

Stock Splits to Profit Insider Trading Lessons from an Emerging Market

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Abstract

Stock splits have long presented financial puzzles: Why are they undertaken? Why are they associated with abnormal returns? Abnormal returns, particularly those coming shortly before a split's announcement date, should raise strong suspicions of insider trading, particularly in nations with weak regulatory structures. We examined the 718 split events in the emerging stock market of Vietnam from 2007 through 2011. We found evidence consistent with illegal insider trading, particularly in firms that were vulnerable to insider manipulation and, therefore, more likely to split their stocks. When vulnerable firms' stocks did split, they provided significant excess short-term returns. Tellingly, the abnormal returns on those stocks prior to the split announcements were also extremely high, indeed higher than their abnormal post-announcement returns. Moreover, trading volume increased prior to the split announcement date. This suspicious pattern is what we would expect if insiders were trading on their knowledge. We propose that illegal insider trading in contexts where it is possible to escape serious penalty provides a previously undiscussed and cogent explanation for both stock splits and abnormal short-term returns.

Keywords: insider trading, stock split, state ownership, emerging market, corporate governance.

JEL Classifications: G32, G15, G34

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1. Introduction

In recent years, insider trading has received increased attention from regulatory agencies, the investment public, and academics. In the United States, for example, a number of high-profile cases have been prosecuted and widely publicized.¹ Official regulatory policies have also tightened considerably worldwide. From 1990 to 2002, the number of developed countries that had insider-trading laws governing their stock exchanges increased from 55 percent to 100 percent (Bhattacharya and Daouk, 2002). Over the same period, the number of developing countries with insider-trading laws increased from 39 percent to 80 percent.

A literature has started to emerge on both legal and illegal insider trading. On legal insider trading, empirical evidence has linked insider transactions to market-timing, liquidity, and diversification motivations (Lakonishok and Lee, 2001; and Jeng, Metrick, and Zeckhauser, 2003). Illegal insider trading has proven much harder to study, given that perpetrators try to cover their tracks and that broadly effective detection methods are not available. Thus, direct data on such trades is lacking. Nevertheless, some existing studies have creatively detected evidence of illegal trades (Bhattacharya, Daouk, Jorgenson, and Kehr, 2000; and Cheng, Nagar and Rajan, 2007).² Typically, inside traders unfairly--and in most nations illegally--exploit their informational advantage about upcoming corporate events, such as mergers and acquisitions. However, inside traders have

¹ The U.S. Securities and Exchange Commission prosecuted about 50 cases each year from 2004 to 2011. High-profile insider trading cases involved Samuel Waksal, the former CEO of ImClone, convicted in 2002, as was his famous investor Martha Stewart; Jeffrey Skilling, the former Enron president, convicted in 2006; Mark E. Lenowitz, hedge fund manager at Chelsey Capital, convicted in 2007; and Raj Rajaratnam, founder of hedge fund firm Galleon Group, convicted in 2011. In November 2013, SAC Capital Advisors was the first large Wall Street firm to plead guilty in a large illegal insider trading case. SAC agreed to pay a record fine of 1.2 billion dollars and stop managing money for outside clients.

² Bhattacharya et al. (2000) identified unrestricted insider trading as the cause of the non-reaction of share-price to corporate news in the Bolsa Mexicana de Valores. Cheng et al. (2007) proved that insiders took advantage of Form 5 to delay the disclosure of their share sales prior to unfavorable earnings announcements.

not been accused of creating such events to generate profitable trade opportunities. Our study will provide evidence that illegal inside traders in Vietnam, a nation with weak regulatory enforcement, actually created and manipulated stock-split events in order to secure profits.³

Stock splits have received extensive examination for a long time, but the reasons for splits and their associated abnormal returns remain unclear. (We use the terms “abnormal returns” and “excess returns” interchangeably to indicate stock price movements above market returns.) Stock splits apparently affect neither the cash flows nor the capital structures of firms, although those factors could boost stock prices. Despite this, a stock split can produce significant positive abnormal returns, both when the split is announced and when it is executed (Dolley, 1933; Barker, 1956; and Hausman, West, and Largay, 1971). The current literature provides three explanations for such excess returns. The *trading-range* explanation posits that a firm splits its stocks to slice the stock price so that it falls within a lower price range, which is preferred by many investors (Copeland, 1979; and Amihud, Mendelson, and Uno, 1999). The *liquidity* explanation posits that a stock split increases the liquidity of a firm’s stock, which in turn increases its split-adjusted price (Muscarella and Vetsuypens, 1996; and Lin, Singh, and Yu, 2009). The *signaling* explanation asserts that split decisions overcome informational asymmetries by disseminating good information that previously was known only to the firm’s management (Fama, Fisher, Jensen, and Roll, 1969; Byun and Rozeff, 2003; and Ikenberry, Rankine, and Stice, 1996). However, these theories have been debated by Copeland (1979); Lamoureux and Poon (1987); and Desai, Nimalendran, and Venkataraman (1998).⁴

Our study proposes a new explanation for why stocks are split. If stock splits can be expected to produce excess returns, at least over some period, they become an attractive strategy for

³ World Bank (2006) “Vietnam--Report on the Observance of Standards and Codes (ROSC): corporate governance country assessment.”

⁴ In an ongoing project, we study how emerging markets with weak legal system react to stock splits differently from developed markets.

illegal insider trading. However, to date, no link between stock splits and insider trading has been discussed in the literature. We know of only three studies that look at stock splits and insiders; those studies do not consider insider trading. Han and Suk (1998) show that greater insider ownership correlates positively with stock splits. They explain this as a use of signaling: when insiders own a great deal of stock, the firm's signal of good performance to the market should be more credible. Ma, Sun, and Yur-Austin (2000) find that insiders tend to sell before splits, but the authors conclude that these sales are not related to the insiders' private information. Devos, Elliott, and Warr (2010) show that executives who have option-based compensation tend to split their companies' stocks more frequently, and the characteristics of their option-based compensation influence the magnitude of the split factor. In this paper, we will demonstrate that insider trading provides a major motivation for stock splits, at least in markets where it is unlikely to be punished.

Vietnam is such a market. The stock exchanges in Ho Chi Minh City and Hanoi were opened in 2000 and 2006, respectively. The regulations there, in principle, prohibit insider trading; but the implementation of these regulations is lax, as in many other emerging markets. During the first decade of the Vietnamese market's existence, insider trading is believed to have been widespread; however, no case was ever prosecuted.⁵

In Vietnam's market, on average, a stock's price increases by 8.4 percent in the 30 trading day period before a split announcement, and increases another 7.4 percent after the announcement, though it subsequently falls back to its initial level. This bubble has an average cycle of around 270 days, but the length varies greatly across both splits and firms (Please see Figure 1). The surprising fact is that this bubble reappears for each new split; the market does not seem to learn to avoid overpaying in the bubble after a split. About eighty percent of participants in this stock market are

⁵ According to Tuoi Tre News Paper, June 29, 2011, the case of Le Van Dung, CEO of Vien Dong Pharmaceutical JSC, in 2011, was the first criminal prosecution of illegal insider trading and stock manipulation activities over the eleven-year history of the Vietnam stock market.

individual investors, mostly unsophisticated,⁶ with limited ability to evaluate the effect of stock-split news on the values of the firms (Saigon Tiep Thi, 2010). Instead, they rely on past experience and the behavior of other investors to make their trade decisions. This leads to momentum-investment behavior and to repeated bubbles. Given the market's consistent behavior, insiders can simply buy a stock at prevailing prices, announce a stock split, wait for the price to rise, sell the stock before it reverts, and reap a handsome profit.

What might prevent insiders from orchestrating stock splits for their own benefit? First, vigorous prosecution of insider trading would be a strong deterrent. Vietnam, like many emerging markets, lacks such prosecution. Second, good corporate governance would prevent splitting to benefit insiders. Given the bubble that follows, stock splits bring a short-term stock price increase at a cost of higher volatility. That volatility raises the long-term risk profile for a stock.⁷ In fact, after a split, the standard volatility measure of these stocks increases by 13% on average. Thus, long-term investors, if they understood the situation, would discourage the management from conducting stock splits. In many firms, investors, who may be ill-informed, make few or unsuccessful efforts to discourage this practice.

Our study focuses on two measurable characteristics of firms that affect their governance: their ownership and their capitalization levels. Ownership structure has been demonstrated, both theoretically and empirically, to be a predictor of corporate governance quality (Shleifer and Vishny, 1997; and Boubakri, Cosset, and Guedhami, 2005). In emerging markets, the link between state ownership and market value and performance of public companies has been identified in the literature. Political connections prove important and valuable. They lead to more favorable pricing in

⁶ According to Capon, Pasini, Phuong, Anh, and Chi (2011), about 90% of trading accounts in Vietnam were opened from 2007 to 2010. This means that most investors joined the market at the height of the stock bubble and only had 3 or 4 years of experience, at most.

⁷ As we discuss below, current stockholders also lose from stock splits because of taxes mistakenly imposed on the new shares received.

an IPO (Francis, Hasan and Sun, 2009), and to superior performance in a merger (Ma, Sun, Waisman and Zhu, 2016). State ownership has been shown to be associated with poor governance (Bushman, Piotroski, and Smith, 2004; Wang, Wong, and Xia, 2008; Aharony, Lee, and Wong, 2000; and Qian, 1996). (Bushman et al. looks across countries, both developed and developing. The other six studies cited for emerging markets focus on China.) Government officials, who represent the state's share in a firm, often also own some shares of the firm, either directly or indirectly through family members. They enjoy substantial voting power thanks to their control of the state's share, which they can deploy to benefit their own relatively small positions. Additionally, they can engage in a strategy of buying additional shares shortly before they announce a split. This asymmetry leads to a problem: officials can use their voting power to manipulate a stock split to benefit themselves at the expense of the other owners of the firm's shares.

The capitalization level of a firm affects the likelihood of insider trading, through at least three mechanisms. First, small capitalization means that the number of investors and analysts who know the firm well will be small. This magnifies the informational asymmetry between the firm's insiders and its outside investors. Second, small capitalization implies that a small group of investors can hold enough voting power to promote a stock split. Third, small capitalization makes it easier for a small group of investors to buy and sell a stock as a means to create momentum in its price. Indeed, size has long been used as an indicator of corporate governance, with bigger being better (Diamond and Verrecchia, 1991; and Black, Jang, and Kim, 2006). The current study uses state ownership and capitalization size as two markers of a firm's vulnerability to insider trading. We will refer to firms with large state ownership and/or small capitalization as *vulnerable firms*.

If stock splits at vulnerable firms are more likely to be exploited by insiders, the evidence would manifest itself in several ways. First, vulnerable firms would be more likely to split their stocks because insiders in these firms would promote that. In fact, we find that a state-owned firm is

12.5 percent more likely to split its stock than a privately owned firm.⁸ Second, vulnerable firms would experience greater short-term abnormal returns from splits than non-vulnerable firms. The inside traders would endeavor to increase short-term returns to provide a source of personal profits. In fact, we find that switching from predominantly private ownership to 50% state ownership increases short-term abnormal returns by 9.8 percentage points in the period from 30 days before split announcements to 30 days after split announcements. Focusing on the firms in the lower half of capitalization boosts short-term abnormal returns by 3.9 percentage points. Third, in comparison to other firms, vulnerable firms would have their stock prices increase relatively more before, rather than after, the split. This is because before the split, insiders at vulnerable firms would start buying stock in anticipation of the split that they would soon be creating. We investigate these hypotheses using standard event-study methods. To preview results, our analyses indicate that, on average, the differences between pre-split and post-split returns for state-owned firms in the study periods of 15 days before and after (-15, +15) and 30 days before and after (-30, +30) are 15.25 and 21.6 percentage points, while the respective figures for private firms are 6.8 and 11.4 percentage points. Halving capitalization increases the differences between pre-split and post-split returns by 3.2 and 6.2 percentage points.

Studies on illegal insider trading generally rely on creative and indirect measures of that activity, given the lack of access to confidential trade-log data. We follow in this tradition. We show that stock prices surrounding splits at vulnerable firms behave in ways that are highly consistent with insider trading. We also discuss alternative interpretations of such behavior and their plausibility.

The remainder of the paper is organized as follows. Section 2 briefly describes Vietnam's stock market and key patterns in our data sample. Section 3 presents our hypotheses about insider

⁸ In this study, firms with state ownership of over 50% are considered state-owned firms. Firms with less state ownership are considered private firms.

trading, our empirical strategy, and our results. Section 4 explores alternative interpretations of the results. Section 5 discusses the study's limitations and offers our conclusions.

2. Vietnam's context and descriptive analysis

2.1. Vietnam's stock market

Vietnam's first bourse, the Ho Chi Minh Stock Exchange (HOSE), was established in Ho Chi Minh City in 2000. Its second bourse, the Hanoi Stock Exchange (HNX), was opened in Hanoi in 2006. The operations of the two exchanges are overseen by the State Securities Commission (SSC), the government agency primarily responsible for enforcing the securities laws and regulating the securities industry in Vietnam.

During the fourteen-year period January 2000 through December 2013, Vietnam's stock exchanges have experienced three main phases. From 2000 to 2004, the market was in a nascent stage, with fewer than ten firms having their shares listed. The total market capitalization of the listed firms represented less than 1% of the nation's GDP. In the period from 2005 to 2007, the market boomed; the stock index tripled during that period. The number of listed firms increased to 240 by the end of 2007. At its peak in 2007, the total market capitalization of the listed firms was equal to about 30% of the GDP. A speculative bubble built up; it burst in early 2008, as Vietnam's economy experienced its most severe crisis since the early 1990s. By March 2009, the market had declined 80% from its peak in 2007. The market rallied briefly in the second half of 2009. From 2010 to the end of 2013, Vietnam's stock index moved sideways within a narrow band, at about 50% of its 2007 peak.

Stock trading on HOSE and HNX is conducted via automated order-matching systems. Caps on price movements have been in effect since the first day of the market's operations. On the

first trading day, a newly listed stock on the HOSE can only trade within a 40% band of the registered listing price. On subsequent trading days, trading limits (for bonds and equities) of 5% of the previous closing price apply. For firms listed on HNX, there are no price limits on the first trading day; but trading limits of 7% of the previous average price apply on subsequent trading days. Besides the price limits, Vietnam's securities laws also restrict other important trading practices, such as intraday trading, leverage, and short sales. Intraday trading of the same stock was totally prohibited in the past and has only been allowed since August 8, 2011. Leverage had not been allowed until recently; and short sales are strictly banned in Vietnam's stock market, which makes upward price manipulation easier to achieve and less risky, since arbitrageurs are prohibited from participation on the sell side.

These trading restrictions in Vietnam's stock market are intended to promote the growth of the market and to prevent market manipulation. However, Bhattacharya and Daouk (2009) show that, in many countries, a stock market lacking securities laws functions more effectively than can a stock market with poorly enforced securities laws. This finding is particularly relevant to Vietnam's stock market. Vietnam's regulators place strict regulations on the books, but the minimal enforcement of those regulations indirectly enables fraudulent activities. Deceitful traders are able to take advantage of the law-abiding traders, who follow the regulations, and to take even greater advantage of naïve traders, who unrealistically feel protected by the regulations. For example, the intraday trading restriction does not allow traders to execute both buy and sell transactions on a single trading day. Additionally, the required waiting time before settlement for buy/sell orders, except for block trades of over 100,000 shares, is four trading days. This means that a law-abiding trader who opens a long or short position for a stock during a bubble will have to wait for four days to close the position. Deceitful traders, on the other hand, usually maintain multiple accounts under

different identities, and thereby circumvent the regulations, selling stocks illegally before the 4-day minimum and outmaneuvering law-abiding traders.

In this lax legal environment, insider trading on private information has emerged as a significant and prevalent problem. Under the laws, insiders and large shareholders (those holding more than 5% of common shares) are required to disclose their trades 7 days before executing the transactions, and again within 7 days after completing them. However, the fine for violating these trade-disclosure requirements is minimal, normally ranging from several hundred dollars to several thousand dollars per case. As a result, insiders can afford to trade illegally at optimal times and pay any fines later. In some cases, insiders even use the trade-disclosure requirements to ambush the market, by declaring a false intent to buy as a way of masking their actual plan to sell, and vice versa.

In a well-known 2010 masking maneuver, Phuong Nguyen, holding 8.7% of VICEM Materials Transport Cement JSC (ticker symbol: VTV), declared her plan to buy another 20.3% share interest of the firm at a 10% premium over the market price. In the month after the announcement, VTV's share price zoomed up 57%. In the meantime, Phuong sold her entire 8.7% holding of VTV without disclosure. VTV's share price then fell back to the pre-announcement level (Thanh Nien, 2010), and Phuong and her co-conspirators gained at least \$500,000 from the transactions. She later paid an \$18,500 fine for violations associated with her patently false "disclosure."

Individual investors dominate Vietnam's stock market. Indeed, such investors, mainly short-term speculators, account for about 80% of the trading volume by value of the two exchanges in Vietnam. These investors are typically government employees, small business owners, or farmers; they may have reaped some windfall money from the recent real estate boom or borrowed from banks. Most individual investors lack professional investment knowledge and simply follow the

herd. My and Truong (2011) showed that “... given the structure of Vietnamese stock market, investors are more likely to follow the actions of others believed to be better informed about the market.” The herding behavior and the lack of investment knowledge make individual investors an easy target for market manipulators, including inside traders. These problems are compounded because the large securities firms that might bring prices into line do not exist.

The high level of state ownership in a number of public firms magnifies the insider-trading problem. Managers of state-owned firms often represent the state at board of director and investor meetings. However, the government has no effective mechanism for supervising its representatives. The managers usually have significant control power but only a small share interest in the firms. This leads to principal-agent problems and to unfair treatment of outside shareholders in most state-owned firms. Compared to private firms, the management of state-owned firms is less likely to focus on shareholder value, and more likely to engage in self-dealing and insider trading.

In recent years, the media and the SSC have uncovered a number of insider-trading violations and stock-price manipulations in Vietnam. Illegal inside traders usually are firm managers, brokerage firms, large investors, or groups of large investors; these possess informational and trading advantages over the investment public.⁹ The most common trading violations in Vietnam are failures to disclose insiders’ transactions, pump-and-dump-practices, and rumor spreading. Although these deceptive practices are common, few cases have been investigated; only one case was criminally prosecuted.¹⁰

⁹ According to the SSC, on average, there were 4 to 5 trading-disclosure violations per month from 2007 to 2010 in Vietnam.

¹⁰ In the prosecuted case, Dung Le, chairman of Vien Dong Pharma JSC (ticker symbol: DVD), and three other people were arrested for manipulating the stock price of DVD and Ha Tay Pharmaceutical JSC (ticker symbol: DHT). From Jan 2010 to Sept 2010, with the help of 4 brokerage firms, Dung and his brother conducted 1,725 trades among 12 different accounts to drive up DVD’s price 120% and DHT’s price 300%. He then used false revenue figures to inflate DVD’s income and started acquisition rumors to sell his stock holdings. DVD went bankrupt after his arrest (Son, 2010; Ha, 2010; and Linh, 2011A).

In 2010, the prevalence of illegal trading activities induced the government and the National Assembly to make major changes in the securities laws and regulations. In December of that year, the government and the National Assembly passed new amendments to the securities law[s] to impose higher penalties and conduct more criminal prosecutions of violations. For illegal insider-trading activities, the new laws allow all related profits to be confiscated and further penalties to be imposed. Criminal prosecutions can now be undertaken for illegal insider trading, rumor spreading, and fraudulent accounting practices (Capon et al., 2011). In several notable cases since then, the SSC has imposed new penalties on inside-information traders and manipulators (Linh, 2011B).

The first stock-split event in Vietnam's stock market took place in 2002. Refrigeration Electrical Engineering Corp. (REE) executed a 1.2/1 split (1.2 new shares for 1 old share). Its market-adjusted excess return in the week after the split announcement was 20%. In their first 4 years, the stock markets of Vietnam only recorded 3 other stock splits. Since 2006, however, stock splits have become a frequent corporate event in the stock market of Vietnam. From January 2007 to May 2011, 718 split events were conducted by 393 of the 686 firms listed on the HOSE and the HNX, implying that, on average, nearly a quarter of the firms split their stocks in a year. By contrast, in the United States, on average only about 10 percent of the firms split their stocks in a year (Desai et al., 1998).

In developed stock markets, Easley, O'Hara, and Saar (2001) noticed that stock splits often attract uninformed traders and small investors. In Vietnam's developing stock market, stock splits have far greater impacts, due in part to the naiveté of investors and regulators as to the nature of the underlying corporate events. For example, in 2010, Vietnam's Ministry of Finance incorrectly categorized the new shares that shareholders receive after stock splits as gains; it even imposed a 5% income tax on the new stock received in splits. The increase in the number of shares is still being treated as a gain for the shareholders. In addition, the effects of nominal prices on investors'

securities preferences, as noted by Baker, Greenwood, and Wurgler (2009), are also significant in Vietnam's stock market. All stocks in Vietnam are required by law to have a par value of VND10,000. For naïve individual investors, that regulation creates an illusion that the lower the stock's nominal price is, especially below VND10,000, the greater a bargain the stock is. Given the attraction of stock splits to investors, strategic splits prove to be an attractive mechanism by which insiders exploit investor naiveté.

2.2. The data sample

The data for this study were provided by StoxPlus Corporation, a major provider of financial data on Vietnam's stock market. The data sample includes all stock splits and stock dividends during the period from January 2007 to May 2011, a total of 718 splits. This time span includes an initial period of high growth in stock prices in Vietnam, followed by a period of decline. *Stock split*, *stock dividend*, and *bonus shares* are the terms which firms in Vietnam use interchangeably to indicate a stock split, a terminology that we adopt. The sample excludes discount share issuances to current shareholders, a hybrid form of stock sale and stock split.

The dates of the split announcements and executions were recorded in detail by StoxPlus. We cross checked a random sample of this information with SSC's database of firm filings and verified its accuracy. We employ a panel dataset on stock prices, with 426,931 daily observations for all firms listed on the exchanges. This dataset includes daily trading data, firms' financial ratios, and stock-split information. For the pre-split periods, stock prices and trading volumes are adjusted by the split factors. Stock prices and trading volumes are also adjusted for other events, such as cash dividends and discount issuances to shareholders, that occurred throughout the period under examination. Financial ratios are calculated by StoxPlus according to the standard methods suggested by the CFA Institute.

Data on market indices (called the VN Index and the HNX Index) are provided daily by each exchange. These are market-value-weighted indices that include all listed stocks on their respective exchanges. The indices include shares eligible for free transfer; they exclude restricted shares.¹¹

2.3. Descriptive Analysis

The sample means for the variables used in our analysis are shown in Table 1. The first column reports the means for all firms in the sample; the next three columns present values for the 25th, 50th and 75th percentiles. The fifth column shows the number of observations for each variable. Because most of the regressions in our analysis use the dataset of split announcements, the greatest number of observations is 718, which is the total number of stock splits in our sample.

[Table 1 about here]

Vietnamese firms are quite small compared to those in developed-nation markets. The mean and median firm sizes, as measured by market capitalization, are VND1,880 billion and VND342 billion, respectively. This is equivalent to US\$89.5 million and US\$16.3 million, respectively. The government holds a significant proportion of shares in many of the stocks. The mean and median of state-ownership percentages are 23.2% and 17.0% among the firms that split stocks.

Among the 718 stock splits, we have data on the realized leading earnings growth on 352. The remaining 366 splits lack this data because they occurred within one year from the start or the end of the data period. The mean and median of the realized leading earnings growth are -1.2% and 0.3%. The liquidity standard measure is the one-month share turnover, that is, the ratio of 30-day average trading volume to the total number of outstanding shares. We measure a stock's return

¹¹ Some high market-capitalization firms such as Vietcombank (ticker symbol: VCB) or Sai Gon-Quy Nhon Mining Corporation (ticker symbol: SQC) account for insignificant parts of the indices because only a small portion of the firms' common shares can be transferred freely. Therefore, the impacts of these stocks on the indices are smaller than those of firms which have similar market capitalization but more free-transfer shares.

volatility in a 30-day period as the standard deviation of its daily returns. The return volatility change post-split execution is measured by the ratio of post-split volatility to pre-split volatility minus one. Stocks that split increase their volatility. The mean and median increases for our sample are 9.9% and 3.6%, respectively.

[Figure 1 about here]

Figure 1 shows the average cumulative market-adjusted return (CMAR) for the period from 30 days before to 240 days after the split announcement. Figure 2 shows the change in trading volume, measured by the ratio of daily trading volume to total outstanding shares, for the period from 30 days before to 30 days after the split announcement. (In this study, “split” refers to the date of the split announcement and not to the date of the actual split.) Split stocks experience a dramatic bubble. The average CMAR rises sharply before the split announcement and continues upward until it peaks at 15%, roughly 80 days after the announcement. After that, the average CMAR falls steadily, returning to its initial level around 220 days after the split announcement.¹² This long period indicates that this is not a momentary market overshoot, but rather an extended bubble facilitated by naïve speculators who misjudge the implications of splits.

[Figure 2 about here]

The magnitude of the bubble is impressive. Table 2 presents test results for the cumulative market-adjusted returns around the split announcements and for the differences between pre-announcement and post-announcement returns. Panel A shows evidence that stock splits provide significantly positive market-adjusted returns. The results in column 1 show that split stocks outperform the market by an average of 12.8% in the event window ($-30, +30$) of the split

¹² This is longer than the 140 days mentioned in the introduction because we include the pre-announcement run-ups in the bubble. The average bubble then expands from Day -30 (30 days before split announcements) to Day +220 (220 days after split announcements).

announcements. The t-statistic of 7.16 indicates that the average cumulative market-adjusted return is significant at the 99.95% level. The non-parametric Wilcoxon test confirms this result. The majority of the run-up occurs before the split announcement, which suggests insider [trading/buying]. The pre-announcement CMAR for the period $(-30, +0)$ is 9.27%. However, we cannot disentangle the three potential contributors to this run up: insiders who are buying to profit from further price increases, leakage (perhaps purposeful) of information to non-insiders, and a momentum response to an initial run-up resulting from insider purchases.

[Table 2 about here]

This short-term abnormal return from splits reverts to zero over an extended period, as indicated in Figure 1. Panel A also shows that the cumulative market-adjusted returns for the periods $(-30, +210)$ and $(-30, +240)$ do not differ significantly from zero. This reversion behavior is important because it supports the insider-trading explanation over alternative explanations, such as the liquidity and signaling theories, or, indeed, any theory that suggests that stock splits enhance long-run stock values. The liquidity and signaling theories rely on fundamental changes, such as a decreased cost of equity (Lin et al., 2009), or revealed information about long-term outperformance (Byun and Rozeff, 2003). Such changes would produce sustained value increases around stock splits rather than short-term abnormal returns followed by full reversion, the pattern seen in Vietnam. Such reversion suggests some mode of manipulation to achieve stock splits, rather than fundamental changes, such as improved liquidity or positive signals.

The pre-announcement abnormal returns have often been used both by market regulators and scholars to detect trades on private information. Meulbroek (1992) shows that the stock market recognizes informed trading and incorporates a major proportion of the information into the stock price before the information becomes public. Olmo, Pilbeam, and Pouliot (2011) point out that a

large part of suspected insider trading occurs in the 25 days prior to the release of market-sensitive information. Building on these studies, we use the difference between pre-announcement return and post-announcement return to indicate the magnitude of illegal insider trading around each split announcement. Specifically, we employ the following formula to calculate this difference in the period $(-j, +j)$:

$$\text{Dif}_{(-j, +j)} = \left[\frac{P_{(0)} - P_{(-j)}}{P_{(-j)}} - \frac{\text{Index}_{(0)} - \text{Index}_{(-j)}}{\text{Index}_{(-j)}} \right] - \left[\frac{P_{(j)} - P_{(0)}}{P_{(-j)}} - \frac{\text{Index}_{(j)} - \text{Index}_{(0)}}{\text{Index}_{(-j)}} \right]$$

(Formula 1)

Here $P_{(j)}$ is the share price at time (j) ; and $\text{Index}_{(j)}$ is the value of the relevant market index at time (j) . The expression in the first pair of brackets indicates the pre-announcement market-adjusted return. The expression in the second pair indicates the post-announcement market-adjusted return. In both bracket pairs, the growth in share price and in the index's value are respectively divided by the share price and the index's value on the benchmark date $(-j)$. This division eliminates concerns about units for share prices and the market index. Using the same benchmark date $(-j)$ for the two components of the calculation ensures that, if pre-announcement market-adjusted returns are higher than post-announcement market-adjusted returns, the indicator $\text{Dif}_{(-j, +j)}$ will always be positive, and vice versa.

An alternative approach would employ the ratio, instead of the difference, of the two components above. However, this ratio would be difficult to interpret when it takes a negative value. In that case, we would not know whether the stock price falls before or after the split announcement. Therefore, we use the difference indicator, which allows us to deal with the cases where the post-announcement returns continue to increase and the cases where the post-announcement returns start to decline. The greater the difference, the greater is the impact of buying

that takes place before the announcement associated with the split. We refer to this as inside buying, since all of it is launched by insiders; however, some is, no doubt, due to information leakage or momentum buying in response to insiders boosting the stock price.

Using this formula, Panel B in Table 2, column 1, provides strong evidence of insider buying. It also shows that returns from illegal insider trading are significant. In the period $(-15,+15)$, on average, the pre-announcement return is higher than the post-announcement return by 10.08 percentage points. This difference is significant at the 99% confidence level, using either a t-test or a non-parametric Wilcoxon test. Similarly, in the period $(-30,+30)$, the pre-announcement return is higher than the post-announcement return by 7.28 percentage points, also significant at the 99% confidence level in both tests. In line with the findings by Meulbroek (1992) and Olmo et al. (2011), the fact that stock prices move sharply higher before stock splits is consistent with the insider-trading explanation. Next, by analyzing stock splits by firms vulnerable to insider problems, we will show further evidence of insider trading. That is, we find insider buying where we would expect to find it.

3. Insider Trading in Vulnerable Firms

3.1. Hypotheses

If inside traders in vulnerable firms are particularly able to exploit stock splits, there should be at least three disparate tracings of evidence. First, vulnerable firms should be more aggressive than non-vulnerable firms in splitting their stocks. Second, abnormal returns from splits by vulnerable firms should be higher due to more active manipulation. Third, the differences between the pre-split and post-split abnormal returns should be greater for vulnerable firms than for non-vulnerable firms. These expectations are developed into three corresponding hypotheses below.

Each hypothesis helps support our overall proposition that illegal insider trading induces stock splits; each explains the splits' abnormal returns in the markets of Vietnam.

Hypothesis 1: *Vulnerable firms are more likely than non-vulnerable firms to split their stocks.*

Vulnerable firms, as mentioned, are defined above as having high state ownership and/or small market capitalization levels. Firms with high state ownership tend to be bureaucratic and should, therefore, other factors being equal, be less active than private firms in conducting a broad array of corporate events, such as stock splits. Also, firms with small market capitalization tend to have low unit stock prices and should, therefore, be less likely to split their stocks for trading-range reasons.¹³

However, the potential for insiders to promote personally beneficial stock splits fosters the opposite tendency. High state ownership or small market capitalization gives a small group of insiders enough voting leverage to push for a stock split that, in the long term, does not benefit, and indeed slightly harms,¹⁴ the shareholders as a whole, while benefiting the insiders personally since they can trade before the split is announced.¹⁵ Cheng et al. (2007) used the case of delayed-disclosure trades to show that strong corporate governance can reduce information-based insider trading. Expanding this finding to the specific case of stock splits, the test of our Hypothesis 1 will indicate whether vulnerable firms are more likely than non-vulnerable firms to split their stocks.

¹³ In our sample, share prices of 69.1% of firms whose market capitalization is below the market median are below the market-median share price.

¹⁴ We refer to the loss due to increased volatility. Since 2010, shareholders also incurred a tax on the new shares received.

¹⁵ Our test of this hypothesis follows the approach of Bertrand and Mullainathan (2001), which detects insiders' opportunism in a corporate event by testing the relationship between the quality of corporate governance and the frequency of the event. Cheng, Nagar, and Rajan (2007) also apply this approach to show that strong corporate governance can reduce information-based insider trading in Form-5 sales.

Hypothesis 2: *Vulnerable firms will have higher abnormal returns around stock splits than non-vulnerable firms.*

As described in the previous section, insiders typically start by secretly buying stocks, then announce the split decision, and then sell their stocks when the price reaches their expected appreciated level in response to the split announcement. This strategy alone would be sufficient if naïve outsiders were highly likely to believe that a stock would rise in response to a split announcement. But some of the naïve outsiders may respond solely or predominantly to momentum in the stock price. Recognizing this, the inside traders who initially promote a split may undertake to manipulate the stock price after the announcement. In a strategy that is referred to as “pump and dump,” they actively buy and sell to themselves or each other to increase the trading volume, boost the short-term price, and thereby attract momentum traders. Pump-and-dump schemes are much cheaper to accomplish in firms with smaller market capitalizations, because the illiquidity of these stocks make the stock prices very sensitive to supply or demand surges. Similarly, it is easier to boost prices and trade volumes in firms with high state ownership because the government rarely buys or sells its holdings. Therefore, we expect that the stock prices of firms with high state ownership and/or low market-capitalization levels will be manipulated upward more intensely after a split, and we conclude that significant run-ups that eventually collapse reveal pump-and-dump traders at work.

Hypothesis 3: *Vulnerable firms will exhibit a greater difference between pre-split and post-split returns than non-vulnerable firms.*

Before the split date, inside traders know about the split; outsiders do not. After the split date, everyone has similar information, at least about the split itself. Consequently, net insider-buying activity should be more intense before, rather than after, the split date. As discussed in Section 2, if stock prices increase significantly prior to the split date, that is highly suspicious.

Further, if the pre-split price increase as compared to the post-split increase is greater for vulnerable firms than for non-vulnerable firms, that provides further evidence for insider trading in the vulnerable firms.

3.2. Computing abnormal returns

A key element of our analyses requires the computation of abnormal returns in response to stock splits. There are two established methods for calculating these returns. The *market-adjusted-return* method computes the abnormal returns as the difference between the stock's actual return and the market's returns. The *market-model-residual* method computes the abnormal returns as the difference between the stock's actual return and the predicted returns using the stock's historical returns. The main advantage of the market-model-residual method is that it permits a different relationship between each stock's returns and the market's average returns. However, this method suffers two major limitations when assessing returns over an extended period. First, the relationship between a firm's stock price and the market average (as measured by the regression beta coefficient) may not be stationary, particularly around stock splits. This renders unreliable the estimates of expected returns after split announcements. Brennan and Copeland (1988) report that firms' betas increase about 20% after split announcements, and about 30% after split executions. They find that, seventy-five days after split executions, betas remain about eighteen percent above their pre-split levels. Second, the market-model-residual method would significantly reduce the size of our data sample, because this method would exclude a number of stock splits which were conducted by newly listed firms. Out of 718 stock split events, slightly more than 200 would have enough observations for our tests of hypotheses. This small sample size would reduce the reliability of those tests.

We choose the *market-adjusted return method* to measure the abnormal returns of split stocks in our analysis. This method, which is appropriate to an extended study period and allows for a larger sample size than the market-model residual method, has previously been used in other studies addressing similar contexts (De Bondt and Thaler, 1985; and Charitou, Vafeas, and Zachariades, 2005). The market-adjusted return is calculated as the difference between the stock's raw return and the return of the market. Although the model is based on the simple assumption that the normal return is equal to the market return, Brown and Warner (1980, 1985) show that the model often provides estimates similar to those of more sophisticated models that control for other factors.¹⁶

In each study period, intraday market-adjusted returns are accumulated to find the cumulative market-adjusted return for the period. The market-adjusted returns and the cumulative market-adjusted returns are then used for tests throughout this study. Figure 1 graphically displays the average cumulative market-adjusted returns for all split announcements under study.

3.3. Testing for Hypothesis 1

Hypothesis 1 states that vulnerable firms are more likely than non-vulnerable firms to split their stocks. To test this hypothesis, we need to identify the relationship between the vulnerability of a firm and the probability that it will split its stock in a certain period. To do so, we need to choose a certain period and then study firms that exist for that whole period. We recognize that a longer study period would offer both advantages and disadvantages. For example, an earlier starting date would cover more splits but would reduce the sample of firms, since few firms were listed on the Vietnamese market in its early years. Given this tradeoff, we choose to count splits from January 1,

¹⁶ We also conducted our tests using the market-model residual method. Stock splits of firms which had been traded on the market for less than one year are excluded from the data sample. This reduced the sample size by roughly 40%. Hypotheses 1 and 2 were sustained using this alternative method. Hypothesis 3 lost significance. Results are available from the authors.

2010, through April 28, 2011, which is the last date in the dataset. (We later vary this study window to test the robustness of our results.) It allows us to test Hypothesis 1 on all 462 firms listed on the HOSE or the HNX as of January 1, 2010. The sample eliminates 224 firms which were listed after January 1, 2010. This period covers 219 of the total 718 splits that are recorded in the dataset. To test for Hypothesis 1, we run the following regression:

$$Split_{i,k} = a_1 STATE_i + a_2 SIZE_i + \beta_1 FirmCharacteristics_i + \gamma_k + \varepsilon_{i,k} \quad (1)$$

Here i and k index firm and industry. $Split_{i,k}$ is a binary variable that turns from 0 to 1 if the firm conducted at least one stock split with a split factor of 1.3 or greater in the period from January 1, 2010, to April 28, 2011. $STATE_i$ is the percentage of the shares held by the government. $SIZE_i$ is the natural logarithm of the firm's market capitalization. $FirmCharacteristics_i$ is a vector of control variables, γ_k is the industry fixed-effects.

All independent and control variables are measured as of January 1, 2010. The control variable vector $FirmCharacteristics_i$ includes the foreign-ownership percentage, realized leading earnings growth, liquidity (measured by the ratio of average 30-day trading volume to total outstanding shares), a dummy variable indicating whether the stock price is higher than the median stock price, and the trailing twelve-month P/E ratio. Because foreign investors, mostly institutional investors, often can significantly impact both share prices and the corporate-governance quality of firms and because they may be more reluctant than Vietnamese investors to invest in poorly governed firms, the model controls for the foreign-ownership percentage.

The model also controls for traditional explanations for stock splits. Thus, it includes a firm's realized leading earnings growth to account for the possibility that firms split stocks to signal positive information to the market. Liquidity is included in the model to account for the possibility that firms split stocks to increase their stocks' trading liquidity. To account for the price-range effect,

we control for whether the firm's stock price is higher/lower than the median stock price in the market. P/E ratio, a popular valuation criterion in Vietnam's stock market, is included in the model to account for the possibility that high P/E stocks are considered expensive by the market.

If the more vulnerable firms are more likely to split their stocks, as Hypothesis 1 predicts, we should expect the relationship with state-ownership percentage to be positive and significant, and the relationship with firm size to be negative and significant.

[Table 3 about here]

Table 3 reports the results of the tests for Hypothesis 1. Columns (1) to (4) present the specification in Model (1) that focuses on the simple relationship between stock splits and the two main independent variables. The relationship with state ownership $STATE_i$ is positive and significant consistently across all specifications. A state-owned firm is shown to be 10.6, 13.2, 14.8 and 13.7 percentage points (50% times the coefficients of the state-ownership percentage in columns 2, 4, and 6) more likely to split its stock over the study periods than is a private firm. Column (5) presents the test results for Hypothesis 1 using propensity score matching (PCA). The treated firms are those which have one standard deviation higher than the average state ownership. Each treated firms is matched with the nearest-neighbor firms in the same industry and date of consideration based on foreign ownership percentage, the natural logarithm of market capitalization, market to book ratio, and trailing P/E ratio. The PCA result shows that the propensity to split stocks of treated firms is 9.4 percentage points higher than that of the matched firms. The coefficient is significant at the 99% level. The results in this table are consistent with the prediction of Hypothesis 1.

Putting the results together, we find that state ownership clearly makes it more likely a stock will split, and that smaller firms are somewhat more likely to split than larger firms. These results

support Hypothesis 1, which posits a positive relationship between firm vulnerability and stock-splitting frequency. However, the level of significance in both specifications is only at the 90% level. Therefore, this provides only suggestive evidence for Hypothesis 1.

None of the control variables is statistically significant in explaining firms' tendencies to split their shares. The second model shows that a stock's trading volume, realized leading earnings growth, and price range do not have a statistically significant relationship with that firm's tendency to split its shares. This result suggests that liquidity improvement, information signaling, and price range--the principal factors in established theories of stock splits--are not prime incentives for Vietnamese firms to split their stocks. It also shows that neither foreign ownership nor its P/E ratio affects a firm's propensity to split its stock.

We vary the study window to check the robustness of our results. Columns 1 to 4 present the results of the model where we use the study windows from January 1, 2009, through April 28, 2011, and from July 1, 2010, through April 28, 2011. Although longer study windows reduce the size of our sample, the correlation between a firm's state-ownership percentage and its propensity to split stocks is consistently positive and significant in these alternative study windows (though only borderline significant in column 6). The control variables are insignificant in explaining firms' propensities to split stocks. These results provide moderate support for our hypothesis that the vulnerability of a firm increases its likelihood of splitting its stock.

3.4. Testing for Hypothesis 2

Hypothesis 2 states that the vulnerability of a firm increases the abnormal return from its stock split. We will test whether split stocks of vulnerable firms outperform split stocks of other firms in the period after the split. If so, that would suggest some form of manipulation. To conduct this test, we run the following regression:

$$CMAR_{i,j,k,t} = a_1 STATE_{i,t} + a_2 SIZE_{i,t} + \beta_1 FirmCharacteristics_{i,t}$$

$$+ \beta_2 \text{SplitCharacteristics}_{j,t} + \gamma_{k,t} + \varepsilon_{i,j,k,t} \quad (2)$$

$CMAR_{i,j,k,t}$ is the cumulative market-adjusted return for firm i , split j , in industry k , and in year t . As in Model (1), $STATE_{i,t}$, state ownership percentage, and $SIZE_{i,t}$, firm size, are two explanatory variables in the models. We can vary this window to see if the results remain significant for the four different windows (-30, -15), (-30, +0), (-30,+15), and (-30,+30). $FirmCharacteristics_{i,t}$ is a vector of control variables for firm characteristics. $SplitCharacteristics_{j,t}$ is a vector of control variables for split characteristics. $\gamma_{k,t}$ is the industry-by-year fixed-effects.

Model 2 does not restrict the analysis to one period and, therefore, allows us to use all the data sample of stock splits. However, we still cannot use either the very early or very late splits because they lack the data necessary for our control variables. More specifically, splits conducted toward the end of the study period do not have data for the realized leading earnings growth; splits executed within one month after the stocks were listed do not provide data on trading liquidity. This leaves us with 252 splits in the middle period, which provides sufficient observations for an effective test.

The control variable vector $FirmCharacteristics_{i,t}$ includes the foreign-ownership percentage, liquidity, and trailing twelve-month P/E ratios. The control variable $SplitCharacteristics_{j,t}$ is a vector that includes the stock's split factor, the elapsed time between the split's announcement and its execution, earnings growth in the one-year period after the split announcement, liquidity ratio change post-split execution (measured by the ratio of post-split one-month share turnover to pre-split one-month share turnover), return volatility change post-split execution (measured by the ratio of post-split standard deviation of stock returns to pre-split standard deviation of stock returns), and a binary variable indicating whether the firm's stock price is higher than the median stock price of the market.

Realized leading earnings growth, return volatility change post-split execution, liquidity ratio change post-split execution, and the dummy indicating whether the stock price is higher than the median stock price are included in the model to control, respectively, for the possibility of a signaling effect, volatility effect, liquidity effect, or price-range effect of stock splits. After controlling for these four factors, if the vulnerability of a firm truly increases the abnormal return from its stock split, we should expect the coefficient for state-ownership percentage to be positive and significant, and the coefficient for firm size to be negative and significant.

[Table 4 about here]

Table 4 reports the results of our regression model. Columns 1 to 4 present the results in study windows (-30, -15), (-30, +0), (-30, +15), and (-30, +30). These results do not control for realized leading earnings growth, return volatility change post-split execution, liquidity ratio change post-split execution, and whether the stock price is higher than the median stock price.

The results indicate a positive relationship between state ownership and the cumulative market-adjusted returns in all four study windows. The coefficients are statistically significant at the 95%, 99%, 99%, and 90% levels, respectively, in the four models. Switching from private to state ownership increases short-term abnormal returns in the study periods (-30,-15), (-30, 0), (-30, +15) and (-30, +30) by 3.6, 10.1, 13.3 and 9.8 percentage points (50% times the coefficients of the state-ownership percentage), respectively. These results support the Hypothesis 2 proposition that stocks of vulnerable firms tend to outperform those of other firms around split announcements.

Firm size also shows a significantly negative relationship with cumulative market-adjusted returns in all four study periods. This relationship is also economically significant. When a firm's market capitalization doubles, short-term abnormal returns in the study periods (-30,-15), (-30, 0),

(-30, +15) and (-30, +30) decrease by 1.0, 3.7, 6.5, and 7.9 percentage points, respectively. This result is also consistent with Hypothesis 2, which posits that smaller (and thus more vulnerable) firms would offer higher cumulative market-adjusted returns than would larger firms.

Foreign ownership has a positive relationship with the cumulative market-adjusted returns in all windows. A possible explanation for this result, if further substantiated, is that foreign ownership of a firm reduces the supply of shares on the market, and thus makes it easier for the inside traders to trade up the stocks in the period surrounding splits. Liquidity also has a significant positive relationship with the firm's cumulative market-adjusted returns in all windows. If the share turnover increases by one percent, the cumulative returns increase by 4.9, 8.8, 10.1, and 9.1 percentage points in the respective study windows. We had expected this result and believe that it reflects the large number of noise traders--who often rely strongly on momentum--who increase both the returns from and the trading volumes of split stocks. None of the other control variables, including split factor, trailing P/E ratio, and split announcement-execution time gap, has a significant relationship with the firm's cumulative market-adjusted returns.

In Table 5, we re-estimate Model (2) in the same study windows, with the inclusion of four control variables: realized leading earnings growth, return volatility change post-split execution, liquidity ratio change post-split execution, and the split's abnormal returns. Including the four control variables affects neither the findings nor the significance levels of our analyses. The coefficient on realized leading earnings growth is positive and statistically significant in the (-30,+15) and (-30,+30) windows. This suggests that the signaling effect may be important. The coefficient on liquidity ratio change post-split execution is negative and significant at the 95% and 90% levels in the (-30,+15) and (-30,+30) windows. This result could not be explained by firms' incentive to increase stock liquidity by splitting stocks. This explanation awaits future research.

[Table 5 about here]

In Table 6, we use PCA to check the robustness of the results in Table 4 and Table 5. The treated firms are those having one standard deviation higher than the average state ownership. Matched firms are in the same industry and are the nearest-neighbors based on foreign ownership percentage, the natural logarithm of market capitalization, market to book ratio, liquidity, and trailing P/E ratio. The results in this analysis are consistent with those in Table 4 and Table 5. Compared with matched firms, cumulative abnormal returns of treated firms in the study periods (-30,-15), (-30, 0), (-30, +15) and (-30, +30) increase by 2.9, 5.4, 11.7, and 12.4 percentage points, respectively. The coefficient is significant at the 90% and 95% levels.

These results in this part support for our hypothesis that vulnerable firms will have higher abnormal returns around stock splits than non-vulnerable firms.

3.5. Testing for Hypothesis 3

Hypothesis 3 states that vulnerable firms will show a greater difference between pre- and post-split returns than non-vulnerable firms. Our regression equation tests this relationship:

$$Dif_{i,j,k,t} = a_1 STATE_{i,t} + a_2 SIZE_{i,t} + \beta_1 FirmCharacteristics_{i,t} + \beta_2 SplitCharacteristics_{j,t} + \gamma_{k,t} + \varepsilon_{i,j,k,t} \quad (3)$$

Here the outcome variable is the difference between pre-announcement return and post-announcement return. $Dif_{i,j,k,t}$ is computed using Formula (1), and serves as a proxy for the level of illegal insider trading around each split because pre-split returns rise when knowledge about the split is private; post-split, the information is obviously public. As with Hypothesis 2, we will use two windows (-15, +15) and (-30, +30). If Hypothesis 3 is supported, the coefficient on $STATE_{i,t}$ will be positive and significant, and the coefficient on $SIZE_{i,t}$ will be negative and significant.

[Table 7 about here]

Table 7 reports the results for this test. Columns 1 and 3 respectively show the results of our regression model in two windows (-15, +15) and (-30, +30). Columns 2 and 4 present the regression results, with controls for realized leading earnings growth, return volatility change post-split execution, liquidity ratio change post-split execution, and whether the stock price is above the median stock price. State-owned firms experience a greater difference between pre-split and post-split returns in all windows. This difference is statistically significant at the 95% and 99% confidence levels in windows (-15, +15) and (-30, +30). This relationship is also economically significant. Switching our focus from private to state ownership increases this difference in periods (-15, +15) and (-30, +30) by 15.3 and 21.7 percentage points (50% times the coefficients of the state-ownership percentage in columns 2 and 4), respectively.

Smaller firms also exhibit a larger pre-post return difference, which is statistically significant in all four windows, respectively at the 99% level. Firm size has an economically large effect on this difference. Focusing on firms of doubled size decreases the pre-post return difference by 6.4 and 12.3 percentage points, respectively (columns 2 and 4). This result suggests that insider trading related to stock splits is more effective in smaller firms. These results regarding state ownership and firm size are predicted by Hypothesis 3.

Neither foreign-ownership percentage nor trailing P/E ratio has a significant effect on the dependent variable in any of our models. Liquidity, however, helps to explain the pre- and post-difference, reaching the 90% and 95% significance levels in three of the four specifications. The relationship detected between liquidity and $Df_{i,j,k,t}$ may provide some evidence that insider trading activity is more profitable in the presence of noise traders. Bhattacharya and Daouk (2009) present a related explanation for the presence of noise traders and insider-trading profits. They show that inside traders can successfully execute their trades only if noise traders counter their trades and provide liquidity to the market. Our results remain significant with the inclusion of control variables

for realized leading earnings growth, return volatility change post-split execution, liquidity ratio change post-split execution, and whether the stock price is above the median stock price.

As in the previous section, we also use principal component analysis to test Hypothesis 3. Table 8 presents the results of this analysis. Treated firms are those which have one standard deviation higher than the average state ownership. Matched firms are chosen from the same industry and are the nearest-neighbors based on foreign ownership percentage, the natural logarithm of market capitalization, market to book ratio, liquidity, and trailing P/E ratio. Consistent with the results in Table 7, the difference between pre-split and post-split returns of treated firms, estimated by PCA method, is higher than that of the matched firms. In the window (-30, +30), the average *Dif* of treated firms is 12.1 percentage points higher than that of matched firms. The estimated coefficient is significant at the 95% level.

Overall, the results in this part are consistent with our hypotheses about illegal insider trading incentive of stock splits among *vulnerable firms* in the Vietnamese stock market.

4. Alternative interpretations

When a stock-price increase precedes a corporate event, we should not immediately leap to the conclusion of insider trading. Research by market participants might have uncovered conditions that were likely to lead to the event, or information may merely have leaked into the market. For example, if a merger is pending, information could leak if the two companies' CEOs were observed meeting together. These alternative explanations present a challenge to any study that infers, rather than directly documents, insider trading. Concerns that market research or sleuthing is the explanation for such anticipatory run-ups will be allayed if we focus on a corporate event that can neither be researched by market participants nor inadvertently revealed. Stock splits would seem to serve splendidly. They are overwhelmingly discretionary, and outsiders' mere observations are not

likely to provide hints. Thus splits differ from most corporate events, such as mergers, which entail big changes and high transactions costs, or dividend increases and stock repurchases, which require dispersing cash. Market participants may predict the possibility that firms will split stocks in the next year or two, but would not be able to predict the timing of split announcements with sufficient precision to produce the run-ups in the brief windows that we observe. Therefore, market participants can only take advantage of the coming split announcements if they either are insiders or get tipped off by insiders.

A second possible interpretation of the relationship between a stock split and abnormal returns would reverse the pattern of causality. The reverse causality problem would arise if a rapid increase in its stock price would induce a firm to execute a stock split to bring the price back to the preferred range. To test for the possible problem of reverse causality in our analysis, we developed a panel regression model to assess the significance of the reverse causal direction in our data sample. Our regression equation is as follows:

$$Split_{i,k,t} = a_1 Return_{i,t} + \beta_1 FirmCharacteristics_{i,t} + \gamma_k + \varepsilon_{i,k,t} \quad (4)$$

Here i and k index firm and industry. $Split_{i,k,t}$ is a binary variable which turns from 0 to 1 if firm i announces a split decision at the end of time period t , and $Return$ is the stock price return in the time period t . $FirmCharacteristics_{i,t}$ is a vector of control variables for firm characteristics. γ_k is the industry fixed-effects. The control variable vector $FirmCharacteristics_{i,t}$ includes three control variables: the probability that the stock price is higher than the market median, realized leading earnings growth, and liquidity. These controls address the possibility that firms would announce stock splits [in/on] the observed trading day to improve liquidity or to send positive signals to the market. If stock price increases induce firms to split stocks, we would expect that the coefficient for $Return$ would be positive and statistically significant. Columns 1, 2, and 3 in Table 6 present the results for

the regressions on stock returns in 30, 20, and 10 days, respectively. The results in all these windows clearly show that rapid price rises do not lead to stock-split announcements.

[Table 9 about here]

A third alternative explanation could challenge our argument that insider trading is a prime promoter of stock splits. We have shown that, on the overall market level, stock splits do not significantly increase trading liquidity or signal positive information about the firms. However, if it were also shown that, in the subgroup of vulnerable firms, stock splits significantly enhance trading liquidity or signal positive information, our argument would have to be qualified, since the splits may have served these more traditional purposes. To address this potential problem, we employ two tests. First, we test the effect on liquidity with the regression:

$$\Delta LIQUIDITY_{i,j,k,t} = a_1 STATE_{i,t} + a_2 SIZE_{i,t} + \beta_1 FirmCharacteristics_{i,t} + \beta_2 SplitCharacteristics_{j,t} + \gamma_k + \varepsilon_{i,k,t} \quad (5)$$

$\Delta LIQUIDITY_{i,j,k,t}$ denotes the growth in the trading liquidity after split execution of firm i , split j , in industry k , and in year t . $\Delta LIQUIDITY_{i,j,k,t}$ is measured by the ratio of post-split one-month share turnover to pre-split one-month share turnover. $STATE_{i,t}$ is the state-ownership percentage, and $SIZE_{i,t}$ is the natural logarithm of the firm's market capitalization. The control variable vector $FirmCharacteristics_{i,t}$ includes the trailing P/E ratio, whether the stock price is higher than the market median, return volatility change post-split execution, and realized leading earnings growth. The control variable vector $SplitCharacteristics_{j,t}$ includes the split factor and the announcement-execution time gap. γ_k is the industry fixed-effects. If vulnerable firms split stocks to improve their trading liquidity, we should expect the coefficient for $STATE$ ($SIZE$) to be positive (negative) and statistically significant.

Our second test addresses the possibility that vulnerable firms may split stocks to signal positive information to the market, as indicated by realized real earnings growth. The regression equation for that test is:

$$\begin{aligned} \text{Realized Leading Earnings Growth}_i = & a_1 \text{STATE}_{i,t} + a_2 \text{SIZE}_{i,t} + \beta_1 \text{FirmCharacteristics}_{i,t} + \\ & \beta_1 \text{SplitCharacteristics}_{j,t} + \gamma_k + \varepsilon_{i,k,t} \end{aligned} \quad (6)$$

Besides the change in the dependent variable, equation (6) replaces two control variables from equation (5) (trailing P/E ratio and realized leading earnings growth) with two other control variables (liquidity and liquidity ratio change post-split execution) in the firm-characteristics vector. If vulnerable firms split stocks to signal positive information to the market, we would expect the coefficient for *STATE* (*SIZE*) to be positive (negative) and statistically significant.

[Table 10 about here]

In Table 10, columns 1, 2, and 3 present the results for model (5), the regressions on the state-ownership percentage and firm size, utilizing different control variables. None of the three regressions shows any significant relationship between the state-ownership percentage or firm size and the growth in liquidity after split executions. This helps to allay the concern that vulnerable firms may split stocks to improve the trading liquidity of their stocks.

In Table 10, the right three columns (4, 5, and 6) test whether stock splits at vulnerable firms signal private information. The regressions have the state-ownership percentage and firm size, along with different control variables, as the independent variables. The dependent variable is each firm's realized leading earnings growth. The results of all three regressions show no significant relationship between either state-ownership percentage or firm size and realized leading earnings growth. This suggests that vulnerable firms are unlikely to split stocks to signal positive information to the market.

A fourth alternative explanation focuses only on the post-split run up. It conjectures that the presence of irrational investors, rather than insider trading, drives the run-ups of stock prices after stock-split announcements at vulnerable firms. In our analysis, we cannot rule out the possibility that vulnerable firms, which usually have high-volatility stock returns, might differentially attract irrational investors. However, the presence of irrational investors could hardly explain why vulnerable firms have much greater pre-announcement returns than more secure firms. If irrational investors were playing a role, it would only be to increase the size and/or duration of the stock bubbles after split announcements.

The evidence rules out each of the four alternative explanations from prior literature for the stock splits we observe. However, the evidence is strongly consistent with insider trading as a prime promoter of stock splits in our sample.

5. Conclusion

Stock splits are a widely observed phenomenon in stock markets, particularly in emerging ones. The motivations for splits in emerging markets are often unclear. The conditions in those markets differ so markedly from those in developed nations' markets that non-traditional motivations should be considered. This analysis addresses the hypothesis that, in Vietnam, insiders use stock splits to generate personal profits. Vietnam is a nation that shows evidence of substantial insider trading, yet where that illegal activity has been subject to little prosecution.

We use the sample of all 718 stock splits by firms in the Vietnamese stock market during a recent period. The pattern of stock run-ups prior to a split, followed by gains after the split announcement, and then a return to the stock price's initial level raises suspicions that splits are manipulated activities. This suspicion is reinforced given heightened trading activity prior to a split announcement. Moreover, firms that would be more vulnerable to insider trading undertake many

more splits. Finally, the principal alternative explanations for splits—as a search for liquidity or as a signal of positive news—find no support.

We focus on the split patterns by firms vulnerable to insider activity. These are firms with some combination of large state ownership and small market capitalization. We find that vulnerable firms split stocks much more frequently, and that those splits yield higher abnormal returns both before and after the split announcement than do splits in less vulnerable firms. Substantial price increases before split announcements are a strong indicator of insider trading. Interestingly, and suspiciously, though prices rise significantly before and after a split announcement, in the long run prices revert to their original levels. This suggests that stock splits in Vietnam's markets yield no lasting value. It simultaneously argues against the liquidity or signaling explanations.

The limitations of our study should be noted. First, Vietnam has a very young, emerging stock market, which caters overwhelmingly to individual investors and is regulated in a lax manner by an inexperienced authority. Hence, our findings may apply in only limited fashion or not at all to developed markets, where regulation is generally much more rigorous. However, our findings may be applicable to many other emerging stock markets, such as those in China.¹⁷ Second, we did not have access to transaction data for individual traders. Thus, we had to follow the approach of most studies on stock markets in general and on insider trading in particular: we used price data to infer the behaviors of traders. Third, we did not have a randomized or natural experiment to estimate effects precisely. Fortunately, we were able to control for important factors that might affect the results. We were also able to show that reverse causality is an unlikely explanation in this case.

¹⁷ Compustat Global records over 2,200 splits executed by Chinese firms in the period 2005-2013.

This study identified a troubling pattern for stock price movements surrounding stock splits in Vietnam. The 30-day period before the announcement is often marked by a sharp rise in price, with the rise persisting for roughly 50 days after the announcement. The stock price then drifts down; 140 days after the announcement, it has fallen back to its level at the announcement. None of the traditional explanations for stock splits, built on experience from developed nations, could explain this pattern. However, it is precisely the pattern that insider purchasing, followed by manipulation schemes to bolster the stock price, would produce. The enhance volume of trading just before the split announcement reinforces the insider trading explanation.

Our analysis moved beyond merely looking at stock price movements to identify firms that would be particularly vulnerable to insider trading schemes. That work showed a clear link between a firm's vulnerability to insider trading and its propensity to split its stock. It also provided an explanation for the widespread use of stock splits in emerging markets. Insider trading will always be with us, particularly in emerging markets, and is sure to be difficult to detect. But understanding the stratagems likely to be used by insiders--in this instance splitting stocks--can help to expose their activities.

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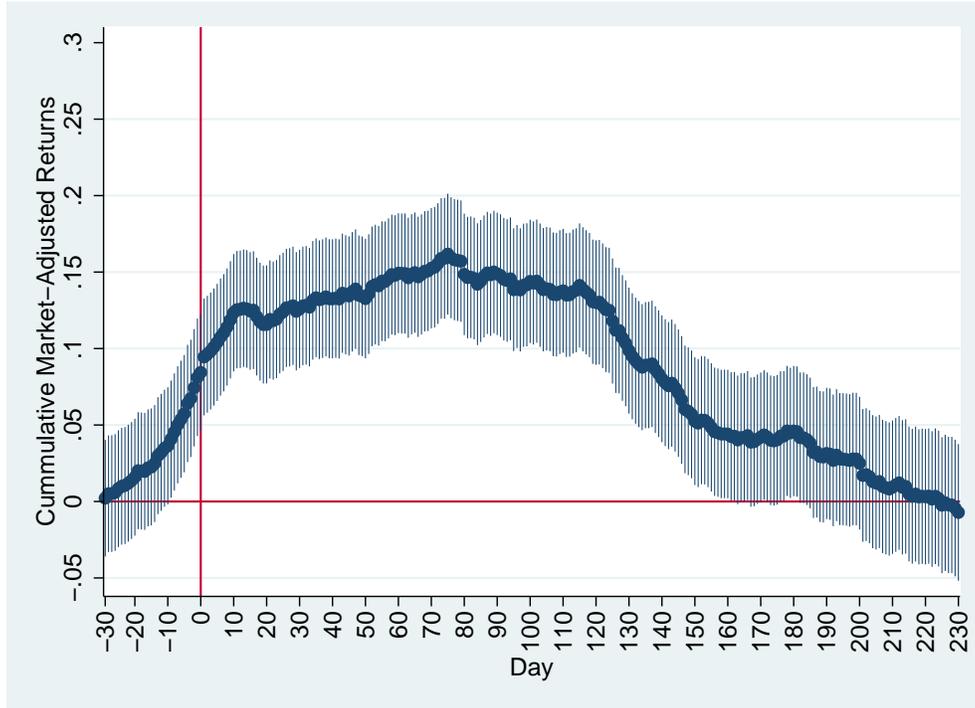


Figure 1: Average Cumulative Market-Adjusted Returns around Split Announcements

This figure shows graphically the average cumulative market-adjusted returns and the 95 percent confidence interval in the period (-30, +240). The benchmark day is day -30, the thirty trading days before stock-split announcements. The cumulative market-adjusted returns for each stock-split announcement are calculated by accumulating daily market-adjusted returns from day -30. The average cumulative market-adjusted returns are calculated by averaging each split's cumulative market-adjusted return on the corresponding trading day.

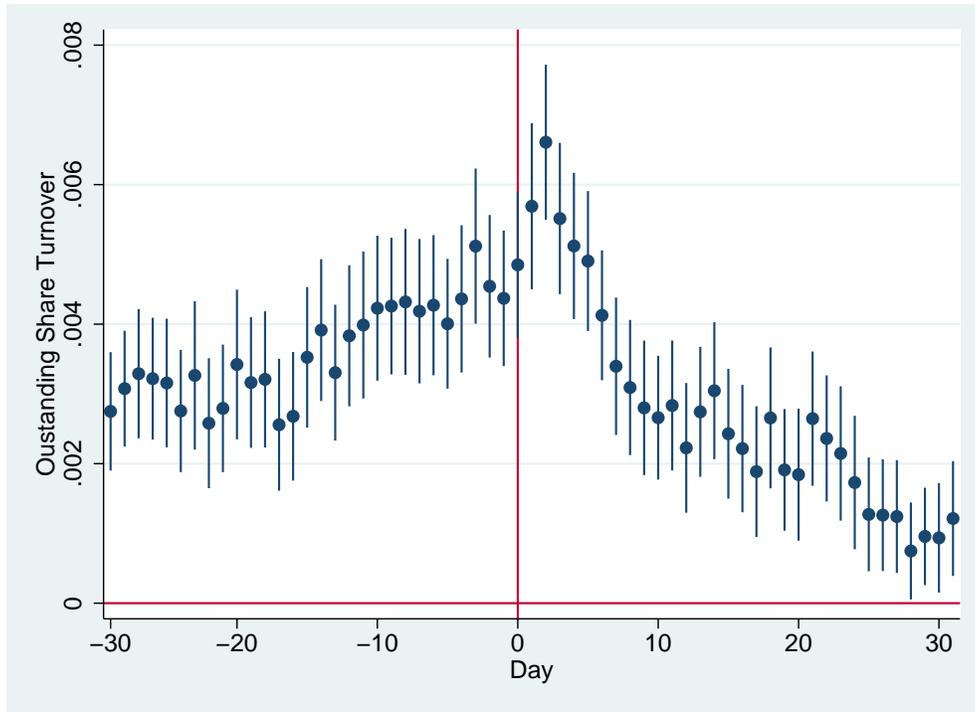


Figure 2: Average Outstanding Share Turnover around Split Announcements

This figure shows the average outstanding share turnover and the 95 percent confidence interval in the period (-30, +30). The outstanding share turnover is defined as the ratio of daily trading volume to total outstanding shares.

Table 1: Descriptive Statistics

This table reports the means, the 25th, 50th and 75th percentiles, and sample sizes of all variables used in this research. The data sample includes all 718 stock splits in the period from Jan 2007 to May 2011. Ownership data is reported daily by the State Securities Commission. Data about split factors and split announcement and execution time gap is collected from companies' filings by StockPlus Corporation. Market capitalization, realized leading earnings growth, and trailing P/E ratio are calculated according to the standard methods suggested by the CFA Institute. Liquidity is measured by the ratio of average 30-day trading volume to total outstanding shares. Liquidity ratio change post-split execution is measured by the ratio of post-split one-month share turnover to pre-split one-month share turnover. Return volatility change post-split execution is measured by the ratio of post-split standard deviation of stock returns to pre-split standard deviation of stock returns. We include a dummy variable which is equal to one when the stock price is higher than the median stock price. $Dif(-j, +j)$, the difference between pre-announcement return and post-announcement return, is calculated by using Formula 1. $CMAR(x, y)$ is the cumulative market-adjusted returns from day x to day y.

	Mean	25th percentile	50th percentile	75th percentile
State ownership percentage	23.22%	0.00%	16.96%	47.56%
Market Capitalization	VND1,890 bn.	VND121 bn.	VND328 bn.	VND964 bn.
Foreign ownership percentage	11.59%	0.92%	4.76%	18.54%
Split factor	1.44	1.01	1.27	2.31
Liquidity	0.82%	0.17%	0.42%	1.05%
Split announcement and execution time gap	57.26 days	8.00 days	7.00 days	66.00 days
Trailing P/E ratio (day -30)	17.7	5.02	8.15	14.32
Realized leading earnings growth	-1.18%	-27.41%	0.32%	10.73%
Liquidity ratio change post-split execution	1.54	0.38	0.81	1.46
Return volatility change post-split execution	9.85%	-13.67%	3.62%	25.53%
Stock price is higher than the market median stock price	0.69	0	1	1
Dif(-15, +15)	9.10%	-8.31%	1.57%	12.99%
Dif(-30, +30)	10.88%	-10.91%	0.30%	19.46%
CMAR(-30, 0)	8.60%	-6.71%	1.88%	16.84%
CMAR(-30, -15)	2.40%	-6.32%	-0.34%	8.18%
CMAR(-30, +15)	11.14%	-9.51%	0.66%	16.95%
CMAR(-30, +30)	9.85%	-11.50%	0.08%	18.58%

Table 2: Cumulative Market-Adjusted Return (CMAR) and Pre-Post Announcement Return Difference

(A) presents the means of the cumulative market-adjusted returns (CMAR) for the study periods. The third and the fourth columns show respectively the results of a parametric t-test and a non-parametric Wilcoxon test across firms. The last column shows the number of events that are used in each case. Panel (B) presents the average difference between pre-announcement return and post-announcement return. Formula 1 presents the detailed calculation for the pre-announcement and post-announcement return difference. The third and the fourth columns show respectively a parametric t-test and a non-parametric Wilcoxon test across firms. The last column shows the number of events in each period. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Period	Average CMAR(t1,t2)	t-test statistic	Wilcoxon test statistic	# splits
<i>Panel (A) Cumulative Market-Adjusted Return around Split Announcement</i>				
CMAR(t -30,t -15)	0.0231	3.95***	1.17	670
CMAR(t -30,t + 0)	0.0927	8.34***	6.56***	681
CMAR(t -30,t +30)	0.128	7.16***	5.45***	650
CMAR(t -30,t +60)	0.1502	7.42***	5.72***	620
CMAR(t -30,t +120)	0.1265	6.15***	3.37***	538
CMAR(t -30,t +210)	0.0113	0.51	-3.87	425
CMAR(t -30,t +240)	0.0087	0.25	-4.36	364
<i>Panel (B) Difference between Pre- and Post- Announcement Returns</i>				
Dif (t - 15, t + 15)	0.1008	7.36***	5.15***	681
Dif (t - 30, t + 30)	0.1303	7.28***	4.73***	675

Table 3: Propensity to Split Stocks as a Function of Firm Vulnerability

This table reports the results of linear probability models, columns (1) to (4), and propensity score matching (PCA), column (5), examining the impact of firm vulnerability on firms' propensity to split stocks. The dependent variable in these models is a binary variable which turns from 0 to 1 if the firm conducted at least one stock split with a split factor of over 1.3 during the study periods, all ending on April 28, 2011. In columns (1) to (4), the independent variables are the state ownership percentage, foreign ownership percentage, the natural logarithm of market capitalization, market to book ratio, and trailing P/E ratio. In column (5), The treated group, including firms have one standard deviation higher than the average state ownership, are matched with the nearest-neighbor firms based on foreign ownership percentage, the natural logarithm of market capitalization, market to book ratio, and trailing P/E ratio. Standard errors are clustered at the industry level and in parentheses. * p<0.10, ** p<0.05, *** p<.01

	Jan 2009	Jul 2009	Jan 2010	Jul 2010	PCA
	(1)	(2)	(3)	(4)	(5)
State-ownership percentage	0.212** (0.081)	0.264*** (0.092)	0.295*** (0.079)	0.273*** (0.072)	
Treated					0.094*** (0.023)
Foreign-ownership percentage	-0.107 (0.191)	-0.036 (0.184)	-0.189 (0.218)	0.004 (0.202)	
Log of market capitalization	-0.026 (0.019)	-0.033* (0.018)	-0.022 (0.017)	-0.019 (0.017)	
Market to Book	0.007 (0.009)	0.001 (0.010)	-0.027 (0.023)	-0.034 (0.023)	
Liquidity	-5.390 (10.659)	-0.840 (3.184)	-2.846 (2.078)	0.723 (3.874)	
Trailing P/E ratio	-0.081 (0.155)	-0.031 (0.019)	0.157** (0.060)	-0.093 (0.277)	
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes
Same Date					Yes
Number of Observations	311	347	411	416	989
Adj. R-Square	-0.010	0.007	0.043	0.016	0.016

Table 4: Abnormal Returns Surrounding Splits as a Function of Firm Vulnerability

The dependent variable in these models is the cumulative market-adjusted returns in the study periods. The date of split announcements is denoted date 0. The independent variables are the state-ownership percentage and the natural logarithm of market capitalization on the first day of the study periods. Control variables are foreign-ownership percentage, leading earnings growth, liquidity, trailing P/E ratio, split factor, split announcement and execution time gap, realized leading earnings growth, the liquidity ratio change post-split execution, the change in stock return volatility post stock splits, and the dummy variable indicating whether the stock price is higher than the median stock price. Standard errors are clustered by industries and in parentheses. * p<0.10, ** p<0.05, *** p<.01 .

	(1)	(2)	(3)	(4)
	CAR	CAR	CAR	CAR
	t-30,t-15	t-30,t-0	t-30,t+15	t-30,t+30
State-ownership percentage	0.072** (0.032)	0.201*** (0.058)	0.265*** (0.082)	0.196* (0.108)
Foreign-ownership percentage	0.120** (0.055)	0.386*** (0.109)	0.241* (0.130)	0.088 (0.151)
Log of market capitalization	-0.010** (0.005)	-0.037*** (0.009)	-0.065*** (0.017)	-0.079*** (0.017)
Liquidity	4.930*** (0.783)	8.795*** (1.500)	10.117*** (3.137)	9.063** (3.686)
Trailing P/E ratio	-0.129* (0.069)	-0.143* (0.071)	-0.184 (0.117)	-0.195 (0.139)
Split Factor	-0.011 (0.015)	-0.018 (0.022)	-0.038 (0.043)	-0.044 (0.042)
Split announcement and execution time gap	0.000 (0.000)	-0.000 (0.000)	-0.001*** (0.000)	-0.001** (0.000)
Industry-Year Fixed-Effects	Yes	Yes	Yes	Yes
Number of Splits	555	556	553	545
Adj. R-Square	0.130	0.195	0.056	0.063

Table 5: Abnormal Returns Surrounding Splits as a Function of Firm Vulnerability

The dependent variable in these models is the cumulative market-adjusted returns in the study periods. The date of split announcements is denoted date 0. The independent variables are the state-ownership percentage and the natural logarithm of market capitalization on the first day of the study periods. Control variables are foreign-ownership percentage, leading earnings growth, liquidity, trailing P/E ratio, split factor, split announcement and execution time gap, realized leading earnings growth, the liquidity ratio change post-split execution, the change in stock return volatility post stock splits, and the dummy variable indicating whether the stock price is higher than the median stock price. Standard errors are clustered by industries and in parentheses. * p<0.10, ** p<0.05, *** p<.01 .

	(1) CAR t-30,t-15	(2) CAR t-30,t-0	(3) CAR t-30,t+15	(4) CAR t-30,t+30
State-ownership percentage	0.090 (0.054)	0.291** (0.118)	0.501*** (0.117)	0.440** (0.167)
Foreign-ownership percentage	-0.028 (0.110)	0.319** (0.140)	0.119 (0.175)	0.047 (0.223)
Log of market capitalization	-0.018** (0.008)	-0.054*** (0.014)	-0.103*** (0.033)	-0.124*** (0.030)
Liquidity	5.750*** (1.873)	12.038*** (4.272)	13.566** (5.522)	8.099* (4.798)
Trailing P/E ratio	-0.412 (0.304)	-0.894 (0.671)	-1.195 (0.966)	-1.296 (0.922)
Split Factor	0.015 (0.034)	0.073 (0.058)	0.010 (0.090)	0.080 (0.100)
Split announcement and execution time gap	-0.000 (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001** (0.001)
Realized leading earnings growth	-0.000*** (0.000)	-0.001*** (0.000)	0.000* (0.000)	0.001*** (0.000)
Liquidity ratio change post-split execution	0.000 (0.001)	-0.002 (0.002)	-0.006** (0.003)	-0.006* (0.003)
Return volatility change post-split execution	-0.008 (0.026)	0.055 (0.072)	0.233 (0.177)	0.178 (0.139)
Stock price is higher than the market median stock price	0.023 (0.029)	0.057 (0.037)	0.156 (0.096)	0.124* (0.065)
Industry-Year Fixed-Effects	Yes	Yes	Yes	Yes
Number of Splits	250	251	251	250
Adj. R-Square	0.131	0.254	0.155	0.182

Table 6: Abnormal Returns Surrounding Splits as a Function of Firm Vulnerability - Propensity Score Matching

This table reports the results of propensity score matching analysis estimating the impact of firm vulnerability on stock split announcement returns. The treated group includes firms which have one standard deviation higher than the average state ownership. Control firms are firms in the same industry and are the nearest-neighbors based on foreign ownership percentage, the natural logarithm of market capitalization, market to book ratio, liquidity, and trailing P/E ratio. T-statistics are in parentheses. * p<0.10, ** p<0.05, *** p<.01

	(1)	(2)	(3)	(4)
	CAR	CAR	CAR	CAR
	t-30,t-15	t-30,t-0	t-30,t+15	t-30,t+30
Treated	0.029* (1.907)	0.054* (1.736)	0.117** (2.113)	0.124** (2.316)
Number of Splits	295	297	296	295
Adj. R-Square	0.009	0.007	0.012	0.015

Table 7: The Difference between Pre-Announcement and Post-Announcement Returns as a Function of Firm Vulnerability

The dependent variable in these models is the difference between pre-announcement return and post-announcement return, calculated in Formula (1). The date of split announcements is denoted date 0. The independent variables are the state-ownership percentage and the natural logarithm of market capitalization on the first day of the study periods. Control variables are foreign-ownership percentage, realized leading earnings growth, liquidity, trailing P/E ratio, split factor, split announcement and execution time gap, realized leading earnings growth, the change in liquidity post stock splits, the change in stock return volatility post stock splits, and the dummy variable indicating whether the stock price is higher than the median stock price. Robust standard errors are in parentheses. * p<0.10, ** p<0.05, *** p<.01

	(1) Dif t-15,t-15	(2) Dif t-15,t-15	(3) Dif t-30,t-30	(4) Dif t-30,t-30
State-ownership percentage	0.119** (0.056)	0.305*** (0.092)	0.170 (0.103)	0.433** (0.167)
Foreign-ownership percentage	0.031 (0.094)	0.045 (0.131)	0.081 (0.149)	0.034 (0.221)
Log of market capitalization	-0.043*** (0.012)	-0.064*** (0.024)	-0.077*** (0.017)	-0.123*** (0.030)
Liquidity	3.070* (1.581)	5.688** (2.784)	9.061** (3.610)	7.917 (4.824)
Trailing P/E ratio	-0.049 (0.091)	-1.099 (0.699)	-0.198 (0.140)	-1.296 (0.920)
Split Factor	-0.020 (0.025)	0.002 (0.056)	-0.040 (0.041)	0.080 (0.100)
Split announcement and execution time gap	-0.000** (0.000)	-0.001*** (0.000)	-0.001** (0.000)	-0.001** (0.001)
Realized leading earnings growth		0.001*** (0.000)		0.001*** (0.000)
Liquidity ratio change post-split execution		-0.005*** (0.002)		-0.006* (0.003)
Return volatility change post-split execution		0.193 (0.117)		0.179 (0.138)
Stock price is higher than the market median stock price		0.091 (0.068)		0.129** (0.063)
Industry-Year Fixed-Effects	Yes	Yes	Yes	Yes
Number of Splits	563	252	558	252
Adj. R-Square	0.027	0.147	0.072	0.184

Table 8: Abnormal Returns Surrounding Splits - Propensity Score Matching

This table reports the results of propensity score matching analysis estimating the impact of firm vulnerability on the difference between pre-announcement return and post-announcement return. The dependent variable in these models is the difference between pre-announcement return and post-announcement return, calculated in Formula (1). The treated group includes firms which have one standard deviation higher than the average state ownership. Control firms are the nearest-neighbors based on foreign ownership percentage, the natural logarithm of market capitalization, market to book ratio, liquidity, and trailing P/E ratio. T-statistics are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	(1) Dif t-15,t-15	(2) Dif t-30,t-30
Treated	0.064 (1.609)	0.121** (2.298)
Number of Splits	303	299
Adj. R-Square	0.005	0.014

Table 9: Robustness Check for Reverse Causality ? Did price rises cause stock splits?

The dependent variable of the model is the dummy variable, which turns from 0 to 1 if the firm split its shares in the trading day. The independent variable in the model is the stock returns in the period of either 30, 20, or 10 days before the trading day. Control variables are liquidity, realized leading earnings growth, the dummy variable indicating whether the stock price is higher than the median stock price, the logarithms of market capitalization, and trailing price to earning ratio. Standard errors are clustered at the firm level and in parentheses. * p<0.10, ** p<0.05, *** p<.01

	(1)	(2)	(3)
30-day return	0.000 (0.000)		
20-day return		0.001 (0.001)	
10-day return			0.001 (0.001)
Stock price is higher than the market median stock price	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Liquidity	0.010 (0.021)	0.011 (0.020)	0.016 (0.019)
Realized leading earnings growth	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Log of market capitalization	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
Trailing P/E ratio	-0.003*** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)
Industry Fixed-Effects	Yes	Yes	Yes
Number of Splits	123,947	125,173	125,173
R-Square	0.001	0.001	0.001

Table 10: Robustness Check for the Liquidity and Signaling Incentives for Stock Splits

The dependent variable in models (1), (2), and (3) is the growth in the trading liquidity after split executions. The dependent variable in models (4), (5), and (6) is the firm's realized leading earnings growth. Columns 1, 2, and 3 present the regressions of model (5), the estimation of the relationship between the post-split trading-liquidity growth and firm vulnerability. Columns 4, 5, and 6 present the regressions of model (6), the estimation of the relationship between firms' realized leading earnings growth and their vulnerability. Standard errors are clustered at the firm level and in parentheses. * p<0.10, ** p<0.05, *** p<.01

	(1)	(2)	(3)	(4)	(5)	(6)
State-ownership percentage	0.488 (0.668)	0.074 (0.651)	-0.810 (2.263)	-0.075 (0.078)	-0.091 (0.096)	-0.177 (0.188)
Foreign-ownership percentage	1.660 (1.272)	1.240 (1.399)	0.125 (1.816)	-0.058 (0.049)	-0.061 (0.057)	-0.140 (0.149)
Log of market capitalization	-0.086 (0.173)	-0.104 (0.197)	0.134 (0.422)	0.020 (0.019)	0.019 (0.019)	0.020 (0.022)
Split Factor		0.137 (0.226)	0.278 (0.365)		0.026 (0.027)	0.028 (0.030)
Split announcement and execution time gap		-0.001 (0.001)	-0.000 (0.003)		0.000 (0.000)	0.000 (0.000)
Liquidity		-54.971*** (12.460)	-100.482*** (31.853)		-1.247 (1.350)	-1.416 (1.407)
Trailing P/E ratio		-0.396 (3.100)	2.039 (13.195)		0.103* (0.057)	0.144 (0.335)
Stock price is higher than the market median stock price			-0.135 (0.475)			0.068 (0.066)
Return volatility change post-split execution			1.263** (0.566)			0.058 (0.061)
Realized leading earnings growth			-0.002 (0.004)			
Liquidity ratio change post-split execution						-0.001 (0.002)
Industry Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of Splits	528	464	245	329	327	245
R-Square	0.068	0.113	0.144	0.079	0.084	0.145