significance at 1%, 5% and 10%, respectively.

Forecast Revision	(1)	(2)	(3)	(4)	(5)	(6)
Split Dummy	0.003***	0.003***	0.002***			
	(4.38)	(3.72)	(3.14)			
Split Ratio				0.004***	0.003***	0.003***
				(4.07)	(3.27)	(3.27)
ΔDividends		0.211***	0.197***		0.210***	0.196***
		(5.46)	(5.13)		(5.44)	(5.11)
ΔEarnings		0.219***	0.198***		0.219***	0.199***
		(7.60)	(6.82)		(7.62)	(6.84)
LnSize			-0.006***			-0.006***
			(-7.32)			(-7.33)
LnBM			-0.008***			-0.008***
			(-6.25)			(-6.28)
Ret[-12, -2]			0.007***			0.007***
			(8.49)			(8.49)
LnCoverage			-0.001**			-0.001**
			(-2.44)			(-2.46)
Earnings Volatility			-0.032			-0.033
			(-0.88)			(-0.89)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.042	0.082	0.120	0.042	0.082	0.119
N	12346	12104	11542	12346	12104	11542

Table 10. Long-term Stock Performance When Splitting Firms Fall Short of Expectations

This table reports long-term stock performance of splitting and non-splitting firms when they fall short of investors' expectations. The dependent variables *BHAR*[1, 12] and *BHAR*[0, 12] are buy and hold abnormal returns relative to 25 size and book to market ratio independently sorted portfolio during the holding periods in the bracket, month 0 is the month when a firm announces its annual distribution proposal. *Split Dummy* equals one for firms conducting stock splits and zero otherwise. *Split Ratio* is the ratio of newly issued shares from stock splits as a fraction of the original number of shares outstanding. In each year for each analyst covered stock, we compute the difference between the next-year-realized net income and analysts' median forecast. We sort the difference into 4 quartiles and define a dummy variable *Underperform*, which equals 1 if a firm belongs to the lowest quartile. *ΔDividends* is the cash dividends change relative to the prior year deflated by prior year market capitalization. *ΔEarnings* is the seasonal earnings change deflated by prior year market capitalization. *LnSize* and *LnBM* are the natural logarithm of total market capitalization and book to market ratio, respectively. *Ret*[-12, -2] is the compounded 11 monthly returns over [-12, -2]. The Sample period is from 2004 to 2017, the numbers reported in parentheses are t statistics with standard errors clusted by stock and year. ***, ** and * indicate statistical significance at 1%, 5% and 10%, respectively.

Panel A	(1)	(2)	(3)	(4)	(5)	(6)
BHAR	[1, 12]	[1, 12]	[1, 12]	[0, 12]	[0, 12]	[0, 12]
[1] Split Dummy	-0.002	-0.003	0.012	0.046**	0.045**	0.063***
	(-0.09)	(-0.19)	(0.69)	(2.62)	(2.61)	(3.12)
Under Perform	-0.124***	-0.124***	-0.121***	-0.131***	-0.132***	-0.130***
	(-8.97)	(-9.16)	(-7.36)	(-8.98)	(-9.16)	(-7.21)
[2] Split Dummy × Underperform	-0.116***	-0.114***	-0.117***	-0.125***	-0.125***	-0.124***
	(-3.70)	(-3.68)	(-3.94)	(-3.52)	(-3.51)	(-3.70)
ΔDividends		0.034	0.749		0.377	1.221**
		(0.07)	(1.49)		(0.74)	(2.33)
ΔEarnings		-0.018	0.023		0.207	0.234
		(-0.08)	(0.11)		(1.06)	(1.37)
LnSize			-0.158***			-0.187***
			(-5.70)			(-5.19)
LnBM			0.175***			0.201***
			(4.07)			(4.48)
Ret[-12, -2]			-0.090***			-0.108***
			(-3.70)			(-3.68)
[1] + [2]	-0.118***	-0.118***	-0.104***	-0.079**	-0.080**	-0.060**
F-Test	(15.58)	(15.97)	(17.81)	(6.27)	(6.28)	(4.89)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.015	0.019	0.076	0.019	0.022	0.091
Observations	13426	13164	11497	13426	13164	11497

Panel B	(1)	(2)	(3)	(4)	(5)	(6)
BHAR	[1, 12]	[1, 12]	[1, 12]	[0, 12]	[0, 12]	[0, 12]
Split Ratio	-0.021	-0.028	-0.004	0.055	0.049	0.080*
	(-0.71)	(-0.95)	(-0.13)	(1.67)	(1.54)	(2.08)
Under Perform	-0.129***	-0.130***	-0.126***	-0.136***	-0.138***	-0.134***
	(-9.08)	(-9.16)	(-7.56)	(-8.69)	(-8.79)	(-7.17)
Split Ratio × Under Perform	-0.128*	-0.121*	-0.138**	-0.152**	-0.147*	-0.163**
	(-2.16)	(-2.07)	(-2.23)	(-2.20)	(-2.15)	(-2.29)
ΔDividends		0.060	0.765		0.368	1.195**
		(0.13)	(1.55)		(0.73)	(2.32)
ΔEarnings		-0.009	0.032		0.216	0.241
		(-0.04)	(0.15)		(1.12)	(1.44)
LnSize			-0.159***			-0.188***
			(-5.73)			(-5.24)
LnBM			0.175***			0.201***
			(4.05)			(4.44)
Ret[-12, -2]			-0.089***			-0.108***
			(-3.66)			(-3.70)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.015	0.019	0.076	0.019	0.022	0.091
Observations	13426	13164	11497	13426	13164	11497

Table 11. Investor Composition and Market Reactions to Stock Splits

This table reports the results of short-run market reaction to stock splits conditional on investor composition. The dependent variables (*CAR*[-1, 1] and *CAR*[-10, 1]) are cumulative abnormal returns over [-1, 1] and [-10, 1]. *Split Ratio* is the ratio of newly issued shares from stock splits as a fraction of the original number of shares outstanding. *Institutional Holdings* is the proportion of shares held by institutional investors. *ΔDividends* is the cash dividends change relative to the prior year deflated by prior year market capitalization. *ΔEarnings* is the seasonal earnings change deflated by prior year market capitalization. *Annual Report* is a dummy variable that equals one if the profit distribution proposal is disclosed together with the annual report and zero otherwise. *LnSize* and *LnBM* are the natural logarithm of total market capitalization and book to market ratio, respectively. *CAR*[-10, -2] is cumulative abnormal returns over [-10, -2]. *Ret*[-12, -2] is the compounded 11 monthly returns over [-12, -2]. The sample period is from 2001 to 2017, standard errors are clustered by stock and event date. ***, ** and * indicate statistical significance at 1%, 5% and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
CAR	[-1, -1]	[-10, 1]	[-1, -1]	[-10, 1]	[-1, 1]	[-10, 1]
Split Ratio	0.050***	0.081***	0.048***	0.082***	0.052***	0.084***
	(20.38)	(21.54)	(16.93)	(18.93)	(17.94)	(20.05)
Split Ratio × Institutional Holdings	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(-8.70)	(-5.91)	(-7.42)	(-5.23)	(-7.67)	(-5.59)
Institutional Holdings	0.000***	-0.000	0.000**	-0.000*	0.000***	0.000
	(2.67)	(-1.21)	(2.50)	(-1.83)	(3.67)	(0.67)
ΔDividends			0.061	0.236***	0.093**	0.277***
			(1.64)	(3.85)	(2.51)	(4.72)
ΔEarnings			0.024**	0.149***	0.040***	0.154***
			(2.13)	(7.30)	(3.51)	(7.01)
Annual Report			-0.009**	0.009	-0.010***	0.006
			(-2.57)	(1.37)	(-2.71)	(0.93)
LnSize					-0.004***	-0.011***
					(-5.44)	(-7.86)
LnBM					0.000	0.002
					(0.07)	(1.19)
CAR[-10, -2]					-0.071***	
					(-9.38)	
Ret[-12, -2]					-0.002**	0.001
					(-2.11)	(0.71)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Event Date Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.102	0.082	0.096	0.084	0.105	0.091
Observations	25601	25601	23709	23709	22989	22989

Table 12. Pre-split Share Prices and Market Reactions to Stock Splits

This table reports the results of the short-run market reaction to stock splits conditional on the pre-split stock price. The dependent variable (*CAR*[-1, 1] and *CAR*[-10, 1]) are cumulative abnormal returns over [-1, 1] and [-10, 1]. *Split Ratio* is the ratio of newly issued shares from stock splits as a fraction of the original number of shares outstanding. *LnPrice* is the natural logarithm of the stock's previous month closing price. *ΔDividends* is the cash dividends change relative to the prior year deflated by prior year market capitalization. *ΔEarnings* is the seasonal earnings change deflated by prior year market capitalization. *Annual Report* is a dummy variable that equals one if the profit distribution proposal is disclosed together with the annual report and zero otherwise. *LnSize* and *LnBM* are the natural logarithm of total market capitalization and book to market ratio, respectively. *CAR*[-10, -2] is cumulative abnormal returns over [-10, -2]. *Ret*[-12, -2] is the compounded 11 monthly returns over [-12, -2]. The sample period is from 1998 to 2017, standard errors are clustered by stock and event date. ***, ** and * indicate statistical significance at 1%, 5% and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
CAR	[-1, 1]	[-10, -1]	[-1, 1]	[-10, -1]	[-1, 1]	[-10, -1]
Split Ratio	0.130***	0.208***	0.131***	0.208***	0.140***	0.211***
	(15.06)	(17.70)	(13.38)	(14.96)	(14.45)	(15.09)
Split Ratio × LnPrice	-0.028***	-0.041***	-0.029***	-0.042***	-0.031***	-0.043***
	(-10.16)	(-11.06)	(-9.29)	(-9.38)	(-10.02)	(-9.55)
LnPrice	-0.010***	-0.018***	-0.010***	-0.020***	-0.012***	-0.020***
	(-9.81)	(-9.99)	(-8.81)	(-10.38)	(-9.35)	(-9.07)
ΔDividends			0.096***	0.297***	0.104***	0.295***
			(2.88)	(5.47)	(3.13)	(5.48)
ΔEarnings			0.038***	0.168***	0.054***	0.173***
			(3.57)	(8.49)	(4.77)	(8.00)
Annual Report			-0.005*	0.005	-0.005*	0.004
			(-1.76)	(0.91)	(-1.78)	(0.70)
LnSize					-0.001	-0.006***
					(-1.11)	(-4.53)
LnBM					-0.004***	-0.005***
					(-4.63)	(-2.85)
CAR[-10, -2]					-0.077***	
					(-10.10)	
Ret[-12, -2]					-0.001	0.002
					(-0.67)	(1.41)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Event Date Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.105	0.097	0.100	0.099	0.111	0.101
Observations	28109	28109	25750	25750	25130	25130

Table 13. Control for Other Potential Channels

This table reports regression analyses of short-run market reaction to stock splits with different share splitting ratio. The dependent variable (*CAR*[-1, 1*]* and *CAR*[-10, 1]) are cumulative abnormal returns over [-1, 1] and [-10, 1]. *Split Ratio* is the ratio of newly issued shares from stock splits as a fraction of the original number of shares outstanding. *Split from Retained Earnings* and *Split from Capital Surplus* are the ratio of newly issued shares funded by retained earnings and capital surplus as a fraction of the original number of shares outstanding, respectively. *ΔDividends* is the cash dividends change relative to the prior year deflated by prior year market capitalization. *ΔEarnings* is the seasonal earnings change deflated by prior year market capitalization. *Annual Report* is a dummy variable that equals one if the profit distribution proposal is disclosed together with the annual report and zero otherwise. *LnSize* and *LnBM* are the natural logarithm of total market capitalization and book to market ratio, respectively. *CAR*[-10, -2] is cumulative abnormal returns over [-10, -2]. *Ret*[-12, -2] is the compounded 11 monthly returns over [-12, -2]. *ΔIlliquidity* is the difference of averaged post-ex-day [10, 70] and pre-announcement [-70, -10] Amihud(2002) illiquidity measure. *ΔTurnover* is the difference of averaged post-ex-day [10, 70] and pre-announcement [-70, -10] daily turnover ratio. *ΔVolatility* is the difference of averaged post-ex-day [10, 70] and pre-announcement [-70, -10] return volatility. *ΔCoverage* is the change of analyst coverage before and after stock splits. *ΔShareholder* is the change of shareholder number before stock splits announcement and after stock splits implementation. The sample period in column (1) and (2) is from 2009 to 2017, in column (3)~(5) is from 2003 to 2017, the numbers reported in parentheses are t-statistics with standard errors clustered by stock and event date. ***, ** and * indicate statistical significance at 1%, 5% and 10%, respectively.

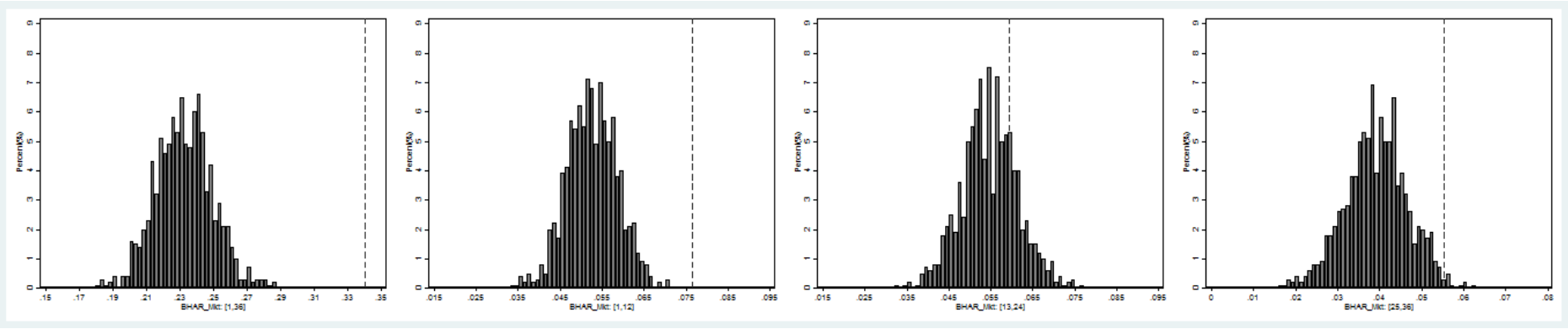
	(1)	(2)	(3)	(4)	(5)	(6)
CAR	[-1, 1]	[-1, 1]	[-1, 1]	[-1, 1]	[-1, 1]	[-1, 1]
Split Ratio		0.040***	0.041***	0.037***	0.037***	
		(18.74)	(19.11)	(15.96)	(15.67)	
Split from Retained Earnings	0.049***					0.045***
	(9.63)					(7.53)
Split from Capital Surplus	0.040***					0.036***
	(17.14)					(14.16)
ΔDividends	0.100***	0.104***	0.101***	0.088**	0.085**	0.085**
	(2.98)	(3.12)	(3.03)	(2.24)	(2.15)	(2.16)
ΔEarnings	0.054***	0.052***	0.053***	0.036***	0.033***	0.033***
	(4.64)	(4.50)	(4.62)	(3.00)	(2.79)	(2.79)
Annual Report	-0.006**	-0.006**	-0.006**	-0.012***	-0.012***	-0.012***
	(-2.03)	(-2.03)	(-1.98)	(-2.90)	(-2.87)	(-2.94)
LnSize	-0.004***	-0.004***	-0.004***	-0.005***	-0.005***	-0.005***
	(-5.16)	(-4.76)	(-4.93)	(-5.67)	(-5.03)	(-5.09)
LnBM	0.001	0.000	0.001	-0.000	-0.000	-0.000
	(0.84)	(0.44)	(0.72)	(-0.26)	(-0.38)	(-0.34)
CAR[-10, -2]	-0.074***	-0.076***	-0.074***	-0.071***	-0.074***	-0.074***
	(-9.60)	(-9.88)	(-9.65)	(-8.94)	(-9.22)	(-9.23)
Ret[-12, -2]	-0.003***	-0.002**	-0.002**	-0.003**	-0.003**	-0.003**
	(-2.68)	(-1.98)	(-2.20)	(-2.31)	(-2.10)	(-2.11)
ΔIlliquidity		-0.888***			-1.011***	-1.010***
		(-4.91)			(-4.38)	(-4.38)
ΔTurnover		0.137***			0.132***	0.132***
		(4.90)			(3.76)	(3.75)
ΔVolatility			0.101**		-0.019	-0.019

			(2.20)		(-0.31)	(-0.32)
ΔCoverage					1.023***	1.026***
					(3.21)	(3.22)
ΔShareholder				0.005***	0.458***	0.454***
				(4.08)	(3.48)	(3.45)
Firm Fixed Effects		Yes	Yes	Yes	Yes	Yes
Event Date Fixed Effects		Yes	Yes	Yes	Yes	Yes
R^2	0.098	0.102	0.099	0.104	0.107	0.107
Observations	25193	25189	25188	20133	20132	20132

Figure D1. The Empirical Distribution of BHAR

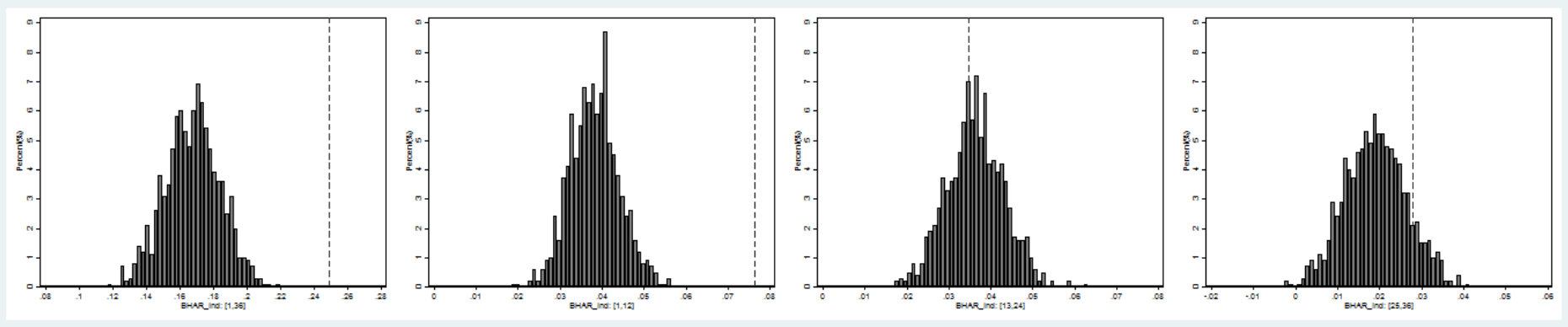
This figure plots the empirical distribution of the mean buy-and-hold abnormal returns (BHAR) for stock splits. For each splitting stock, we randomly select a non-splitting stock in the same year-month and the same benchmark portfolio, and form a pseudo portfolio using only the non-splitting stocks and calculate the BHAR for the pseudo portfolio. We repeat the above procedure for 1,000 times and obtain the empirical distribution of the BHARs under the null assumption of zero abnormal returns. Each event stock and its associated pseudo stock enter into the portfolio s months after the split announcement month and held for τ months. The holding periods are [1, 36], [1, 12], [12, 24] and [25, 36], respectively. We use value-weighted market portfolio as benchmark in Panel A, value-weighted industry portfolio as benchmark in Panel B, and value-weighted 25 size and book-to-market ratio independently sorted portfolio as benchmark in Panel C, and report the corresponding empirical distributions. The dashed line demonstrate the realized BHAR for share splitting stocks.

Panel A. BHAR with Market Portfolio as the Benchmark



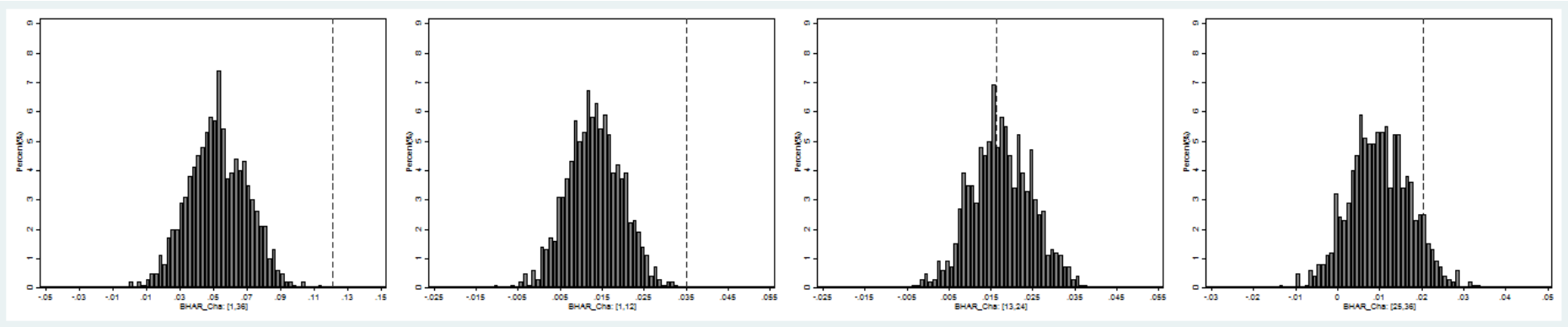
BHAR[1, 36] BHAR[1, 12] BHAR[13, 24] BHAR[25, 36]

Panel B. BHAR with Industry Portfolios as the Benchmark



BHAR[1, 36] BHAR[1, 12] BHAR[13, 24] BHAR[25, 36]

Panel C. BHAR with 25 Size and B/M Sorted Portfolios as the Benchmark



BHAR[1, 36] BHAR[1, 12] BHAR[13, 24]

Table D1. Short-term Market Reaction to Stock Splits with Different Split Ratio: Alternative Model Specification

This table reports regression analyses of short-run market reaction to stock splits with different share splitting ratio employing alternative model specifications. The dependent variables (*CAR*[-1, 1] and *CAR*[-10, 1]) are cumulative abnormal returns over [-1, 1] and [-10, 1]. *Split Ratio* is the ratio of newly issued shares from stock splits as a fraction of the original number of shares outstanding. *ΔDividends* is the cash dividends change relative to the prior year deflated by prior year market capitalization. *ΔEarnings* is the seasonal earnings change deflated by prior year market capitalization. *Annual Report* is a dummy variable that equals one if the profit distribution proposal is disclosed together with the annual report and zero otherwise. *LnSize* and *LnBM* are the natural logarithm of total market capitalization and the book-to-market ratio, respectively. *CAR*[-10, -2] is cumulative abnormal returns over [-10, -2]. *Ret*[-12, -2] is the compounded 11 monthly returns over [-12, -2]. In Column (1) and (2) we employ OLS regression with firm and event date fixed effects, with firm and event date clustered standard error on a PSM matched sample. In each year, we find a non-splitting firm that has similar observable characteristics to the splitting firm. These characteristics include *LnSize*, *LnBM*, *LnPrice* (the natural logarithm of closing price), *ΔEarnings*, *ΔDividends*, *Split Capacity* (capital surplus plus retained earnings per share, which determines the maximal split ratio), *ROA* (return on asset), *Age* (number of years a firm has been listed) and industry affiliations (22 industries based on the China Securities Regulatory Commission industry classification). In Column (3) and (4) we employ the Fama & Macbeth (1973) regression by running cross-sectional regressions with industry fixed effects year by year and report the time-series average of regression coefficients and the corresponding sample t statistics. In Column (5) and (6) we employ OLS regression with year and industry fixed effects, with robust standard errors but only use the splitting firms. The sample period is from 1998 to 2017, the numbers reported in parentheses are t statistic. ***, ** and * indicate statistical significance at 1%, 5% and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	PSM Sample		Fama-Macbeth		Splitting Firm	
CAR	[-1, 1]	[-10, 1]	[-1, 1]	[-10, 1]	[-1, 1]	[-10, 1]
Split Ratio	0.044***	0.077***	0.052***	0.105***	0.046***	0.088***
	(15.64)	(19.02)	(13.51)	(11.28)	(12.98)	(18.37)
ΔDividends	0.137*	0.323***	0.158***	0.371***	0.127	0.328**
	(1.84)	(2.67)	(4.08)	(5.22)	(1.37)	(2.45)
ΔEarnings	0.107**	0.223***	0.141***	0.316***	0.107*	0.298***
	(2.55)	(3.24)	(3.32)	(4.78)	(1.85)	(3.27)
Annual Report	-0.007	0.006	-0.011**	-0.008	-0.010***	-0.001
	(-1.51)	(0.68)	(-2.62)	(-1.23)	(-3.37)	(-0.22)
LnSize	-0.006***	-0.013***	-0.000	-0.002	-0.005***	-0.008***
	(-3.38)	(-4.34)	(-0.23)	(-1.22)	(-4.67)	(-4.76)
LnBM	-0.001	0.003	-0.001	-0.000	0.002	0.001
	(-0.43)	(0.62)	(-1.08)	(-0.34)	(0.76)	(0.28)
CAR[-10, -2]	-0.087***		-0.090***		-0.137***	
	(-6.14)		(-8.31)		(-8.89)	
Ret[-12, -2]	-0.002	0.002	-0.002**	-0.002	-0.005**	-0.008***
	(-0.81)	(0.46)	(-2.27)	(-0.56)	(-2.48)	(-2.67)
Firm Effect					Yes	Yes
Industry Effect	Yes	Yes	Yes	Yes		
Event Date Effect					Yes	Yes
Year Effect	Yes	Yes	Yes	Yes		
R^2	0.169	0.150	0.106	0.140	0.124	0.146
Observations	7382	7382	25635	25635	4129	4129

Table D2. Long-run Stock Performance Following Stock Splits

Panel A. Buy-and-Hold Abnormal Return (BHAR) Approach

This table reports the long-run performance of splitting stocks using the buy-and-hold abnormal return (BHAR) approach. We calculate the BHAR as the buy-and-hold cumulative returns of splitting stock minus that of a benchmark portfolio. To obtain the empirical distribution of BHAR, we randomly select a non-splitting stock in the same year-month and in the same benchmark portfolio as the splitting stock, and form a pseudo portfolio using the non-splitting stocks and calculate the BHAR for the pseudo portfolio. We repeat the above procedure for 1,000 times and obtain the empirical distribution of the BHAR under the null assumption of zero abnormal return. Each event stock and its corresponding pseudo stock are bought s months after the split announcement month and held for τ months. The holding periods are [1, 36], [1, 12], [12, 24] and [25, 36], respectively. y_h and y_l are the 95th and the 5th percentile value derived from the empirical distribution, p is the fraction of BHARs in the empirical distribution that are larger in magnitude than the BHAR of the splitting sample. The three columns MKT, IND, and CHA represent different benchmark portfolios, corresponding to the value-weighted market portfolio, value-weighted industry portfolio, and value-weighted size and book-to-market ratio independently double-sorted portfolio, respectively.

Holding Period [s, s+τ]	Statistics	MKT	IND	CHA
[1, 36]	BHAR	34.30%	24.87%	12.11%
	y_h	26.04%	19.38%	8.22%
	y_l	20.53%	14.02%	2.44%
	p	0	0	0
[1,12]	BHAR	7.64%	5.81%	3.52%
	y_h	6.27%	4.81%	2.40%
	y_l	4.32%	2.90%	0.26%
	p	0	0	0
[13, 24]	BHAR	5.95%	3.46%	1.62%
	y_h	6.63%	4.78%	2.84%
	y_l	4.40%	2.52%	0.61%
	p	0.24	0.62	0.57
[25, 36]	BHAR	5.54%	2.80%	2.05%
	y_h	5.17%	3.16%	2.27%
	y_l	2.71%	0.76%	-0.30%
	p	0.01	0.12	0.08

Panel B. Calendar-Time Portfolio Approach

This table reports the long-run performance of splitting stocks using the calendar-time portfolio approach. In each month, we select all the stocks announcing split in the previous [1, 36] months, [1, 12] months, [13, 24] months or [25, 36] months according to the holding period in brackets. Column (1) report the time-series average excess return. Columns (2) to (6) report portfolio alphas estimated from time-series regression of excess returns on the market factor, the Fama and French (1993) 3 factors, the Carhart (1997) 4 factors, the Fama and French (2015) 5 factors and the Liu, Stambaugh and Yuan (2018) Chinese 3 factors, respectively. The upper part of Panel B reports the results for the equal-weighted portfolio and the bottom part reports the results for the value-weighted portfolio. The numbers reported in parentheses are t statistics, ***, ** and * indicate statistical significance at 1%, 5% and, 10%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Holding Period [s, s+τ]	ER	CAPM	FF-3	Carhart-4	FF-5	CH-3
Equal Weighted Stock Split Portfolio						
[1, 36]	0.015**	0.006**	0.002*	0.001	0.001	0.004***
	(2.31)	(2.44)	(1.71)	(1.44)	(0.53)	(3.39)
[1, 12]	0.015**	0.006**	0.003**	0.003*	0.001	0.004**
	(2.36)	(2.44)	(2.07)	(1.74)	(0.73)	(2.03)
[13, 24]	0.014**	0.005**	0.001	0.001	0.000	0.004***
	(2.25)	(2.25)	(1.31)	(0.94)	(0.25)	(2.92)
[25, 36]	0.015**	0.006**	0.002	0.002	0.001	0.004***
	(2.30)	(2.44)	(1.60)	(1.50)	(1.19)	(4.06)
Value Weighted Stock Split Portfolio						
[1, 36]	0.010*	0.002	0.002***	0.001	0.001*	0.002**
	(1.75)	(1.63)	(2.84)	(1.44)	(1.89)	(2.03)
[1, 12]	0.011*	0.002*	0.004***	0.003*	0.003**	0.002
	(1.85)	(1.66)	(3.37)	(1.74)	(2.21)	(1.41)
[13, 24]	0.008	0.000	0.001	0.001	-0.000	0.002
	(1.52)	(0.28)	(0.83)	(0.94)	(-0.11)	(1.16)
[25, 36]	0.010*	0.001	0.003**	0.002	0.002**	0.003*
	(1.71)	(1.12)	(2.35)	(1.50)	(2.12)	(1.67)