

Catering Through Nominal Share Prices*

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Abstract

We propose and test a catering theory of nominal stock prices. The theory predicts that when investors place higher valuations on low-price firms, managers respond by supplying shares at lower price levels, and vice-versa. We confirm these predictions in time-series and firm-level data using several measures of time-varying catering incentives. More generally, the results provide unusually clean evidence that catering influences corporate decisions, because the process of targeting nominal share prices is not well explained by alternative theories.

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Abstract

We propose and test a catering theory of nominal stock prices. The theory predicts that when investors place higher valuations on low-price firms, managers respond by supplying shares at lower price levels, and vice-versa. We confirm these predictions in time-series and firm-level data using several measures of time-varying catering incentives. More generally, the results provide unusually clean evidence that catering influences corporate decisions, because the process of targeting nominal share prices is not well explained by alternative theories.

In frictionless and efficient stock markets, there is no optimal nominal (per-share) stock price. A firm's board of directors may choose to split to manage the nominal share price and number of shares outstanding but cannot change its overall market value through these means. Yet boards typically do manage their firm's nominal share price, rather than watch it passively drift with returns. Theories offered to explain share price management include that trading costs depend on nominal prices (Dolley (1933), Angel (1997)), that splits signal inside information (Brennan and Copeland (1988), Asquith, Healy, and Palepu (1989), and Ikenberry, Rankine, and Stice (1996)), or that prices in certain ranges simply constitute a market norm (Benartzi, Michaely, Thaler, and Weld (2007)).¹

In this paper, we propose a catering theory of nominal share prices. We define catering as the managerial behavior of increasing the supply of a characteristic that investors appear to be paying a premium for, even though that characteristic does not increase fundamental value. The catering theory of nominal share prices thus posits that the supply of securities of different price ranges is partly a response to investor demand for securities of different price ranges. In other words, managers increase the supply of low-priced securities when investors are paying a premium for them. Empirically, this theory predicts that splits will be more frequent, and to lower prices, when the valuations of low-priced firms are attractive relative to those of high-priced firms.

To explain managerial behavior, the catering theory requires only that managers *believe* that nominal prices matter to investors. While the majority of managers subscribe to this belief (Baker and Gallagher (1980)), the theory gains further motivation from evidence that, contrary to efficient markets, return characteristics actually are affected by nominal price. Green and Hwang

¹ See also Rozeff (1998) who suggests that one reason mutual funds split because it is costly to deviate from a "conventional" price.

(2007) find that stocks that split experience sudden increases in their comovement with lower-priced stocks. Ohlson and Penman (1985) find that stocks that split experience large increases in volatility; thus, as splitting stocks comove more with low-price, generally smaller-cap stocks, they inherit their higher volatility as well. Lakonishok, Shleifer, and Vishny (1992) and Gompers and Metrick (2001) show that individual investors hold lower-price stocks than institutions, suggesting a segmented market, and Schultz (2000) shows that the number of small shareholders increases following a split. Black (1986) also views low-price stocks as subject to greater noise trading. Investors thus appear to categorize stocks in part based on price, and this affects returns, much as the addition or deletion of a stock from an index affects returns in Barberis, Shleifer, and Wurgler (2005), Greenwood (2007a), and Greenwood and Sosner (2007).

An example introduces our main ideas. Figure 1 plots the share price of Applied Materials, Inc. from 1980 through 2004. Applied Materials enjoyed success in this period and split its shares nine times. However, far from maintaining a constant share price, the company split to nine different prices, ranging from \$15 all the way to \$88, through both 2-for-1 and 3-for-2 splits. Catering predicts splits to lower prices when lower-priced shares are in favor. Consistent with this prediction, the figure illustrates a close connection between the post-split share price and a relative valuation measure that we refer to as the “low-price premium,” the log difference between the average market-to-book ratio of low-nominal-price firms and that of high-nominal-price firms. In the figure, the series is inverted so that higher values suggest an investor preference for higher-priced stocks. Simply put, the figure shows that when low-priced stocks enjoyed relatively high valuations, Applied Materials maintained a lower share price, and when high-priced stocks enjoyed high valuations, the company maintained a higher share price.

In our empirical work, we use three time series proxies for catering incentives with annual data from 1963 through 2006. We just introduced the low-price premium. There is a strong cross-sectional relationship between size and share price, as in Dyl and Elliott (2006) and Benartzi et al. (2007), suggesting the possibility that catering-minded splitters may be trying to portray themselves not as low-priced firms *per se* but rather as small-cap firms. We therefore construct a “small-cap premium” as the average market-to-book ratio on small-cap firms relative to the average market-to-book ratio on large-cap firms. As a third measure of the time-varying incentive to reduce prices, we use the average announcement effect of recent splits. Greenwood (2007b) finds that high announcement effects for Japanese splitters are associated with more splits and higher split ratios in subsequent quarters. Both results are consistent with catering.

A simple accounting framework for nominal share prices suggests examining four components of publicly traded firms’ “price management” decisions. These include the initial price chosen at the IPO; the binary decision to split in a given period; the price chosen by splitters; and, summarizing the combined effect of the latter two decisions, the average change in price due to price management in a given period.² Using both time-series and firm-level data, we examine how each of these components of price management is affected by catering incentives.

We find strong empirical support for the catering predictions. In terms of univariate time series regressions, our proxies for catering incentives explain up to 30% of the annual variation in the frequency of stock splits, with more firms splitting when low-priced or small-cap firms have higher valuations. The average net change in price across firms, including the net effect of all splits, stock dividends, and reverse splits, is also lower when investors favor lower-priced

² To be clear, Benartzi et al. (2007) emphasize that stock prices are quite stable relative to the extreme benchmark of no price management. However, relative to the other extreme benchmark of constant nominal price levels, prices are quite variable over time. The average prices selected by stocks that split, the average prices selected by IPOs, and average nominal stock prices in general have varied by a factor of two to three over the last few decades. We address this variation.

firms. Of course, prices are ultimately what we seek to explain. Catering incentives explain up to 75% of the time variation in (log) initial public offering offer prices and 78% of the time variation in (log) first-day closing prices, with firms going public at higher prices when catering incentives point in that direction. Perhaps most broadly, catering proxies also explain up to 52% of the time variation in (log) post-split prices chosen by splitters. It seems unlikely that theories based on transaction costs or asymmetric information could achieve comparable explanatory power. The effects are robust to controlling for overall average prices and recent returns, which are other determinants of splits.

We consider several robustness tests for the regressions involving post-split prices, such as subsample splits, time trends, difference specifications, and so forth, with little qualitative change in the results. One interesting finding that emerges is that catering incentives affect post-split prices only for larger firms. That is, the post-split price results reflect large firms trying to “act small” at opportune times, not small firms acting large. However, the results for IPO prices involve smaller, younger firms, so in that sense firms respond to catering concerns at multiple points in their life cycle. We also conduct robustness tests using firm-level data. This controls for changes in the composition of firms that might confound aggregate time-series tests. We find that proxies for catering incentives have incremental explanatory power for the various components of price management when examined at the firm level, after controlling for firm- and industry-level characteristics.

Our final tests involve future stock returns. As noted above, it is not required that share prices be inefficient in order for catering to explain managerial behavior. Managers may cater in vain to an efficient market, not understanding that the valuations of low- and high-priced stocks differ for fundamental reasons. Nonetheless, we treat subsequent stock returns as proxies for the

correction of ex ante mispricing and ask whether observed split patterns are consistent with the successful pursuit of misvaluation. Perhaps surprisingly, given our relatively short time series, the evidence is consistent with this view. High split frequencies and low post-split prices portend lower future returns on small stocks versus large stocks and on low-priced stocks versus high-priced stocks.

In summary, nominal share prices are influenced by catering incentives: There is a supply response to demand shifts. One question that the results raise, and that we leave to future work, is *why* nominal share prices matter to investors. Institutional trading frictions may play a role. The psychology of stock price levels is unexplored. Bernartzi et al (2007) suggest that stock prices constitute a norm. Perhaps some investors suffer from a nominal illusion in which they perceive that a stock is cheaper after a split, has more “room to grow” (\$10 is farther from infinity than \$25 is), or has “less to lose” (\$10 is closer to zero than \$25 is). Alternatively, perhaps they naively equate low nominal prices with small capitalization. Given the strong cross-sectional correlation between price and capitalization, and the fact that for individual investors it is a bit harder to obtain capitalization data than a price quote, this is not an entirely unreasonable heuristic. And, managers of large caps may be able to exploit it. More generally, investors may categorize stocks according to price, so that a change in price can potentially lead to an increase in attention or investor recognition in the sense of Merton (1987). Or, equivalently, clienteles with a particular focus in terms of stock price shift in importance over time.³ Whatever the mechanism, our particular results suggest time variation. Occasionally, investors as a group shift focus to different price categories, and professional arbitrageurs are unable to fully accommodate

³ Odean (1999), Hirshleifer and Teoh (2002), and Barber and Odean (2007) emphasize that individual investors as a group limit their search for stocks to those that catch their attention. Nominal prices and splits may play a role in attracting individual investor attention, and thus stimulating demand.

these demands, leaving room for firms to fill the gap as well.⁴ In some respects, firms are well-positioned to engage in this type of arbitrage.⁵

The results serve two main purposes. First, they support a new theory of why firms split, and in doing so they add nominal share prices to a list of managerial decisions that may be shaped by catering influences.⁶ Baker and Wurgler (2004a,b) and Li and Lie (2006) consider catering via dividend policy. Cooper, Dimitrov and Rau (2001) and Cooper, Korana, Osobov, Patel, and Rau (2004) find that corporate names, e.g. “Pets.com” versus “Pets, Inc.,” can be shaped by catering considerations. Greenwood (2007b) finds that firms in Japan are more likely to split following a period when other splits have generated high announcement returns.⁷ Polk and Sapienza (2006) suggest that corporate investment decisions are shaped by catering considerations; Aghion and Stein (2006) view them as an influence on the strategic decision to cut costs or maximize sales growth; and Baker, Ruback, and Wurgler (2007) suggest that time-varying investor preferences for the conglomerate form may help to explain the rise and subsequent dismantling of conglomerates. Second, nominal share prices and stock splits offer a cleaner test of catering than many of these settings because they are not associated with any “real” motivation involving firm fundamentals.

⁴ See Bikhchandani, Hirshleifer, and Welch (1992) for a model of fads and customs.

⁵ Baker, Ruback, and Wurgler (2007) describe the case of an overpriced firm taking advantage by issuing equity. If the equity subsequently appreciates, investors are unlikely to complain. A hedge fund that shorts the overpriced firm is in a far worse position. Analogously, a firm that splits because it perceives low-nominal price firms to be overvalued is not going to be criticized by its investors if the low-price premium subsequently widens, but a hedge fund that shorts low-priced firms will suffer obvious losses. Greenwood, Hanson, and Stein (2008) argue that compared with hedge funds, firms are better suited to accommodating supply and demand shocks.

⁶ Somewhat related, Hong, Wang, and Yu (2007) suggest that firms can directly influence the supply and demand conditions in their own securities by repurchasing shares.

⁷ The mechanism in Greenwood’s paper is different from what we study here. In Greenwood’s paper, a split generates investor demand (or short covering) not through its effect on nominal prices but through its effect on the quantity of tradeable shares. This is not catering, in the sense of providing a greater supply of securities that are in demand. However, the pattern that time-varying announcement effects produce a corporate response is similar.

The paper proceeds as follows. Section I outlines the methodology and main hypotheses. Section II shows time-series tests. Section III offers firm-level tests. Section IV examines return predictability. Section V concludes.

I. Methodology

Stock prices change passively with stock returns and actively through price management. Price management has a few components. We start by introducing a general accounting framework for price management and then describe the main hypotheses involving catering.

A. Accounting for share prices

Stock prices are initially set at the IPO. Subsequently, active price setting happens through the choice of how often to split and at what ratio. Ignoring dividends for the moment, stock prices are determined as follows. Prices P typically grow by the stock return R . The manager of firm i can lower or raise the end of period price by choosing to split the stock:

$$P_{i,t} = P_{i,t-1} \cdot (1 + R_{i,t}) \cdot (1 + S_{i,t} \cdot N_{i,t}) \quad (1)$$

where S is an indicator variable, equal to one if the manager decides to split the stock, and N is the inverse of the split ratio minus one. For example, in a typical 2-for-1 stock split, N (and hence SN) is equal to -0.5; in a 100-for-1 split, N (and SN) equals -0.99. We can express this in logs as follows:

$$p_{i,t} = p_{i,t-1} + r_{i,t} + \log(1 + S_{i,t} \cdot N_{i,t}) \equiv p_{i,t-1} + r_{i,t} + m_{i,t} \approx p_{i,t-1} + r_{i,t} + s_{i,t}n \quad (2)$$

where p is the log price, r is the log total return, and m is the net effect of splitting activity between time t and $t+1$. If the split ratio, and therefore N , does not vary over time – this is approximately the case empirically – then s is simply an indicator variable for splits and n is a constant, equal to the log of $1+N$, and the approximation in equation (2) is exact.

In addition to the explicit effect of splitting through s and n , the manager is implicitly controlling p through splitting decisions in prior periods. In that spirit, we can substitute for $p_{i,t-1}$:

$$p_{i,t} \approx \sum_{k=0}^{T_i} r_{i,t-k} + s_{i,t-k}n + p_{i,IPO} \quad (3)$$

where T is the number of periods since firm i 's initial public offering.

Dividend policy can be treated in one of two ways. It can be lumped into active price selection by using total returns in the equations above or it can be taken as exogenous by using only the capital gains portion of returns in the equations above. We take the latter approach, focusing on the role of splits.

Our focus in the empirical tests is on the aggregate determinants \mathbf{x} and, to a lesser extent, the firm level determinants \mathbf{w} of active price selection. We take returns as given and examine the determinants of p_{IPO} , s and m in the following four specifications. In each case, we look at firm level and market wide data. The initial measure of price selection is the IPO price:

$$p_{i,IPO} = f(\mathbf{w}_{i,IPO}, \mathbf{x}_{t-1}) + u_{i,IPO} \text{ or, at the market level, } p_{t,IPO} = f(\mathbf{x}_{t-1}) + u_t \quad (4)$$

The narrowest measure of price selection following the IPO is simply the indicator variable s :

$$s_{i,t} = f(\mathbf{w}_{i,t-1}, \mathbf{x}_{t-1}) + u_{i,t} \text{ or } s_t = f(\mathbf{x}_{t-1}) + u_t \quad (5)$$

We then expand this to include the combined effect of s and n :

$$m_{i,t} = p_{i,t} - p_{i,t-1} - r_{i,t} = f(\mathbf{w}_{i,t-1}, \mathbf{x}_{t-1}) + u_{i,t} \text{ or } m_t = f(\mathbf{x}_{t-1}) + u_t \quad (6)$$

The broadest measure of price selection is the price level itself:

$$p_{i,t} = f\left(\sum_{k=0}^{T_i} r_{i,t-k}, \mathbf{w}_{i,t-1}, \mathbf{x}_{t-1}\right) + u_{i,t} \text{ or } p_t = f\left(\sum_{k=0}^T r_{t-k}, \mathbf{x}_{t-1}\right) + u_t \quad (7)$$

For the IPO price, we of course focus on firms that have just listed. For the price level, we focus in similar spirit on firms that have split in period t . These firms have made an active decision within period t and so the price reflects an explicit choice, rather than simply managerial inertia.

We also include past returns and price levels in these specifications. For tests of the frequency of splits and their combined effect on prices, on the other hand, we include all listed firms.

B. Main hypotheses

When estimating these four equations we are particularly interested in the effect of elements of \mathbf{x} that proxy for catering incentives. In particular, when the relative valuations of low-priced or small-cap firms are high, relative to other firms, catering implies that prices in (4) and (7) will be lower, all else equal. With respect to equations (5) and (6), we hypothesize that when the relative valuations of low-priced or small-cap firms are high, relative to other firms, splits will be more common and lead, on average, to greater reductions in share prices.

The last hypothesis we test is complementary but somewhat distinct. We consider future returns on low-priced and small-cap firms (relative to other firms) as a dependent variable, putting split frequency s and post-split prices p on the right-hand side as predictors. The idea is that if mispricing indeed causes splits toward a particular price range, we may observe return predictability on stocks in that price range as their mispricing subsequently corrects.

II. Time-series tests

We begin with time-series tests involving average or aggregate measures of active nominal price management such as average post-split stock prices, average prices chosen by newly-public firms, and aggregate split frequencies of listed firms. This is a natural level of analysis because our proxies for catering incentives are purely time-series measures.

A. Data on splitting activity and post-split prices

We track stock splits and post-split prices for all shares on CRSP between 1963 through 2006 that have share codes of 10 or 11. Stock splits are events with a CRSP distribution code of

5523. We distinguish between three types of splits. Regular splits are defined as events having a split ratio of greater than 1.25-for-1. Stock dividends have split ratios between 1.01-for-1 and 1.25-for-1. Reverse splits have split ratios less than 1-for-1.

The first several columns of Table 1 report the total number of splits, the average pre-split price, the average post-split price for splitters, and the aggregate effect of price management (which we label m). The pre-split price is the closing price on the day prior to the split. The post-split price is the pre-split price divided by the split ratio. The broader measure of splitting activity m measures the average active management of price over the course of the year. It is the average across all listed firms of the log difference between the actual stock price and the beginning of year stock price grown at the stock return excluding dividends. For example, in 1963, the average is -4.00%, meaning that the average firm reduced its price by 4% through splitting activity. The last two columns show the average first-day and offering prices for IPOs. We thank Jay Ritter for providing IPO dates and offer prices; the first-day prices are from CRSP. Note that the Penny Stock Reform Act of 1990 placed restrictions on IPOs that were priced below \$5, which is at least one reason why we see average IPO prices never dropping below \$11 after 1990.

A salient feature of Table 1 is that the fraction of firms that splits varies considerably over time. In 1970, for example, 46 regular splits were conducted, or fewer than two percent of listed firms, while in 1983, 780 regular splits were conducted, or well over ten percent of listed firms. (A detail here is that Table 1 counts the number of splits, not the number of firms that split. However, it is rare for a firm to split more than once in a year, so the number of splits is close to the number of firms that split.) The broader measure of price management also varies over time, from a maximum reduction in price of 8.69% in 1981 to an increase in price of 0.32%

in 2001.⁸ To some extent these series are driven by returns. When past returns are high, managers tend to move prices down toward their historical trading range, consistent with the norms theory of Benartzi et al. (2007).

The “target” prices to which splitters split and the prices at which newly public firms choose to list vary greatly over time. Shedding light on these target prices is our primary goal. At the height of the Internet bubble, the average post-split price approached \$50 per share, whereas in earlier years it had been as low as \$18. Average IPO prices follow a similar pattern to average post-split prices, at lower levels. The time-series correlation between the average post-split price and the first-day IPO price is 0.92. The correlation between the average post-split price and the offering IPO price is slightly lower at 0.70. The average post-split price is, not surprisingly, positively correlated with the average pre-split price, although of course firms can decide both when they want to split and, by manipulating the split ratio, the exact price they split to.

Finally, Table 1 shows that reverse splits are quite rare for much of the sample, and the pre- and post-split prices suggest that when they do occur they reflect an effort to satisfy exchange listing requirements. Kim, Klein, and Rosenfeld (2008) note that reverse splitters are a special set of firms in terms of their poor operating performance and high short sales constraints. For these reasons we give more attention to regular splits and stock dividends in the analysis.

B. Data on catering incentives

Next we form proxies for catering incentives. These are the aggregate determinants of price management x of most interest to us. Baker and Wurgler (2004a,b) construct a dividend premium variable based on the difference between the average valuation ratios of dividend

⁸ During this time, there were numerous reverse splits by stocks that were in danger of being deleted from Nasdaq for failure to meet the \$1 minimum price requirement.

payers and nonpayers. Similarly, we construct variables intended to capture any small-cap premia and low-nominal-price premia that may emerge in market prices.

For starters, Figure 2A plots share price breakpoints for low- and high-priced shares. Low-priced stocks are taken to be those with per-share prices below the 30th percentile of New York Stock Exchange common stocks. High-priced stocks are those with per-share prices above the 70th percentile. Average share prices for high-priced stocks have varied over time from a high near \$50 per share in the late 1960s to a low below \$20 per share in the early 1970s. Figure 2B plots average share prices for large-cap and small-cap firms.⁹ Small caps are defined as those with capitalizations below the 30th percentile of NYSE common stocks and large caps have capitalizations above the 70th percentile. As noted by prior authors, for example, Benartzi et al. (2007), capitalization and share prices have a very strong cross-sectional relationship, with smaller stocks typically having lower share prices.

These fluctuating share prices are associated with fluctuating valuation ratios. Figure 3A plots the average market-to-book ratios of low- and high-price stocks. Market equity is end of year stock price times shares outstanding (Compustat item 24 times item 25). Book equity is stockholders' equity (216) [or first available of common equity (60) plus preferred stock par value (130) or book assets (6) minus liabilities (181)] minus preferred stock liquidating value (10) [or first available of redemption value (56) or par value (130)] plus balance sheet deferred taxes and investment tax credit (35) if available and minus post retirement assets (330) if available. The market-to-book ratio is then book assets minus book equity plus market equity all divided by book assets. Similarly, Figure 3B plots the average market-to-book ratios of small-cap and large-cap stocks. We show the value-weighted average market-to-book ratios in these

⁹ Like Benartzi et al. (2007), we exclude Berkshire Hathaway from computations of mean prices. The price of Berkshire Hathaway stock has been above \$10,000 per share since October 1992, and above \$100,000 per share since October 2006.

figures but we also compute equal-weighted averages.¹⁰ Because of the strong cross-sectional relationship between size and share price, Figures 3A and 3B look quite similar.

Finally, we translate these valuations into proxies for catering incentives. Figure 3C displays the low-price premium P^{CME} (“cheap minus expensive”), which is the log of the average market-to-book ratio of low-priced stocks minus the log of the average market-to-book of high-priced stocks. It also shows the small cap premium P^{SMB} (“small minus big”), which is the log of the average market-to-book ratio of small-caps minus the log of the average market-to-book of large-caps. Again, we plot only the value-weighted average measure, but Table 2 also reports the equal-weighted measure.

Capitalization is positively correlated with the market-to-book ratio, so it is not surprising that low-priced and small stocks have on average sold at a discount in terms of their value-weighted average valuation ratios, with 1983 the lone exception in the value-weighted series. In the equal-weighted average valuation ratios, small stocks displayed a premium valuation ratio from 1979 through 1985 and in 2003 and 2004. More importantly for this analysis, the equal-weighted premium for high-priced stocks has very similar variation.

Historical market commentaries give some color to the peaks and troughs in the low-price and small-cap premia. For example, according to Malkiel (1999), two peaks in Figure 3C, the late-1960s and 1983, were both notable eras for new issues, which tended to be low-price and of small capitalization. There are also two troughs in which large caps and high-priced stocks were apparently more in favor. One is the early 1970s and reflects what Siegel (1998) calls the “nifty fifty” bubble. The name refers to fifty large, stable, consistently profitable stocks. Siegel writes, “All of these stocks had proven growth records ... and high market capitalization” and

¹⁰ In computing the equal-weighted averages, we winsorize the market-to-book ratio of individual firms at a maximum value of 10.

surely high nominal share prices (p. 106). Another trough occurs in the Internet period. This is driven by extraordinary valuations on high-price, large-cap stocks, consistent with the popular impression of a long bull market for the S&P 500 that started in the 1980s. It also reflects the valuations of many growth stocks that had such high returns that they quickly leapfrogged smaller capitalization firms to *become* high-price, large-cap stocks. Indeed, data from Jay Ritter's website indicate that the *average* first-day return among the 1999 IPO cohort was 70%.

Two historical anecdotes seem particularly à propos of the catering hypothesis and help to give some color to the variation in the low-price and small-stock premia. First, the low-price premium reached its maximum in 1983. Perhaps not coincidentally, 1983 also witnessed the proposed offering of startup Muhammad Ali Arcades International in the form of units of one share plus two warrants at the price of *one penny*. As Malkiel writes, "... when it was discovered that the champ himself had resisted the temptation to buy any stock in his namesake company, investors began to take a good look at where they were. Most did not like what they saw. The result was a dramatic decline in small company stocks in general" (1999, p. 77-78). As a second interesting anecdote, in 1989, at the tail end of a 15-year period of outperformance of low-price stocks, Fidelity Investments launched the Low-Priced Stock Fund. The fund's mandate was to select stocks trading at \$10 or less. Over the next several years—as high-price stocks began to outperform—the definition of "Low-Priced" was reset to \$25 and then to \$35.

In addition to relative valuation ratios, we also use the market reaction to splits as a proxy for catering incentives. When splitting firms are greeted with a positive market reaction (Fama, Fisher, Jensen, and Roll (1969) and subsequent authors find that the average split announcement effect is positive) perhaps the simplest inference is that investors prefer lower prices. More specific evidence comes from Greenwood (2007b), who shows that Japanese firms split more

frequently following high split announcement effects. He also finds that high split announcement effects are associated with higher split ratios. Both results are consistent with catering. Of course, at least in the U.S., positive news about earnings or dividends news is often announced at the same time as a split. In using the market reaction to splits as a measure of catering incentives, we are implicitly assuming that this news content is similar across years or, to the extent it varies over time, that it is not correlated with catering incentives.

Specifically, we compute the return in the window from the day before the CRSP split announcement date through 10 trading days after the effective date, net of the value-weighted market index.¹¹ To control for differences in volatility across firms and across time (see Campbell, Lettau, Malkiel and Xu (2000)), we scale each firm's excess return by the square root of the number of days in the window times the standard deviation of its daily excess returns. We measure volatility in the period from 100 trading days prior to the split announcement through five days before the announcement. We label the standardized announcement effect A and report the average within each year over time. This series is presented in Table 2 and in Panel D of Figure 3. The figure shows that A varies considerably over time, from a high of 0.88 in 1977, meaning that the average event return was 0.88 standard deviations above zero, to a low of -0.09 in 1962. The figure also shows a fairly high degree of correlation between A and the low price ($\rho=45\%$) and small cap premia ($\rho=52\%$). Thus, the valuation benefits of splitting vary with our premium measures in an intuitive way. We view all of these measures as alternative, but noisy, proxies for catering incentives.

C. Catering incentives and splitting activity

¹¹ We have experimented with different windows for measuring the announcement premium, achieving similar results using both shorter and longer windows. We also find that the announcement premium is not much affected whether one includes or excludes stock dividends in the calculation of A .

We start by examining whether aggregate measures of split activity, as in equations (5) and (6), are related to measures of catering incentives. Specifically, we regress the split percentage and the broader measure of splitting activity on equal- and value-weighted measures of the low price and small stock premia and the split announcement premium, controlling for beginning of period prices and returns:

$$s_t = a + bP_{t-1}^{CME} + cP_{t-1}^{SMB} + dA_{t-1} + ep_{t-1}^{EW} + fr_t^{EW} + u_t, \text{ and} \quad (8)$$

$$m_t = a + bP_{t-1}^{CME} + cP_{t-1}^{SMB} + dA_{t-1} + ep_{t-1}^{EW} + fr_t^{EW} + u_t.$$

We expect the coefficients on the low price (cheap minus expensive) and small stock (small minus big) premia, labeled b and c , as well as the split announcement effect, labeled d , to have a positive relationship with the split percentage. In other words, when low priced and small stocks are trading at a premium relative to high priced and large stocks, or when splits are associated with larger announcement returns, we expect to see more firms splitting their shares down to lower prices, in the hopes of attracting investor demand. The broader measure of splitting activity is decreasing in the propensity to split and the split ratio, so we expect opposite signs. When splits are associated with high announcement returns, we expect to see firms taking actions m to decrease their stock prices. Note in the measure s we include regular splits; it makes little difference if we include stock dividends. The measure m includes all firms and thus is the net effect of splits of any type.

The estimates of b , c , and d in Table 3 are broadly consistent with these predictions. The top panel shows univariate results. All ten coefficients have the correct sign, and all but two are statistically significant at the five percent level. Standard errors are adjusted for heteroskedasticity and autocorrelation of up to three lags and all of the independent variables are standardized. Thus, in terms of economic significance, a one standard deviation increase in the

value-weighted low-price premium, for example, is associated with a 0.94 percentage point increase in split frequency and a 0.85 percentage point net decrease in prices through price management. Equal-weighting the low price premium or using the small stock premium as a measure of catering incentives leads to slightly larger effects. Split announcement effects are associated with split frequencies as well as being strongly associated with net decreases in prices.

The bottom panel shows multivariate results that control for the overall equal-weighted average share price from the beginning of the year and the equal-weighted average return over the course of the year. Naturally, split activity is more common when share prices and returns are generally high. More important for us is that the inclusion of these control variables does not affect the coefficients on catering proxies, which are similarly strong. In fact, the t-statistics on catering incentives are typically as high as the t-statistics on the average price level (unreported), and the inclusion of these variables does not greatly increase goodness of fit relative to univariate regressions that contain only catering incentives. One might have expected the average price level to be the dominant effect on overall split activity, but these results suggest that catering incentives may be as important.

D. Catering incentives and IPO and post-split prices

Next we examine IPO and post-split prices, as in equations (4) and (7). These are situations where the firm has explicitly chosen a stock price. Catering predicts that splitters will split to lower prices and new firms will list with higher prices when low-priced firms (or small firms) are more highly valued. In some respects, this is a clearer test. We expect to see more splitting activity simply in response to higher prices and past returns, but we would not necessarily expect to see differences in post split or IPO prices.

Figure 4 shows the relationship between catering incentives and IPO first-day closing prices. Initial public offerings offer a unique setting to test for catering effects on prices, as the price is highly discretionary, there are strong incentives to adapt cosmetic aspects of the firm to attract investor demand, and there is no issue of inertia with respect to a particular historical price range. Average IPO closing prices almost tripled from 1984 to 1999 and have fallen more recently. This variation appears to be well explained by proxies for catering incentives, which are inverted and once-lagged in the figure. The figure shows that when the relative valuations of *large* or *high*-priced stocks are high, firms go public at higher prices, and vice-versa. The correlation between IPO closing prices and the lagged value-weighted low price premium is -0.88 and the correlation with the small stock premium is -0.84.

Perhaps the central result of the paper is illustrated in Figure 5, which looks at the larger and longer sample of post-split prices chosen by seasoned firms. The average post-split price is plotted against the low price and small stock premia, lagged one period and inverted. The variation in post-split prices is qualitatively similar to the variation in prices chosen by newly public firms. In 2000, for example, the average post-split price was nearly \$50, or more than double the average price that firms had been splitting to just a few years earlier and roughly double the price that firms would be splitting to a few years later. Measures of catering incentives again appear to help explain this variation. When the low-price premium is relatively high, firms that conduct splits split to lower prices. The correlation between the post-split price and the value-weighted low price premium is -0.72. The correlation with the small stock premium is -0.64. The 2000 spike in post-split prices matches a spike in the relative valuation of small-cap and low-price firms, but there seems to be a correlation in other periods as well.

Somewhat more formally, we regress IPO and post-split log prices on equal- and value-weighted versions of the low price and small stock premium and the split announcement premium, controlling for beginning of period prices and returns:

$$p_t^{IPO} = a + bP_{t-1}^{CME} + cP_{t-1}^{SMB} + dA_{t-1} + ep_{t-1}^{EW} + fr_t^{EW} + u_t, \text{ and} \quad (9)$$

$$p_t = a + bP_{t-1}^{CME} + cP_{t-1}^{SMB} + dA_{t-1} + ep_{t-1}^{EW} + fr_t^{EW} + u_t.$$

We expect that b , c , and d on actively chosen prices to be negative. In other words, when low priced and small stocks are trading at a premium relative to low priced and small stocks, or when splits to lower prices are associated with a larger announcement effect, we expect to see firms choosing lower prices.¹²

The estimates in Table 4 are consistent with predictions. The top panel shows univariate results, and the bottom panel controls for past prices and contemporaneous returns. All coefficients have the right sign and almost all are statistically significant at the five percent level. In terms of economic significance, a one-standard-deviation increase in the low-price premium is associated with a 19 percentage-point decrease in IPO prices and a 17 percentage-point decrease in post-split prices. Results for the small-stock premium are similarly strong. These effects are only slightly affected by the inclusion of average prices and recent returns as control variables, and the inclusion of such controls increases the statistical and economic significance of the split announcement premium.

E. Robustness checks

We test several aspects of the robustness of the link between catering incentives and post-split prices. The details of these calculations are available in Table A6 of an Internet Appendix (Baker, Greenwood, and Wurgler (2008)).

¹² We use log prices as dependent variables here, but we obtain similar results using dollar prices.

We start by examining whether the results come predominantly from one part of the sample. Splitting the sample into halves indicates that this is not the case, as the coefficients and t-stats are nearly identical. Nor are the results driven by the Internet peak, which appears prominently in some of our figures, as shown by the fact that we obtain strong results upon excluding 1998-2001 or 1998-2005 periods.

A second concern is that both the premia and the average post split price may share a common time trend, leading to a spurious correlation. But, controlling for a time trend only strengthens the results. We also go a step further and run equation (9) in differences, removing the time trend from both series. The dependent variable is the change in the log post-split price, and the independent variable is the lagged change in the low-price (or small-cap) premium. Again, results are similar.¹³

We also use past relative returns of cheap and expensive stocks and small and large stocks in place of valuation premia. We compound these differences over the three years prior to year t and use the gap in returns to predict the average post split price in year t . As expected, the basic results are qualitatively unchanged. In the IPO specifications, we replace first-day closing prices with offering prices. Although Loughran and Ritter (2002) show that the closing price is predictable, the offering price may be a better gauge of the intended share price. In any event, the results are not sensitive to this distinction, though the coefficient increases as a result of the lower variance of offering prices.

Another conceivable issue with the results in Table 4 involves a composition effect. Suppose that small firms always split to low prices and large firms always split to higher prices.

¹³ Related to the difference specification, we have estimated GLS specifications based on a variant of the Cochrane-Orcutt procedure, which assumes that regression residuals are AR(1). Again, the results are similar and significant. In other untabulated results we find that the level of the log post-split price is significantly related to past changes in the low-price (or small-cap) premium.

Then, when small-cap or low-price premia are high, we would expect more small firms to be potential splitters. Since small firms split to lower prices, the average post-split price will be lower, potentially producing the effect in Table 4. An easy test of this alternative explanation is to separate small from large firms. We define small firms as those with market capitalization less than the 30th NYSE percentile and large firms as those with market cap greater than the 70th percentile. Our results are driven by large firms, consistent with the idea that large firms “act small” (when catering incentives point in that direction) rather than the composition effect suggested above. Perhaps smaller listed firms have less scope to alter investor perceptions, especially if their prices are already low (reverse splits are rare as shown in Figure 1). At the same time, the results for IPO prices involve smaller and younger firms, and so catering incentives seem important at various stages of the firm life cycle.

In another check, we estimate low-price and small-stock premia based solely on profitable firms, to account for the fact that some low price and small stocks are distressed. This has little effect. Finally, we split the low price and small stock premia into their components. This addresses a class of alternative explanations in which our catering incentives measures are correlated with overall valuation levels. For example, high overall valuation levels may proxy for low expected returns, so perhaps firms choose not to split to low prices because they expect their price to fall on its own. A simple test is to see whether the effect is coming from both or just one part of our relative valuation measures. The results suggest that post-split prices are significantly positively related to the valuations of high priced (or large) stocks as well as significantly negatively related to the valuations of low priced (or small) stocks.

A class of explanations that is popular in the splits literature involves signaling. It is hard to rule out signaling as an explanation for any particular split or pattern of a firm’s decisions. For

example, Applied Materials may have split to lower prices because of increased confidence that its current valuation was not too high. However, signaling is unlikely to explain our large sample results. We find a pattern between publicly available data (the relative valuation of low and high priced firms) and the propensity to split. While this could reflect time series variation in asymmetric information, it would more naturally predict that the need to signal was greater, not lesser, when low priced and small stocks (opaque firms) were trading at a discount.

III. Firm-level tests

As another robustness test we can use firm-level data. This allows us to more fully control for composition effects that could affect average post-split prices and split activity but that do not involve catering, as well as to correct for effects related to variation over time in the cross-sectional dispersion in prices or other relevant characteristics. The specific approach is to add time series measures of catering incentives to pooled firm level regressions corresponding to eqs. (4) through (7).

A. Data

We gather firm- and industry-level determinants of splits and post-split share prices at an annual frequency. We take beginning-of-year nominal share prices and construct annual stock returns using CRSP data. We measure firm size as the NYSE capitalization decile as of the end of the previous calendar year. We control for industry average prices using Fama and French (1997) industry classifications, updated using data from Ken French's website. In some cases we also control for idiosyncratic, firm-specific preferences for a specific price range by using the price to which the firm split when it split the last time (whether that was a regular split, stock

dividend, or reverse split). Inclusion of this last control limits the sample to firms that have split previously.

B. Catering incentives and firm-level splitting activity

In Table 5, we estimate the firm level analogue to our time series regressions in Table 3. An indicator variable equal to one when firms i splits or pays a stock dividend in quarter t replaces the aggregate split percentage, and the firm level measure of the net impact of splitting activity m replaces the equal weighted average across firms. We regress these dependent variables (using probit for the dichotomous split decision) on the value-weighted low price premium, controlling for beginning of period log prices p , contemporaneous log returns r , the NYSE size decile $NYSED$, lagged total return volatility σ , the industry average price $p^{Industry}$, and the price at last split $p^{LastSplit}$. We cluster the residuals u by year to match the variation in the low price premium.¹⁴

$$\Pr(s_{i,t} = 1) = a + bP_{t-1}^{CME} + ep_{i,t-1} + fr_{i,t} + gNYSED_{i,t} + h\sigma_{i,t-1} + jp_{i,t-1}^{Industry} + kp_{i,t-1}^{LastSplit} + u_{i,t}, \quad (10)$$

and

$$m_{i,t} = p_{i,t} - p_{i,t-1} - r_{i,t} = a + bP_{t-1}^{CME} + ep_{i,t-1} + fr_{i,t} + gNYSED_{i,t} + h\sigma_{i,t-1} + jp_{i,t-1}^{Industry} + kp_{i,t-1}^{LastSplit} + u_{i,t}.$$

As before, we expect the coefficient on the low price premium b to have a positive sign in the first equation and a negative sign in the second. We expect the effect of past price and contemporaneous returns to be positive for splits and negative for the broader measure m . That is, when prices are high initially or because of recent returns, we expect to see more splits and more downward management of price. Firms in size deciles and industries with higher prices are likely to split less and manage prices higher. A conjecture is that volatile firms are (all else

¹⁴ We have also estimated t-statistics following Thompson (2006), who describes a technique for obtaining standard errors when residuals are clustered both by firm and in time. Although this adjustment appears to matter for many of the control variables, it does not much affect the significance of b , the coefficient on the low price premium.

equal) less likely to split, in light of the greater chance of reaching a low price anyway. Finally, firms may have their own idiosyncratic preference for share price that is manifested in past stock splits. Those with preferences for low prices will split more often and manage price downward.

Most of these predictions are supported in Table 5. Splits are more common when prices are higher, when returns are higher, when the industry average share price is lower (as in Lakonishok and Lev (1987)), and when the firm's last post-split price is lower. Large firms are somewhat less likely to split, all else equal, consistent with the cross-sectional pattern in which large firms maintain higher average share prices. More importantly, the high price premium has the correct sign in all six regressions, and is significant at the five percent level in five out of six.

In the first specification in the top panel of Table 5, a one-standard deviation increase in the low price premium is associated with a 0.62 percentage point increase in the probability that a firm will split in that year, all else equal. This may appear small but it should be compared to the unconditional probability of a split in a given year, which is roughly four to twelve percentage points, as can be inferred from Table 1. Note also that we are controlling for beginning of year price, which itself reflects the impact of our annual proxy for catering incentives. It is also associated with a 0.88 percentage point reduction in the average firm's share price that year as effected through splitting activity. A somewhat unexpected result is the effect of volatility, which suggests that volatile firms have a greater, not lesser, propensity to manage prices downward.

In Table A4 of an Internet Appendix (Baker, Greenwood, and Wurgler (2008)), we have considered additional interaction effects in the probits in Table 5. We include interactions of the low-price premium with institutional ownership, size, and a time trend. If individual investors are those being catered to, it is perhaps natural to test whether the effects are stronger when

institutional ownership is low, size is small (presumably correlated with institutional ownership), and earlier in the sample when institutional ownership was generally lower. Consistent with this, all three interaction terms are indeed negative, although their inclusion does not improve the pseudo- R^2 of the probit by more than 1%. The result that the decision to split is more sensitive to the low-price premium for small firms contrasts with the finding that the low-price premium has a stronger effect on post-split *price* for large firms; of course, the low-price premium is quite closely linked to average IPO prices, so the relationship between firm maturity and catering through nominal share prices is not clear cut.

C. Catering incentives and firm-level IPO and post-split prices

In Table 7, we also estimate the firm level analogue to the time series regressions in Table 4. Firm level IPO prices and post-split month-end prices replace the time series averages. We regress these dependent variables on the value-weighted low price premium, controlling for the NYSE size decile $NYSED$, the log industry average price $p^{Industry}$, and in the case of post-split prices, the log price following the last split $p^{LastSplit}$, log returns since the last split $r^{LastSplit}$, and firm-level lagged total return volatility σ . For firms that have not split before, $p^{LastSplit}$ denotes the log month-end price following the IPO, and $r^{LastSplit}$ is the log ex-dividend return since the IPO. The intuition behind including volatility is that when volatility is high, firms may tend to be more conservative in adjusting prices downward, although the previous table did not find support for this idea.

Here, we expect the coefficient on the low price premium b to be negative, as before, and all other coefficients to be positive. With the exception of the volatility coefficient, which is at best marginally negative, these predictions are borne out in the bottom two panels Table 7. Notably, the low price premium is negative in all four regressions and statistically significant at

the five percent level in three of them. The base case result for post-split prices implies that a one-standard deviation increase in the low-price premium is associated with firm-level prices that are on average lower by about 5 percentage points, all else equal.

The results for IPOs are statistically somewhat weaker, although they are economically larger, with a one-standard deviation increase in the low-price premium associated with a three to four percentage point decrease in IPO prices. This lower statistical significance is partly a function of the smaller sample but primarily due to the size control. Without the size control, the coefficient b is -0.17 with a t-statistic of -8.41. This suggests that firms that are small (relative to existing NYSE stocks) are more likely to go public when the low price and small stock premium are high. This is broadly consistent with the notion that investor demand for small and low priced stocks varies over time. One way to satiate this demand is to split; the other is to bring more firms with these characteristics public.

We have also tried an alternative estimation approach. In analogy to Fama and French (2001) and Baker and Wurgler (2004b), who estimate the “propensity to pay dividends,” we also estimate the firm-level “propensity to split” as a function of firm- and industry-specific factors in the first stage, and ask whether catering incentives help to explain the remaining time variation (the constant term in the cross-sectional regressions) in the second stage. Similarly, we estimate the firm-level “active price manipulation due to splits” as a function of firm- and industry-specific factors, and ask whether unexplained time fixed effects depend on prevailing catering incentives. This procedure has the benefit of giving equal weight to each time period, but has disadvantages. The effect of the time series predictor in the second stage can be contaminated by the first stage variables. In particular, the time series averages of the firm-level predictors can make up an important part of the variation in the annual average residuals. Whatever the relative

merits, it is comforting that this procedure produces similar results to the pooled regressions shown here, so we omit the results.

IV. Future stock returns

In the purest catering theory, firms split in an effort to categorize themselves, via their new share price, into a group of small or low-price firms that is relatively overvalued. If this is accurate, then split activity may forecast the returns on small or low-priced stocks, relative to the returns on large or high-priced stocks, as prices eventually revert. On the other hand, it is also possible that the catering activity is misguided, and no actual misvaluation exists, i.e. small and low-price firms have high valuations because their fundamentals are strong (in which case our proxies for catering incentives are measures of the relative growth prospects of small versus large firms). Still another possibility is that misvaluation exists, but because corrections of mispricing are irregular they may go undetected in predictive regressions with relatively short time series.

We consider two of the time series we have focused on, the frequency of splits and average post-split share prices, as potential forecasters of the SMB and CME relative return factors. Also, since the equal-weighted average nominal price level itself has such a strong effect on the frequency of splits and average post-split share prices, we control for it. In other words, we ask whether “excess” splitting activity, or “excess” variation in post-split prices, predicts returns. The predictive regressions are

$$R_{t+1} = a + bs_t + cp_{t-1}^{EW} + u_t \quad (11)$$

$$R_{t+1} = a + bp_t + cp_{t-1}^{EW} + u_t$$

where R denotes the return on low minus high priced stocks or small minus large cap stocks. We consider forecasts of one-, two-, and three-year ahead relative returns. The sample period includes 1963-2005 annual returns.

As it turns out, the results in Table 6 are quite supportive of catering. The left columns show that when splits are particularly frequent, controlling for overall average share prices, future returns are lower on low-price stocks relative to high-price stocks, and on small-cap stocks relative to large-cap stocks. For example, suppose the aggregate frequency of splits increases by one percentage point, which is about a third of its standard deviation. Then, controlling for overall average share prices, equal-weighted returns on low-priced stocks are lower, relative to equal-weighted returns on high-priced stocks, by a total of 8.27 percentage points over the next three years. This is in the direction consistent with splits as a response to ex ante relative overvaluation of low-priced stocks, and the magnitude seems substantial.

The right columns show that average post-split share prices are also useful for predicting size- and price-based relative return factors. Suppose that average post split prices are lower by one nominal dollar, which is about a sixth of one standard deviation. Then, controlling for overall average share prices, for example, the equal-weighted returns on low-priced stocks are low relative to the returns on high-priced stocks by a total of 1.02 percentage points over the next three years. Again, this is consistent with ex ante relative overvaluation of low-priced stocks inspiring splitters to target lower prices.¹⁵ In both panels, split activity is better at predicting

¹⁵ Stambaugh (1999) describes the potential for bias due to autocorrelated regressors whose innovations are correlated with returns. Annual innovations in stock splits and post split prices are not statistically correlated with relative returns of high- and low-priced stocks or small and large stocks. The correlations range from -0.04 to -0.17 for stock splits (the wrong sign for bias) and from -0.02 to -0.16 for post split prices (correct sign but small magnitudes). Moreover, the reduced-bias estimator of Amihud and Hurvich (2004) indicates virtually no bias for either predictor in our setting. However, standard errors using the Amihud-Hurvich approach are slightly above those in Table 6. The difference comes primarily from switching from the homoskedastic to robust standard errors, not from the bias correction.

relative returns at longer horizons, suggesting a slow correction of mispricing. And we note that, in addition to being consistent with the catering hypothesis, this evidence of return predictability further casts doubt on rational expectations versions of signaling.¹⁶

V. Conclusion

Boards of directors are free to choose whatever nominal price they decide is optimal, subject only to listing requirements. Existing theories of nominal share prices typically invoke frictions such as trading costs and asymmetric information. In this paper, we suggest a catering theory of nominal share prices. The catering theory posits that the supply of stocks of different price ranges responds to investor demand for stocks in those price ranges: Managers increase the supply of the securities that investors are willing to pay a premium for. As with catering theories of dividends and other managerial behaviors, the “friction” is limits to arbitrage that allow for mispricing, here associated with nominal share price levels.

We find empirical support for this view of share prices. Splits are far more common, and to lower prices, when the valuation ratios of small- and low-priced firms are high relative to the valuation ratios of large- and high-priced firms. Simple valuation ratio-based proxies of catering incentives explain a large fraction of variation in post-split share prices. They also explain a large fraction of variation in the prices chosen by newly-public firms. Finally, price management appears to take advantage of relative overvaluation of low-priced firms. When firms split more often and to lower prices, the subsequent returns on small and low-priced firms are unusually low.

¹⁶ In a related vein, Guo, Liu, and Song (2008) find that acquirers are more likely than nonacquirers to split prior to their acquisition announcements, particularly when they are paying with stock and particularly when they are also manipulating earnings.

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Figure 1. Stock splits by Applied Materials, Inc. Applied Materials monthly share price (solid) is plotted against the low price premium (dash – scale adjusted and inverted). Applied Materials went public in the fourth quarter of 1972, split its stock for the first time in the second quarter of 1980 and eight more times through 2004. Diamonds indicate split dates and mark the post-split price. We omit the scale of the inverted low-price premium.

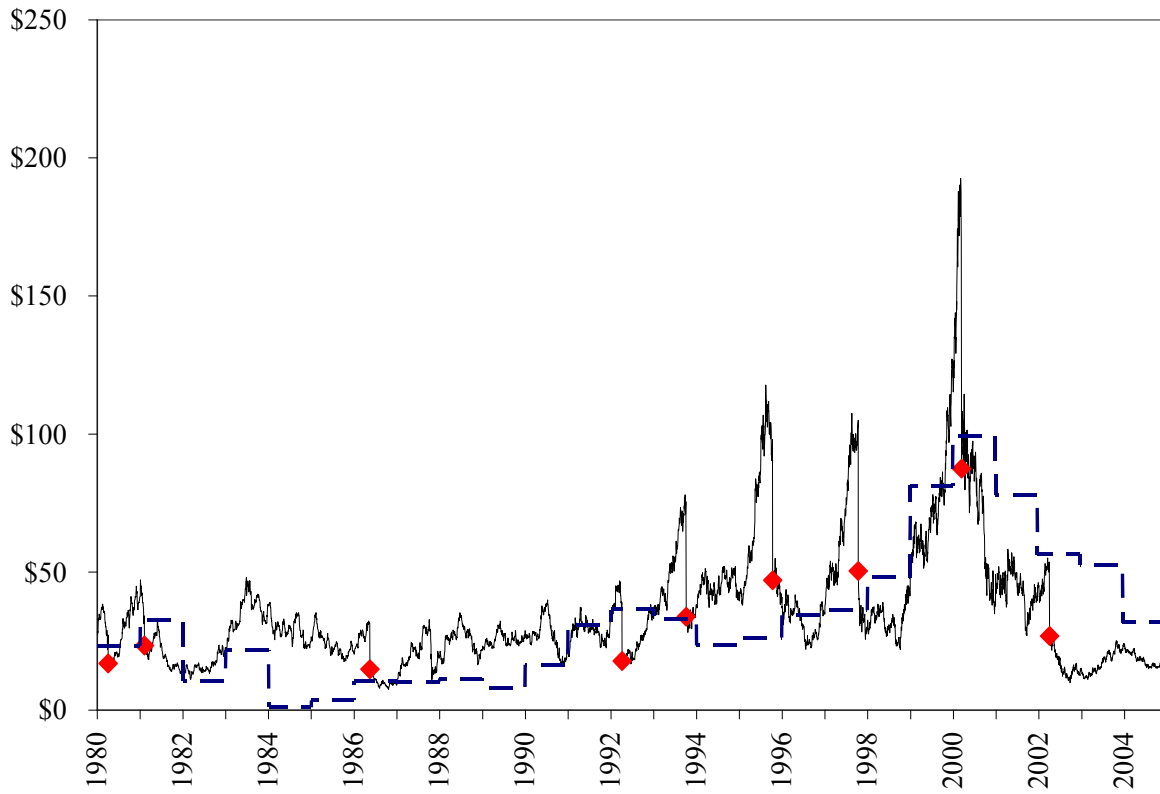


Figure 2. Share price breakpoints. In Panel A., all NYSE stocks with share codes of 10 or 11 are ranked each year by share price at the end of December. The figure shows the 30th percentile and 70th percentile share price breakpoints. In Panel B, all NYSE stocks with share codes of 10 or 11 are ranked each year by market capitalization at the end of December. The figure shows the equal-weighted average share price for stocks with market capitalizations below the 30th percentile and above the 70th percentile.

Panel A. Share price breakpoints for high-price (solid) and low-price (dash) NYSE stocks



Panel B. Average share prices for large (solid) and small-cap (dash) NYSE stocks

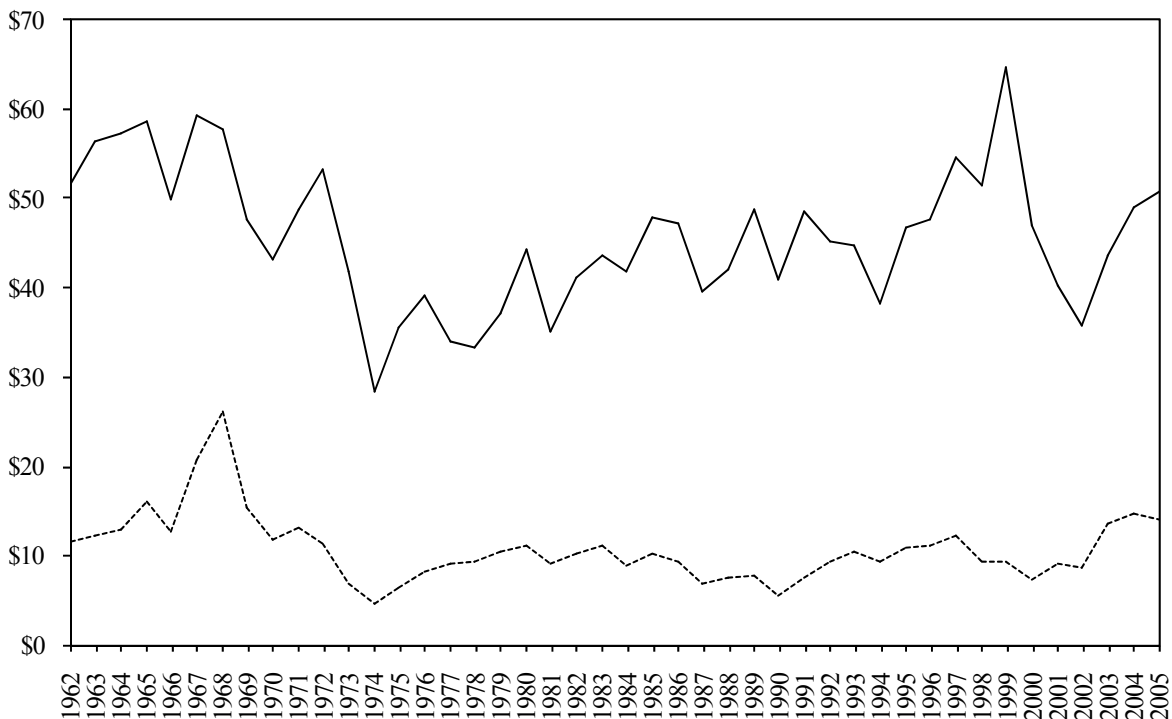
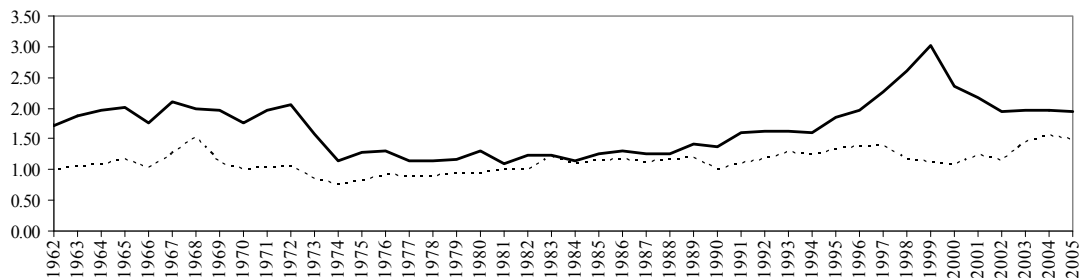
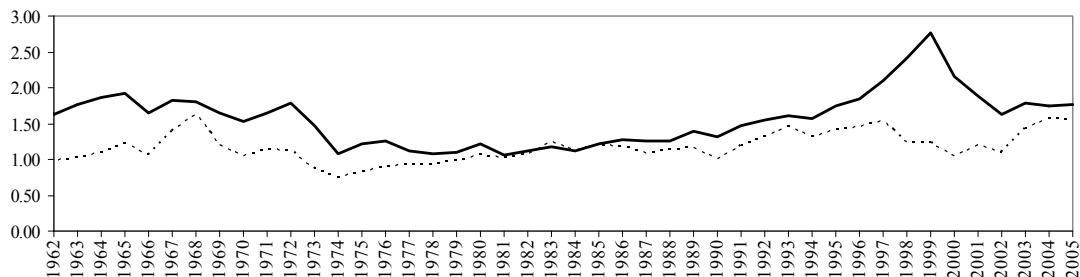


Figure 3. The low price and small stock premia, and the split announcement premium. The low price premium is the log difference in the value weighted average market-to-book ratios of low and high priced stocks. The small stock premium is the log difference in the value weighted average market-to-book ratios of small and large stocks. The market-to-book ratio is the ratio of the market value of the firm to its book value. Market value is equal to market equity at calendar year end plus book debt. Book equity is defined as stockholders' equity minus preferred stock plus deferred taxes and investment tax credits and post retirement assets. All NYSE stocks with share codes of 10 or 11 are ranked each year by share price and market capitalization at the end of December. Low (high) price stocks are stocks with share prices below the 30th percentile (above the 70th percentile) by share price. Small (large) stocks are stocks with market capitalizations below the 30th percentile (above the 70th percentile) by capitalization. Panels A and B plot the value weighted average market-to-book ratios of high and low priced stocks and large and small stocks. Panel C plots the low price and small stock premia. Panel D plots the split announcement premium, defined as the abnormal return from the day before split announcement through ten days after the effective date, scaled by the standard deviation of returns.

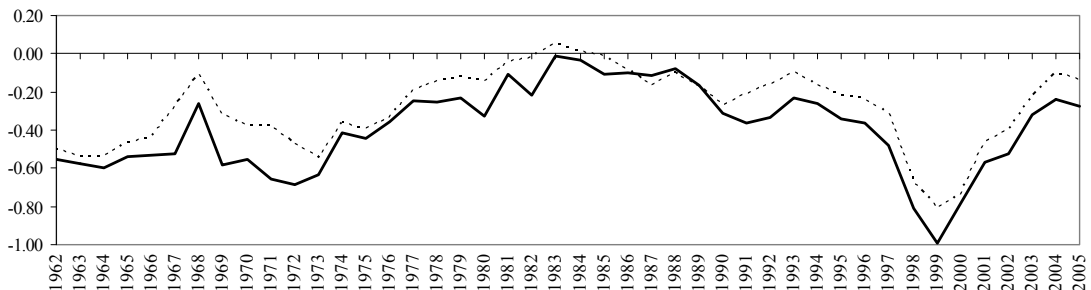
Panel A. Value weighted average market-to-book ratio for high price stocks (solid) and low price stocks (dash)



Panel B. Value weighted average market-to-book ratio of large stocks (solid) and small stocks (dash)



Panel C. The low price premium (solid) and small stock premium (dash)



Panel D. The split announcement premium

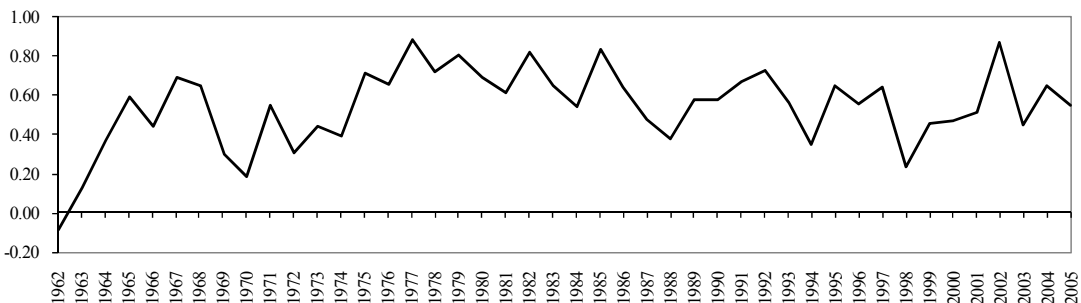


Figure 4. The small stock premium and IPO prices.

The average IPO first day closing price (solid), plotted against the low-priced-stock premium (short dash – right axis, inverted) and the small stock premium (long dash – right axis, inverted) in year $t-1$. The low-price-stock premium P^{CME} is the difference between the logs of the value-weighted market-to-book ratios for low and high priced firms. The small-stock premium P^{SMB} is the difference between the log of the value-weighted market-to-book ratios for small and large firms. Data on IPO prices is from Jay Ritter.

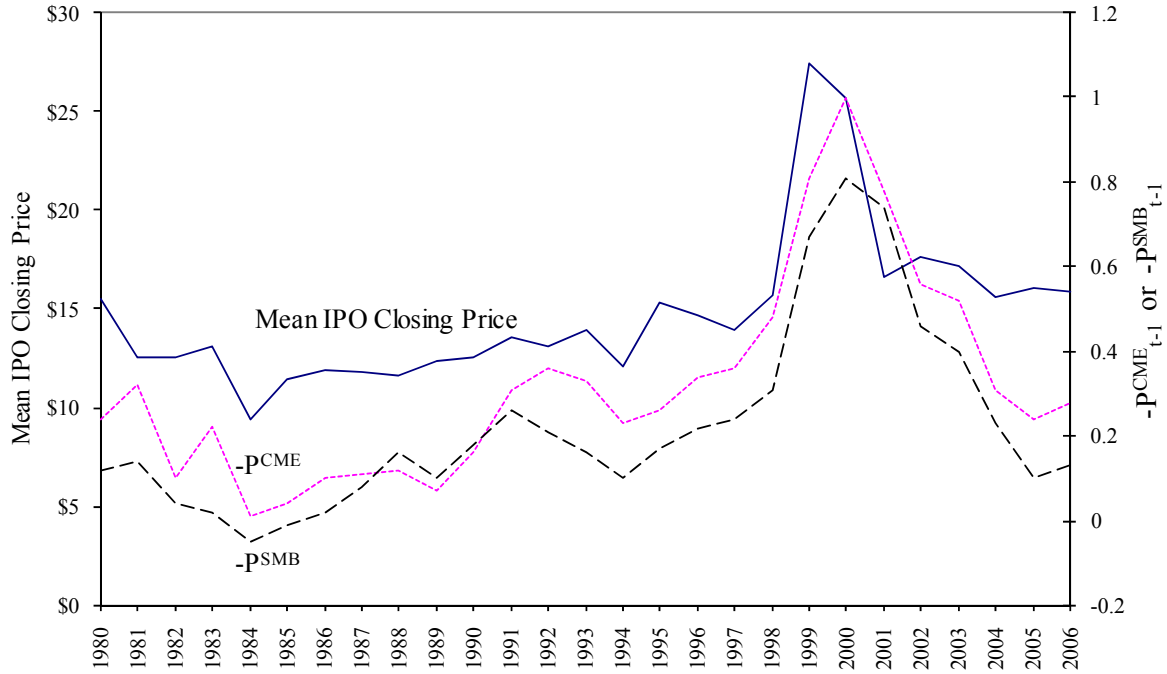


Figure 5. The low price premium and post split stock prices. The average post split price (solid – left axis) in year t is plotted against the low price premium (dash – right axis, inverted) and small stock premium (long dash – right axis, inverted) in year $t-1$. The average post split price is described in Table 1 and the low price premium and small stock premium are described in Table 2.

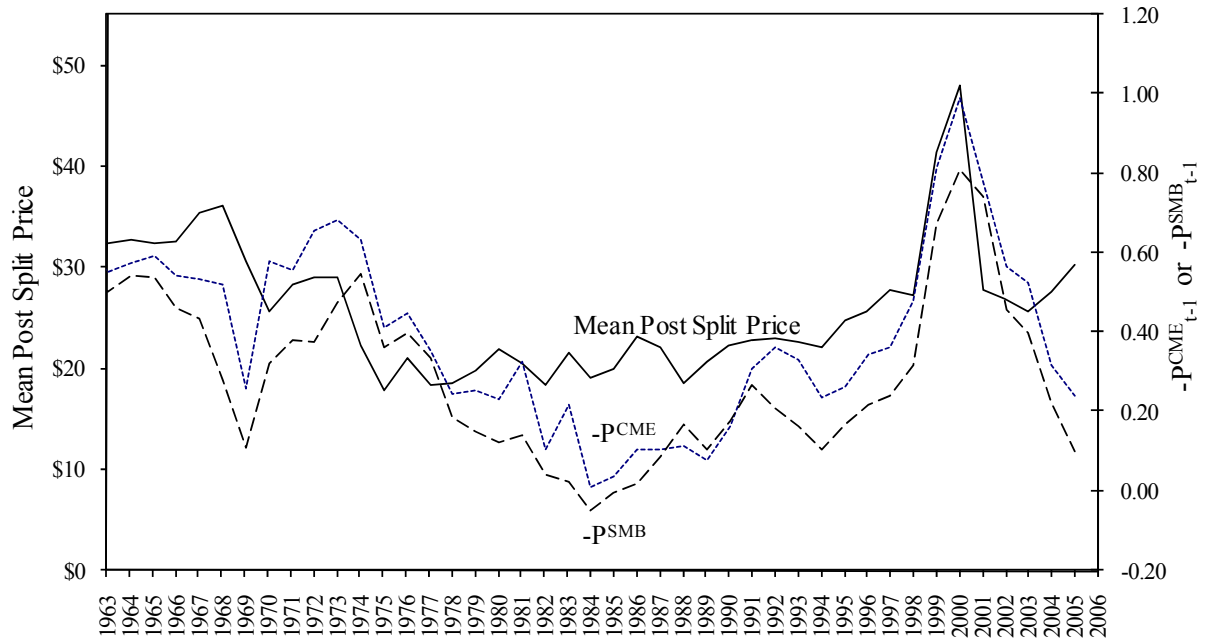


Table 1. Stock splits and post split prices. The number of splits, the average pre split price, the average post split price, and the average split ratio for splits, stock dividends, and reverse splits. Events with a CRSP distribution code of 5523 are divided into three categories: Splits have a split ratio greater than 1.25-for-1; stock dividends have a split ratio between 1.01-for-1 and 1.25-for-1; and, reverse splits have a split ratio less than 1-for-1. The pre split price is the closing price on the day prior to the split. The post-split price is the pre split price times the reciprocal of the split ratio. The left most column lists the year end sample of CRSP firms. The right most two columns show a summary measure of splitting activity m and the average offering price and first-day close for IPOs. m is equal to the log of the ratio of the actual average stock price to the beginning of year stock price grown at the stock return excluding dividends, expressed in percentage terms. We report the equal-weighted average m across all listed stocks.

Year	All	Splits			Stock Dividends			Reverse Splits			m %	IPO Prices	
		N	Pre	Post	N	Pre	Post	N	Pre	Post		FirstDay	Offering
1963	2,074	57	63.96	32.49	2	34.50	27.60	5	2.59	10.94	-4.00		
1964	2,138	99	70.12	32.78	13	82.85	66.28	10	3.10	9.07	-3.62		
1965	2,135	132	72.39	32.46	13	28.74	22.99	5	2.21	10.74	-4.56		
1966	2,177	163	64.61	32.68	8	32.75	26.20	4	2.47	10.72	-4.77		
1967	2,180	108	70.21	35.50	10	38.36	30.88	1	17.00	34.00	-3.48		
1968	2,179	218	70.91	36.21	15	32.73	26.19	3	6.17	18.21	-4.99		
1969	2,264	210	59.83	30.74	1	16.63	13.30	3	4.35	19.77	-4.60		
1970	2,336	46	50.06	25.65	1	18.63	14.90	-	-	-	-0.99		
1971	2,431	94	51.46	28.28	9	30.18	24.30	5	7.10	16.85	-2.77		
1972	5,300	148	56.69	29.08	9	27.94	22.54	5	4.28	14.45	-1.81		
1973	4,993	178	56.33	29.00	23	37.32	30.26	11	2.99	9.36	-3.21		
1974	4,699	78	43.48	22.29	20	13.99	11.34	5	7.81	16.74	-2.09		
1975	4,737	101	33.50	17.86	19	16.09	13.01	7	1.96	9.35	-2.95		
1976	4,802	203	38.48	21.01	53	15.06	12.16	11	1.93	7.02	-4.67		
1977	4,730	236	33.23	18.47	58	17.35	14.01	6	1.63	9.08	-4.48		
1978	4,659	340	33.27	18.55	66	19.81	15.91	9	1.13	4.17	-5.30		
1979	4,612	272	37.44	19.77	83	19.19	15.76	5	1.35	19.15	-5.45		
1980	4,780	456	40.94	21.94	78	20.79	16.76	5	3.24	9.56	-7.43	15.47	12.96
1981	5,130	505	38.98	20.53	67	21.42	17.26	14	4.66	11.83	-8.69	12.48	11.74
1982	5,100	226	31.69	18.44	67	18.69	15.12	24	0.83	5.70	-5.88	12.53	11.11
1983	5,720	780	40.56	21.60	73	20.98	16.86	29	2.81	7.03	-8.54	13.08	11.88
1984	5,837	349	34.86	19.15	49	15.85	12.78	28	0.55	4.00	-5.80	9.37	9.16
1985	5,800	480	36.10	19.98	78	18.09	14.65	40	3.34	9.44	-6.03	11.42	10.80
1986	6,061	738	44.39	23.17	75	20.51	16.49	25	1.99	8.09	-7.88	11.87	11.15
1987	6,360	554	41.75	22.15	81	21.31	17.27	62	1.09	8.85	-3.85	11.76	11.11
1988	6,099	205	33.08	18.53	54	19.72	16.02	52	0.92	6.05	-2.43	11.55	10.94
1989	5,902	292	37.76	20.76	64	21.34	17.27	60	1.41	6.86	-1.71	12.38	11.51
1990	5,737	197	43.50	22.26	38	20.77	16.73	93	0.75	3.82	-0.51	12.48	11.23
1991	5,792	248	41.39	22.79	41	15.89	12.87	84	1.45	6.85	-1.50	13.53	12.08
1992	5,930	416	44.60	23.10	45	19.73	15.94	140	1.02	5.87	-0.43	13.08	11.76
1993	6,451	477	40.55	22.62	61	22.73	18.26	104	2.15	9.88	-1.96	13.95	12.26
1994	6,780	345	42.75	22.05	52	23.98	19.35	84	2.60	7.82	-1.07	12.10	11.01
1995	7,021	447	45.83	24.77	47	20.10	16.20	87	1.32	6.78	-2.01	15.28	12.49
1996	7,489	562	47.73	25.69	51	24.47	19.65	87	1.86	6.59	-2.39	14.68	12.39
1997	7,483	630	51.36	27.87	59	26.60	21.43	88	2.81	7.96	-2.81	13.88	12.05
1998	7,020	630	52.28	27.23	60	25.60	20.79	157	1.04	4.61	-2.43	15.63	12.61
1999	6,665	405	81.53	41.44	40	24.51	20.49	103	0.98	4.39	-1.97	27.43	14.80
2000	6,357	442	97.23	48.07	12	23.55	19.47	52	3.43	10.23	-1.35	25.68	14.82
2001	5,653	180	49.08	27.74	27	23.21	19.55	101	0.69	3.95	0.32	16.56	14.46
2002	5,232	186	48.24	26.96	23	21.69	17.65	94	1.04	7.41	-0.01	17.62	15.95
2003	4,917	193	45.40	25.69	32	26.25	21.73	68	1.02	5.16	-1.28	17.13	15.21
2004	4,856	262	52.20	27.57	27	26.20	21.48	42	2.88	12.00	-1.82	15.54	13.61
2005	4,775	260	56.03	30.22	33	24.49	20.00	50	1.85	7.82	-0.88	16.04	14.32
2006	4,714	206	57.22	29.82	32	23.48	19.98	57	2.51	9.22	-1.01	15.89	13.65

Table 2. The low price and small stock premia. The low price premium P^{CME} is the log difference in the average market-to-book ratios of low and high priced stocks. The small stock premium P^{SMB} is the log difference in the average market-to-book ratios of small and large stocks. The market-to-book ratio is the ratio of the market value of the firm to its book value. Market value is equal to market equity at calendar year end plus book debt. Book equity is defined as stockholders' equity minus preferred stock plus deferred taxes and investment tax credits and post retirement assets. All NYSE stocks with share codes of 10 or 11 are ranked each year by share price and market capitalization at the end of December. Low price i.e. cheap stocks (high price i.e. expensive) are stocks with share prices below the 30th NYSE percentile (above the 70th percentile) by share price. Small (large) stocks are stocks with market capitalizations below the 30th NYSE percentile (above the 70th percentile) by capitalization. Each premium is presented with both equal weighted (EW) and value weighted (VW) averages. The cumulative abnormal return CAR is the difference between the stock return and the value weighted market return over the interval that starts the day before split announcement and ends ten days after the effective date. The split announcement premium is the CAR scaled by the square root of the number of days in the window times the standard deviation of daily returns in the 100 trading days ending five days prior to the split announcement date. The average split announcement premium A is reported in the table. The t-statistic is from Campbell et al. (2001) and tests the hypothesis that the average split announcement return is equal to zero.

Year	Low Price Premium		Small Stock Premium		Split Announcement Premium		
	P^{CME}		P^{SMB}		A		
	VW	EW	VW	EW	CAR	A	t-stat
1962	-0.55	-0.51	-0.50	-0.54	0.24	-0.09	-0.66
1963	-0.57	-0.56	-0.54	-0.57	1.92	0.13	0.99
1964	-0.60	-0.48	-0.54	-0.51	3.45	0.37	4.01
1965	-0.54	-0.50	-0.46	-0.45	9.10	0.59	6.99
1966	-0.53	-0.63	-0.43	-0.49	6.70	0.44	4.98
1967	-0.52	-0.54	-0.28	-0.24	9.84	0.69	8.28
1968	-0.26	-0.32	-0.11	-0.07	9.67	0.65	9.22
1969	-0.58	-0.73	-0.32	-0.42	4.43	0.29	3.68
1970	-0.56	-0.69	-0.38	-0.50	2.47	0.18	1.23
1971	-0.66	-0.81	-0.37	-0.56	8.38	0.55	5.77
1972	-0.69	-0.88	-0.47	-0.65	4.29	0.30	3.39
1973	-0.63	-0.87	-0.54	-0.81	6.75	0.44	5.46
1974	-0.42	-0.57	-0.36	-0.57	7.80	0.39	3.27
1975	-0.45	-0.55	-0.40	-0.55	11.50	0.71	7.50
1976	-0.35	-0.41	-0.34	-0.38	8.07	0.65	10.14
1977	-0.25	-0.30	-0.19	-0.19	9.93	0.88	14.48
1978	-0.26	-0.30	-0.15	-0.13	9.83	0.72	14.11
1979	-0.24	-0.19	-0.12	0.02	10.79	0.80	13.90
1980	-0.32	-0.16	-0.14	0.08	11.30	0.69	16.05
1981	-0.10	-0.07	-0.04	0.09	7.87	0.61	13.60
1982	-0.22	-0.17	-0.02	0.02	11.94	0.82	14.76
1983	-0.01	0.11	0.05	0.15	9.47	0.64	17.90
1984	-0.04	0.07	0.01	0.06	5.43	0.54	10.06
1985	-0.10	0.03	-0.02	0.08	9.90	0.83	19.03
1986	-0.11	-0.07	-0.08	-0.03	8.91	0.64	17.52
1987	-0.12	-0.13	-0.16	-0.18	6.48	0.47	11.20
1988	-0.07	-0.05	-0.10	-0.04	8.84	0.37	5.87
1989	-0.16	-0.15	-0.18	-0.13	7.42	0.57	10.75
1990	-0.31	-0.39	-0.26	-0.25	7.23	0.57	8.11
1991	-0.36	-0.48	-0.21	-0.26	11.23	0.67	11.38
1992	-0.33	-0.29	-0.16	-0.14	11.80	0.72	15.25
1993	-0.23	-0.22	-0.10	-0.07	9.50	0.56	12.74
1994	-0.26	-0.31	-0.17	-0.09	7.31	0.35	6.51
1995	-0.34	-0.44	-0.22	-0.19	10.78	0.65	13.99
1996	-0.36	-0.38	-0.24	-0.19	10.71	0.55	12.66
1997	-0.48	-0.41	-0.31	-0.27	9.03	0.64	14.28
1998	-0.81	-0.77	-0.67	-0.57	5.06	0.23	4.86
1999	-1.00	-0.90	-0.81	-0.64	17.70	0.45	9.20
2000	-0.78	-0.90	-0.74	-0.71	12.08	0.46	8.73
2001	-0.56	-0.48	-0.46	-0.35	8.54	0.51	6.85
2002	-0.52	-0.41	-0.40	-0.29	9.59	0.86	12.16
2003	-0.31	-0.07	-0.23	0.01	7.26	0.45	6.89
2004	-0.24	-0.05	-0.10	0.04	8.31	0.65	10.67
2005	-0.28	-0.08	-0.13	-0.05	6.06	0.54	9.06

Table 3. The low price and small stock premia and splitting activity. Regressions of measures of splitting activity on the low price and small stock premia.

$$s_t = a + bP_{t-1}^{CME} + cP_{t-1}^{SMB} + dA_{t-1} + ep_{t-1}^{EW} + fr_t^{EW} + u_t \text{ and } m_t = a + bP_{t-1}^{CME} + cP_{t-1}^{SMB} + dA_{t-1} + ep_{t-1}^{EW} + fr_t^{EW} + u_t$$

where s is the number of splits in year t , expressed as a percentage of the number of firms, shown in Table 1, m is a summary measure of splitting activity in year t equal to the log of the ratio of the actual average stock price to the $t-1$ stock price grown at the stock return excluding dividends, P^{CME} and P^{SMB} are the low price and small stock premia shown in Table 2, A is the split announcement premium shown in Table 3. In the multivariate regressions, the controls include the log equal weighted average stock price p^{EW} in year $t-1$ and the log equal weighted return r excluding distributions at time t . Each regression has 44 observations. All right-hand-side variables have been standardized to unit variance. T-statistics use standard errors that are robust to heteroskedasticity and autocorrelation of up to three lags.

	<i>Split % s</i>					<i>Splitting Activity m</i>											
VW P_{t-1}^{CME}	0.94				1.33					-0.85							-1.00
	[2.32]				[2.84]					[-2.08]							[-2.42]
EW P_{t-1}^{CME}		1.15															-0.86
		[3.05]															[-1.95]
VW P_{t-1}^{SMB}			1.33														-0.93
			[2.99]														[-2.05]
EW P_{t-1}^{SMB}				1.56													-0.88
				[4.66]													[-1.75]
A_{t-1}					1.62			1.82									-0.79
					[3.37]			[4.20]									[-1.55]
p_{t-1}						1.82	1.59	1.63									-0.74
						[3.32]	[3.28]	[3.92]									[-1.25]
r_t						1.84	1.93	0.92									-1.69
						[1.41]	[1.57]	[0.70]									[-1.70]
Adj. R^2	0.08	0.14	0.19	0.27	0.29	0.18	0.27	0.38	0.12	0.12	0.14	0.13	0.10	0.13	0.14	0.08	

Table 5. The low price and small stock premia and splitting activity: Firm level panel regressions. Regressions of measures of splitting activity on the high price and large stock premia for CRSP-listed stocks 1963-2005.

$$\Pr(s_{i,t} = 1) = a + bP_{t-1}^{CME} + ep_{i,t-1} + fr_{i,t} + gNYSED_{i,t} + h\sigma_{i,t-1} + jp_{i,t-1}^{Industry} + kp_{i,t-1}^{LastSplit} + u_{i,t} \text{ and}$$

$$m_{i,t} = p_{i,t} - p_{i,t-1} - r_{i,t} = a + bP_{t-1}^{CME} + ep_{i,t-1} + fr_{i,t} + gNYSED_{i,t} + h\sigma_{i,t-1} + jp_{i,t-1}^{Industry} + kp_{i,t-1}^{LastSplit} + u_{i,t}$$

$$p_{i,t}^{IPO} = a + bP_{t-1}^{CME} + eNYSED_{i,t} + gp_{i,t-1}^{Industry} + u_{i,t} \text{ and}$$

$$p_{i,t} = a + bP_{t-1}^{CME} + cp_{i,t-1}^{LastSplit} + dr_{i,t}^{LastSplit} + eNYSED_{i,t} + f\sigma_{i,t-1} + gp_{i,t-1}^{Industry} + u_{i,t}$$

where s is an indicator variable equal to one if firm i splits in year t , m is a summary measure of splitting activity in year t equal to the log of the ratio of the stock price p for firm i at year end t to the stock price p for firm i at year end $t-1$ grown at the stock return r for firm i in year t excluding dividends, p^{IPO} is the log first day closing price for newly listed firms, p is the log month-end price for stocks that split in month t , and P^{CME} is the low price premium shown in Table 2. Panel A shows results for s , Panel B shows results for m , Panel C shows results for p^{IPO} , and Panel D shows results for p . Additional control variables include the NYSE market capitalization decile $NYSED$ for firm i , lagged volatility σ based on the previous year's daily returns, the log average price $p^{Industry}$ in the matched Fama and French (1997) industry, and the log of the post split price $p^{LastSplit}$ from the most recent split for firm i . T- and z-statistics use standard errors that are clustered by year. For the probit regressions, the coefficients and associated z-statistics denote the marginal effects and R^2 denotes the pseudo- R^2 .

Specification:	P^{CME}	p	r	$NYSED$	σ	$p^{Industry}$	$p^{LastSplit}$	R^2	N
	b	e	f	g	h	j	k		
Panel A. (Split = 1) = s									
Base Case	0.62 [3.78]	3.98 [9.03]	4.11 [13.26]	-0.40 [-8.43]	29.53 [3.53]			0.24	212,192
Industry Control	0.57 [3.78]	3.90 [9.10]	3.95 [12.46]	-0.34 [-8.77]	22.32 [2.98]	-1.02 [-5.30]		0.25	212,192
Last Split Control	0.99 [3.92]	8.43 [9.99]	7.87 [16.01]	-0.61 [-8.99]	56.58 [3.37]		-3.00 [-8.55]	0.24	88,655
Panel B. Splitting Activity m									
Base Case	-0.88 [-2.22]	-7.32 [-15.68]	-7.43 [-11.79]	0.98 [14.20]	-24.28 [-1.67]			0.12	212,192
Industry Control	-0.83 [-2.13]	-7.34 [-15.73]	-7.44 [-11.72]	0.92 [12.49]	-19.00 [-1.35]	1.26 [3.62]		0.12	212,192
Last Split Control	-0.79 [-1.76]	-10.04 [-16.57]	-9.82 [-12.09]	0.93 [11.02]	-85.23 [-3.95]		2.90 [9.10]	0.14	88,655
Panel C. IPO Price p^{IPO}									
Base case	-0.04 [-1.92]			0.19 [27.71]				0.50	6,719
Industry Control	-0.03 [-1.44]			0.19 [26.80]		0.11 [6.04]		0.51	6,719
Panel D. Post Split Price p									
Base case	-0.05 [-7.21]	0.55 [18.27]	0.52 [21.21]	0.05 [13.17]	-1.16 [-1.71]			0.76	13,127
Industry Control	-0.05 [-7.15]	0.54 [18.20]	0.51 [21.47]	0.05 [13.49]	-0.70 [-1.11]	0.08 [5.48]		0.76	13,127

Table 6. Splitting activity, post-split prices and the future returns on high price and large stocks. Regressions of future excess returns of low price stocks over high price stocks, or of small stocks over large stocks, on splitting activity and post-split price levels, controlling for overall price levels.

$$R_{t+1} = a + bs_t + cp_{t-1}^{EW} + u_t \text{ and } R_{t+1} = a + bp_t + cp_{t-1}^{EW} + u_t$$

where s is the number of splits in year t , expressed as a percentage of the number of firms, shown in Table 1, p is the log of the average post-split stock price in year t , and p^{EW} is the log equal weighted average stock price in year $t-1$. The coefficient on p^{EW} is not reported. The sample period includes 1963-2005 annual returns. T-statistics in the second stage regression use standard errors that are robust to heteroskedasticity and autocorrelation up to three years of lags.

	N	Split % s				Post Split Price p			
		R_{t+1} EW		R_{t+1} VW		R_{t+1} EW		R_{t+1} VW	
		b	Adj-R²	b	Adj-R²	b	Adj-R²	b	Adj-R²
Panel A: Relative returns of low-price stocks over high-price stocks									
$R_{Cheapt+1} - R_{Expt+1}$	43	-2.62		-1.96		0.40		0.28	
		[-3.53]	0.06	[-2.43]	0.04	[2.62]	0.01	[2.84]	0.06
$R_{Cheapt+2} - R_{Expt+2}$	42	-4.70		-3.52		0.60		0.43	
		[-2.92]	0.07	[-1.98]	0.05	[2.27]	0.00	[2.22]	0.05
$R_{Cheapt+3} - R_{Expt+3}$	41	-8.27		-6.49		1.02		0.80	
		[-3.24]	0.16	[-2.35]	0.12	[2.58]	0.04	[2.22]	0.09
Panel B: Relative returns of small stocks over large stocks									
$R_{Smallt+1} - R_{Larget+1}$	43	-2.39		-2.18		0.30		0.26	
		[-3.79]	0.05	[-3.35]	0.06	[1.75]	0.00	[1.84]	0.00
$R_{Smallt+2} - R_{Larget+2}$	42	-4.42		-3.98		0.47		0.40	
		[-2.96]	0.05	[-2.46]	0.06	[1.87]	-0.01	[1.80]	-0.02
$R_{Smallt+3} - R_{Larget+3}$	41	-7.94		-7.21		0.86		0.76	
		[-3.00]	0.14	[-2.62]	0.14	[2.37]	0.02	[2.31]	0.02