

Value and Reason: Analyzing Stock Split Excess Returns

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Introduction

The Law of the Conservation of Investment Value, as outlined in John Burr Williams' seminal treatise, *The Theory of Investment Value* (1938), states the value of a firm is wholly dependent on the amount of cash it generates, regardless of how the cash is structured. Nothing is gained or lost by the company if the two cash flows are combined or if the cash flow is split in two.

One application of this conservation-of-value principle is a forward stock split. When a company splits its stock, the number of outstanding shares increases, while the value of each share is reduced proportionately. Assuming that there are no further changes in the company's operations, the aggregate market value of the company remains the same. For example, a company with one million shares that are each \$80 has a market capitalization of \$80 million. Doubling the number of shares will result in two million shares, each at \$40, with the market capitalization remaining at \$80 million.

If stock splits are purely cosmetic in nature, why do firms engage in them? One explanation is that if a company allows its stock price to rise to \$200, \$500, or \$1,000 per share, some retail investors cannot afford to purchase its shares. Periodic splits that maintain the price per share in a desirable trading range keep the stock affordable though the underlying value remains unchanged. Walmart, which went public in 1970 with a stock price of \$16.50 has done eleven 2:1 stock splits, one every few years to maintain its stock price in the range of \$50 to \$70 per share. Had Walmart not split its stock, its stock price would currently be \$147,000 per share. Yet, it has been nearly 20 years since Walmart has done a split, which may indicate that other performance factors and industry trends such as the rise of internet-based ecommerce retailers that have lead to stagnant growth for Walmart and thus little justification in another stock split.

Moreover, the existence of large financial institutions including mutual funds, pension funds, hedge funds, and endowments have eroded the affordability argument. At times, affordability

has been ludicrous. When it first went public in March 1979, American Telnet, a television production firm, had a stock price of 50 cents a share. The firm had not sold a single television show by August 1980, resulting in a rapid decline of its stock price to 43 3/4 cents. At this point, the president of American Telnet decided to split its stock 5:1, thinking it would be “more affordable.” However, it is unreasonable for investors to buy one share of an 8-cent stock because of brokerage commissions, especially when there is no significant difference between buying 5,000 shares at 8 cents or 1,000 shares at 40 cents each.

On the other hand, Warren Buffett’s company, Berkshire Hathaway, has never split, even though its shares are currently in the \$300,000 price range. In a Christmas card to a friend, Buffett wrote, “May you live until B-H splits.” Evidently, Warren Buffett is highly opposed to stock splits, as he believes splits attract short-term investors, rather than long-term investors. With Berkshire Hathaway’s shares at \$33,000 each in 1996, investment companies planned to create unit investment trusts where they would buy Berkshire shares and resell them to investors in fractional \$1,000 pieces. Buffett was more opposed to the possible creation of these “Berkshire look-alikes” than stock splits, as they would not only create a speculative bubble, but also allow the investment companies to profit from small investors via sales fees and administrative expenses. In response, Berkshire Hathaway issued Class B shares—known as “Baby Berkshires”. Each “Baby B” was worth 1/30th and had 1/200th of the voting rights of the regular Class A share. The Class B shares initially traded for slightly more than \$1000 per share. In January 2010, with Class B shares in the mid-\$3000 range, they were split 50:1 and each share was now worth 1/1,500th of Class A shares. On February 27, 2018, Berkshire B closed at \$210.62 and Berkshire A closed at \$316,126.00, slightly 1500 times more than Class B. The affordability hypothesis does not seem to be applicable nor relevant to Berkshire Hathaway.

A more plausible rationale for stock splits is that blue-chip stocks with a market capitalization in the billions have traditionally traded in the \$20 to \$100 range, and some companies prefer to stay in that range (Fama, 1998). If a company’s stock price increases to \$80

and is decreased to \$40 via a 2:1 split, the split serves as a signal for investors that the run-up in price was justified, as seen with the split of Class B shares in January of 2010. Mindless speculation of the stock's price would eventually cause it to decline to below \$20, where stocks of lower value trade at.

For example, Apple announced a 7:1 split for its stock trading at \$524.75 on April 23, 2014. Investors believed Apple's unusual decision of a 7:1 split was a signal that reflected the company's belief of positive growth and thus rise in its stock price to \$700. The 7:1 split would reduce the price back to \$100. Investors were indeed correct, as Apple's stock soon increased to over \$100 per share.

The signaling hypothesis also indicates why reverse stock splits are rare. If a stock price declines to below \$20, the company could choose to engage in a 1:2 split that halves the number of shares, while doubling the share price to \$40. However, this tactic may tarnish the company's reputation by artificially increasing the stock price to avoid potential delisting.

We will evaluate the affordability and signaling hypotheses by examining stock price changes for corporations and exchanged-traded funds (ETFs) near the time of the announcement and split date. The signaling argument states that a stock split serves as a positive signal for investors. Thus, according to the hypothesis, there should be significant excess returns to a stock around the announcement date of a split as a sign from investors deciding to invest after the positive signal. The excess returns on the announcement date should be greater for corporations than for ETFs, since the managers of ETFs have presumably little inside information. Thus, they base their decisions on affordability. Our research updates the existing body of literature on stock splits by looking at a more recent time range from 2007 to 2016 and analyzing if the affordability and signaling hypotheses still hold in particular time periods.

Literature Review

If a split announcement serves as a positive signal, then the evidence should show positive excess returns around a split announcement. Aggarwal and Chen (1989) analyze daily

returns related to the 571 split proposals during the period 1977 to 1981. They sought to examine the adjustments of stock returns to stock split announcements. Under the assumption that information tends to be more readily available for large companies than small ones, they split firms by size deciles in order to observe return volatility in relation to equity. More available information for large firms should result in returns adjusting more quickly. They found an increase in stock return variability, but they found no excess returns associated with stock split proposal announcements.

Hardin et. al (2005) analyze the returns for real estate investment trusts (REIT) stock splits believing that REITs are of interest due to their tax benefits, great transparency, and corporate structure. The authors calculate abnormal returns from two days before and two days after the split announcement date, record date, and ex-date. For long-term reactions, they examined 250, 500, and 750 days of returns to represent one, two, and three year holding periods, respectively. They found that stock splits resulted in positive market reactions around the announcement date of the split, a muted response around the ex-date, and no reaction around the record date.

Ikenberry et. al (1996) studied 1,275 firms that did 2:1 stock splits between 1975 and 1990, and found post-split excess returns of 7.93 percent in the first year following the splits and 12.15 percent in the first three years. The article subsequently found announcement returns of 3.38 percent for the stocks which were sorted by time period, size decile, book-to-market quintiles, and post-split price percentiles.

They concluded that much of the excess long-run performance for glamour stocks which typically have a high earnings growth rate is confined to year one. Firms with moderate to high book-to-market ratios showed evidence of continuing excess returns in years two and three, contradicting the efficient market hypothesis in which the existing share price would adjust immediately when a split occurs. The study concluded that splits occur when stocks trade at high prices and the market under reacts to split announcements. Stock splits realign prices to a lower trading range, but managers self-select by conditioning the decision to split on expected future

performance, essentially a synthesis of the signaling and trading range hypothesis. Overall, these three studies highlight the different methodologies in constructing a portfolio of companies and subsequently measuring the effect of stock splits. Our area of interest aligns the most with Ikenberry, and thus our methodology will be a modified version of his approach, but we will also examine the returns for ETFs.

Data

We examined all 2-for-1 stock splits recorded in the Center for Research in Security Prices (CRSP) data base that were announced and completed during the 10-year period from January 1, 2007, to December 31, 2016. The decision to focus specifically on 2-for-1 stock splits is due to its frequency and because other split ratios such as Apple's 7-for-1 split, may introduce confounding factors (Brennan and Copeland 1988, Brennan and Hughes 1991). The CRSP database listed a total of 463 stock splits during this time period, but the database only had 397 announcement dates recorded. Most of the missing announcement dates were found using Investment House (2018) and online press releases that were available. We used the next market day for announcements made on days when the markets were closed. The data gathered contained 78 splits by ETFs and other publicly traded funds in addition to the splits by corporations.

We also utilized the CRSP data base to gather the split-adjusted daily returns for all stocks. The daily market-adjusted excess returns were calculated by taking the difference between each stock's return and the return for the CRSP value-weighted market portfolio (Ikenberry, Rankine, and Stice 1996).

Lastly, CRSP was used to obtain the split-adjusted daily volume of trading for the splitting stocks. Taking into account that twice as many shares needed to be traded after the split in order to equate to pre-split prices, the trade volume on and after the split date was divided by two. The trade volume data presented some anomalies in which some stocks traded at nearly 500 times the normal trading volume. Since trading volume is more easily influenced by outliers than return

data, the trading volume was benchmarked against the median daily trade volume for the ten days before the split and the actual split date. If a day's trading volume divided by this benchmark returned a ratio of 1.07, this means that this specific day had seven percent more trading than the base median trading volume.

Results

Table 1 shows the average excess returns for the ten trading days before and after the split announcement and the actual split date for corporate stock. Testing the null hypothesis of zero daily excess returns provides the listed p-values. The excess returns during the four days before the split announcement are small, but positive and statistically significant or nearly so at the five percent level which may indicate investors anticipating the announcement of the split. More noteworthy are the average excess returns on the announcement date and the four days following it. The returns are positive and both significant statistically as well as substantial. The positive returns are greatest on the announcement date and trickle out to the fourth day after the announcement.

Meanwhile, on the other side of this analysis, neither the ten days before or after the actual split date in Table 1 showed any substantial or statistically significant average excess returns at the five percent level. 64 percent of the stocks had positive excess returns on the announcement date while 50.5 percent of the stocks had positive excess returns on the split date.

Table 2, likewise, shows the average excess returns for the ten trading days before and after the split announcement and the actual split date for the ETFs. Apart from the excess returns being small, there is no consistent pattern. The few statistically significant excess returns are most likely flukes that occur with multiple statistical tests since there is no compelling explanation for them. A total of 52 percent of the ETFs had positive excess returns on the announcement date. 58.3 percent of the ETFs had positive excess returns on the split date, however, the average excess return was small and negative.

Figures 1 and 2 show the average cumulative excess returns for 10 days after the announcement and split. These were calculated by taking the difference between each stock's cumulative return and the CRSP index cumulative return over the appropriate time period. There was quite a substantial 3.42 percent average cumulative excess return for the ten days after the announcement date for corporate stock splits, but only a meager 0.38 percent for the ten days following the split itself. Meanwhile, ETFs had an average cumulative excess return ten trading days following the announcement of 1.16 percent, and -1.21 percent for the ten days following the actual split. However, there is no evidence of any beneficial effects from an ETF splitting its stock for affordability.

Figures 3 and 4 show the average cumulative excess returns 250 days (about one calendar year) following the announcement and split date. In Figure 3, corporate stock holds an initial cumulative excess return of 3.42 percent ten days following the announcement and maintains 3 percent after 250 days. However, similar to the previous finding, there was a low 0.38 percent average cumulative excess return in the ten days following the actual split and 0.12 percent after 250 days. Figure 4 shows the average cumulative excess returns for ETFs. The results are somewhat parallel to corporate stock splits with a 0.32 percent average cumulative excess return 250 days after the announcement and a lower -0.29 percent for the 250 days after the actual split.

The data on excess returns can be used to evaluate the signaling and affordability hypothesis for stock splits while trade volume data can be an additional evaluation method of the affordability hypothesis. The trade volume data in Table 3 shows the median excess trading volume for corporate stocks for the ten days before and after the split and its announcement. The null hypothesis of a 1.0 median was tested using the binomial distribution. Tied to the post-announcement price surge is a positive and statistically significant median excess trading volume for the day before the announcement and for the seven days after it.

The median excess trade volume data for ETFs is shown in Table 4. There is a rise in trading

volume after the announcement, but the third day is the only day that is statistically significant at the five percent level. On the other hand, trade volume fell in the five days preceding the actual split and stayed under one in the ten days following the split.

Discussion

The data show there are substantial and statistically significant excess returns shortly after the announcement of corporate splits, but not after the actual split. This is in line with the signaling hypothesis. The announcement sends a signal, but the split itself does not, because it has been anticipated well in advance of when it actually occurs.

The affordability hypothesis predicts an increased interest in buying after the stock splits as it becomes more affordable. However, the lack of positive excess returns after the split itself seems to disagree with this theory. Perhaps the positive effects of the stock becoming more affordable after it splits are captured in the price surge occurring after the split announcement.

It is not unreasonable to think that the effects of a split announcement will be the greatest on the day of the announcement and the day after since split announcements sometimes occur after the market closes. The benefits from a stock split should be fully reflected in the price immediately as implied by the efficient market hypothesis, but the substantial positive excess returns up to four days after the announcement are at odds with this.

Overall, trading volume for ETFs declines after a stock split, more so than corporate stock splits. The declining amount in trading after a split in addition to the lack of substantial and statistically significant effects on returns for ETF splits and announcements illustrate the importance of the signaling hypothesis over the affordability hypothesis. The decision to split a stock is a positive signal for investors, but no comparable signal exists for an ETF stock split. Moreover, the corporate stock split does not lead to affordability as shown by the excess return and trade volume data after the stock splits. Affordability may also be less observed with 2:1 stock splits, as opposed to splits with higher ratios such as Apple's 7:1 split.

Our results contradict Aggarwal and Chen (1989) in that we found excess returns associated

with stock split announcements. Our results only partially agree with those of Ikenberry et al. which found excess returns not only around stock split announcements, but also after the actual stock splits, unlike our results. Our findings agree with Hardin et al. where splits yield positive market reaction around the announcement date for corporate stock, but our results for ETFs are weak or insignificant. Overall, corporate stock splits serve primarily as a positive signal for investors that the company is performing well and will continue to do well after the split occurs. Consequently, this induces investors to buy more shares at the time of the announcement which ultimately increases excess returns.

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Table 1 Average Percent Excess Return for Corporate Stock

Trading Day	<u>Before and After Announcement</u>		<u>Before and After Split</u>	
	Daily Return	2-sided p-value	Daily Return	2-sided p-value
-10	0.139	0.2129	0.026	0.7957
-9	0.012	0.8930	0.166	0.0825
-8	0.041	0.6443	0.106	0.3771
-7	0.015	0.8646	0.039	0.7069
-6	0.020	0.8409	0.124	0.3405
-5	0.002	0.9816	-0.039	0.7245
-4	0.241	0.0209	-0.039	0.6714
-3	0.312	0.0061	-0.066	0.4955
-2	0.187	0.0819	0.053	0.5581
-1	0.191	0.0545	-0.002	0.9893
0	1.088	0.0000	0.088	0.5123
1	1.033	0.0000	0.262	0.0854
2	0.368	0.0073	-0.059	0.6514
3	0.277	0.0094	0.048	0.7176
4	0.329	0.0197	-0.019	0.8533
5	-0.067	0.5886	0.030	0.7902
6	0.111	0.3435	-0.178	0.1147
7	0.061	0.5213	0.035	0.7504
8	0.088	0.4020	0.001	0.9917
9	-0.110	0.3303	0.033	0.7777
10	0.184	0.1102	0.126	0.2315

Table 2 Average Percent Excess Return for ETFs

Trading Day	<u>Before and After Announcement</u>		<u>Before and After Split</u>	
	Daily Return	2-sided p-value	Daily Return	2-sided p-value
-10	0.034	0.8846	0.119	0.6560
-9	0.044	0.9033	0.350	0.0441
-8	0.324	0.0795	-0.425	0.3108
-7	0.064	0.6794	-0.064	0.7650
-6	-0.111	0.6886	-0.099	0.7231
-5	0.638	0.0005	0.283	0.1852
-4	-0.677	0.0137	0.215	0.4265
-3	-0.478	0.2748	-0.446	0.1202
-2	-0.390	0.1629	0.129	0.4504
-1	-0.278	0.2306	0.389	0.0301
0	0.231	0.4436	-0.018	0.9471
1	0.157	0.4192	-0.308	0.2391
2	-0.379	0.0928	-0.113	0.5210
3	0.334	0.1178	-0.356	0.1223
4	-0.080	0.6332	0.416	0.0669
5	0.499	0.0431	-0.150	0.5812
6	0.050	0.8169	-0.015	0.9571
7	0.031	0.8829	-0.131	0.3734
8	-0.114	0.5102	-0.236	0.3874
9	0.472	0.1305	-0.161	0.5583
10	-0.105	0.4873	-0.011	0.9660

Table 3 Median Excess Volume for Corporate Stock

Trading Day	<u>Before and After Announcement</u>		<u>Before and After Split</u>	
	Daily Volume	2-sided p-value	Daily Volume	2-sided p-value
-10	0.996	0.7937	1.007	0.6033
-9	0.976	0.2320	1.006	0.9165
-8	0.988	0.2536	0.998	0.9577
-7	0.964	0.0060	1.001	0.9577
-6	1.005	0.9165	0.997	0.8753
-5	1.002	0.7948	0.985	0.4354
-4	1.003	0.8753	0.976	0.1463
-3	0.998	0.9165	0.982	0.2751
-2	1.025	0.0969	1.008	0.6774
-1	1.060	0.0009	1.032	0.0170
0	1.238	0.0000	1.024	0.4354
1	1.394	0.0000	1.085	0.0007
2	1.263	0.0000	0.990	0.8753
3	1.151	0.0000	0.931	0.0332
4	1.091	0.0005	0.925	0.0428
5	1.088	0.0197	0.941	0.0691
6	1.116	0.0011	0.868	0.0001
7	1.104	0.0001	0.893	0.0002
8	1.020	0.4367	0.934	0.0043
9	1.074	0.1952	0.909	0.0332
10	1.071	0.0128	0.931	0.0109

Table 4 Median Excess Volume for ETFs

Trading Day	<u>Before and After Announcement</u>		<u>Before and After Split</u>	
	Daily Volume	2-sided p-value	Daily Volume	2-sided p-value
-10	1.028	0.3236	1.160	0.0956
-9	0.970	0.5366	1.022	0.6267
-8	0.954	0.3307	1.013	0.8954
-7	0.988	0.9906	1.031	0.9910
-6	0.994	0.9906	1.022	0.8954
-5	1.017	1.0000	0.903	0.3375
-4	1.007	0.9903	0.998	1.0000
-3	1.031	0.8002	0.830	0.1525
-2	0.972	0.3901	0.974	1.0000
-1	1.095	0.1467	0.971	0.7110
0	1.181	0.0536	0.759	0.0009
1	1.125	0.8002	0.748	0.0089
2	1.144	0.1467	0.811	0.0175
3	1.311	0.0300	0.876	0.0570
4	1.111	0.6217	0.739	0.0020
5	1.007	0.9903	0.704	0.0043
6	0.807	0.1798	0.684	0.0001
7	1.011	1.0000	0.860	0.0570
8	0.869	0.1798	0.817	0.1525
9	1.014	1.0000	0.991	1.0000
10	0.750	0.0536	0.944	0.8032

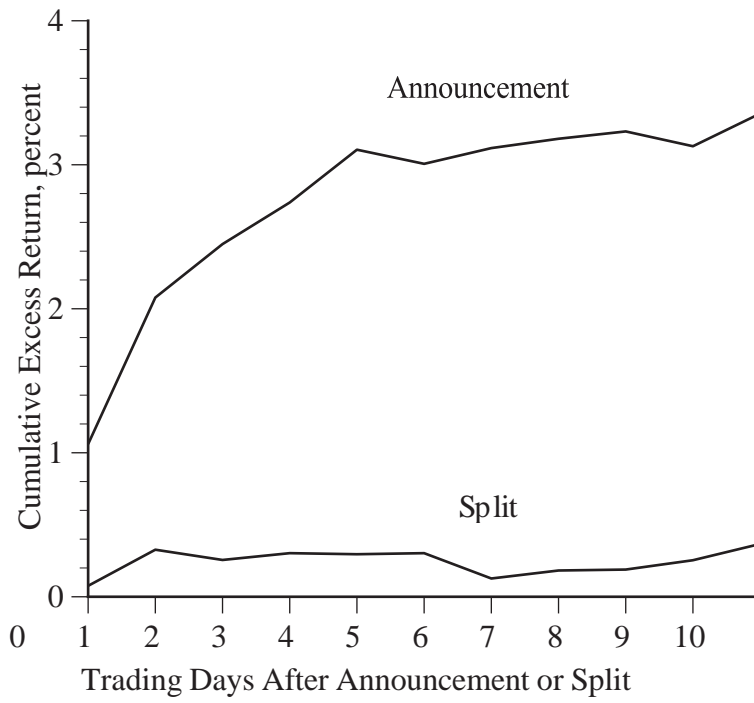


Figure 1 Average Cumulative Excess Return For Corporate Stock After Announcement or Split

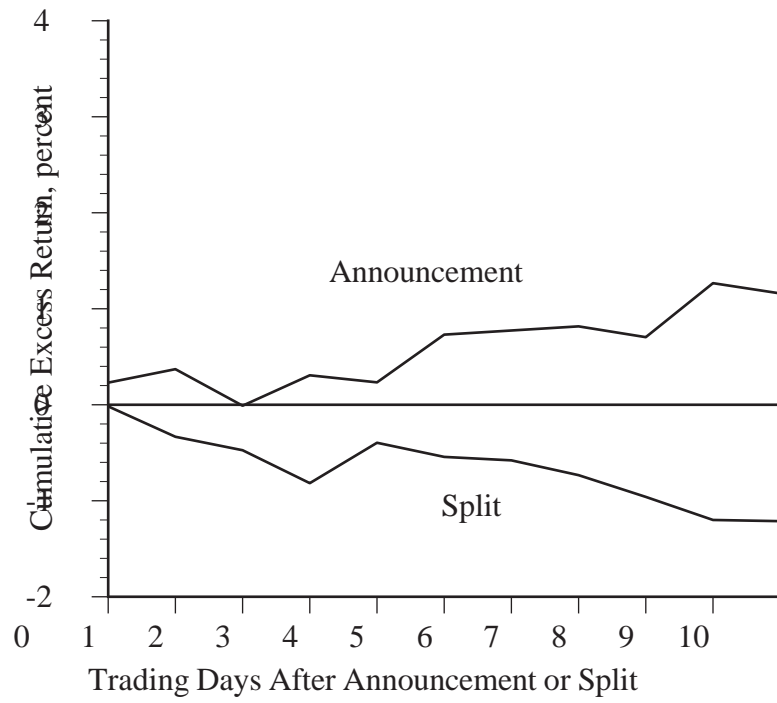


Figure 2 Average Cumulative Excess Return For ETFs After Announcement or Split

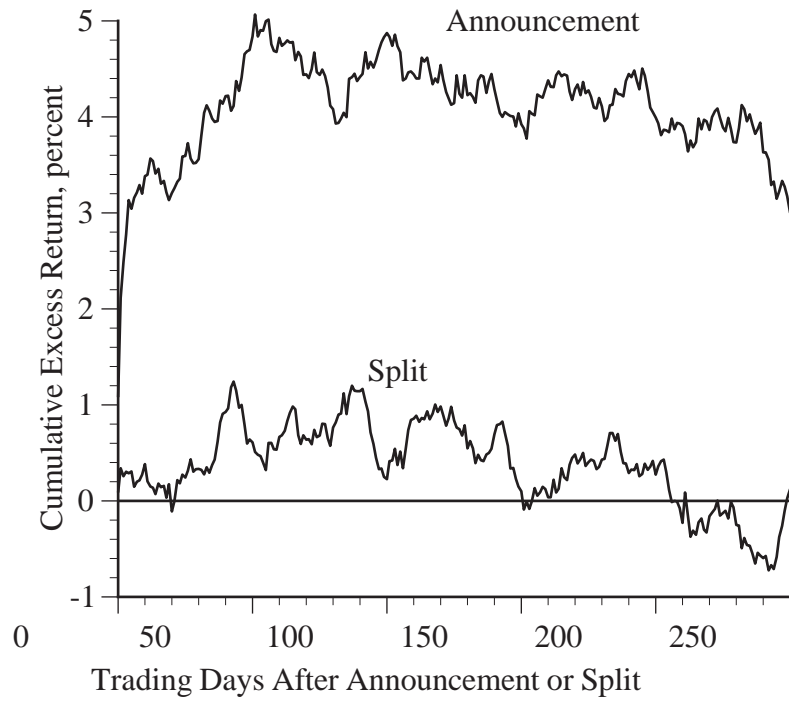


Figure 3 Average Cumulative Excess Return For Corporate Stock After Announcement or Split

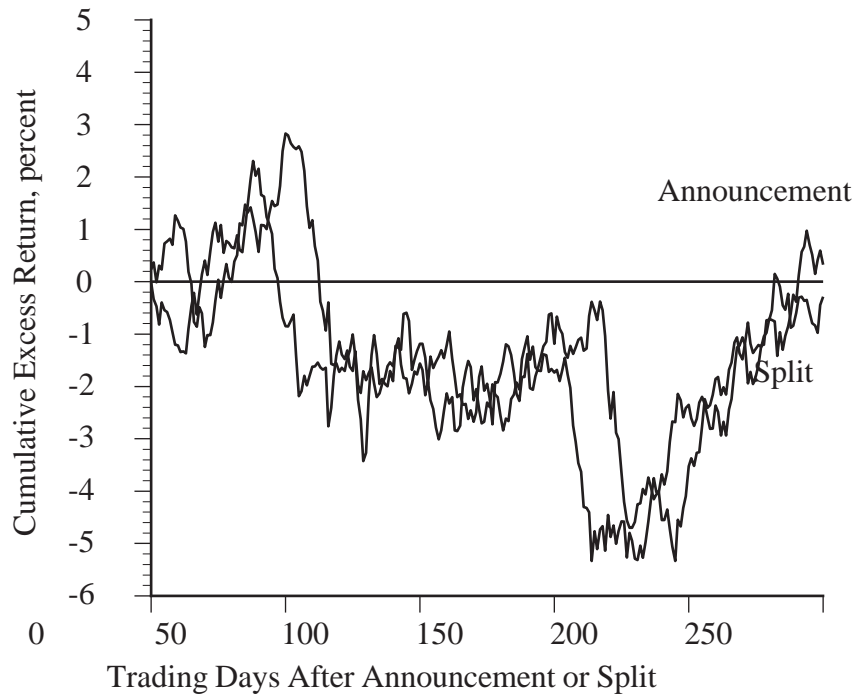


Figure 4 Average Cumulative Excess Return For ETFs After Announcement or Split