S&P 500 Index Replacements

A new game in town.

Messod D. Beneish and Robert E. Whaley

Sensational price increases for stocks added to the S&P 500 index are now regarded as a fact of life. With over a trillion dollars in index fund wealth tied to the S&P 500 index, newly added stocks are subject to enormous buying pressure both immediately after the addition is announced and throughout the days following before the change becomes effective. Indeed, the phenomenon has led to the creation of the "S&P game," where traders buy the newly added stock before the index funds step in, and sell it back when index fund buying pressure is at its peak.

A new S&P game has arisen in recent years. The reason is that Standard & Poor's now actively replaces stocks in the S&P 500 index due to "lack of representation." Where historically stocks were replaced mainly due to mergers or buyouts, S&P now deletes stocks when they have low market capitalization, low share price, or dwindling market share, or it simply needs to find a spot in the index for a new up-and-comer. Among other things, this study shows that trading in stocks deleted in the aftermath of their exclusion from the S&P 500 appears to generate significant risk-adjusted returns.

More generally, our purpose is to examine the price and trading volume effects of stocks that have been added to and deleted from the S&P 500 during the past six years. The most recent published evidence is for a period ending December 1995, and there are a number of reasons to suspect that the stock market reactions to additions to the S&P 500 may have changed.

For one thing, the amount of wealth tied to the S&P

MESSOD D. BENEISH is professor of accounting at the Kelley School of Business at Indiana University in Bloomington (IN 47405).
dbeneish@indiana.edu

ROBERT E. WHALEY is T. Austin Finch Foundation professor of business administration at the Fuqua School of Business at Duke University in Durham (NC 27706).
whaley@duke.edu

500 index portfolio has continued to grow at an extraordinary rate. The net asset value of the Vanguard S&P 500 fund (the most widely known public S&P 500 index fund) was at $17.4 billion at the end of 1995. At the end of 2001, the figure was $87.0 billion. Part of the increase in value is attributable to the fact that the S&P 500 portfolio value increased by nearly 90% over the six-year period, but the total increase in value is well over 400%. Has this enormous increase in the amount of S&P 500 indexing caused the price reactions of added stocks to become more exaggerated?

A second way market reactions have changed is in awareness of the S&P game plus the advent of after-hours trading. Research has documented that the abnormal price increase in new additions has two separate components—the overnight price change from the close on the announcement day until the open on the day after the announcement, and the price change from the open on the day after the announcement until the close of the day the change becomes effective. Since the price increase from the open on the day after the announcement until the close on the effective day is a tradable opportunity, the profitability of the S&P game should have been driven away by competition among traders.

Moreover, the overnight price increase may now also present a tradable opportunity due to the establishment of after-hours trading. S&P generally makes its announcement an hour or two after the nominal market close at 4:00 PM EST, but trading now continues much later in the day.

Together, these two factors should have led to a reapportioning of the announcement day/effective-day return. That is, the overnight return should now be a greater proportion of total return.

Finally, authors have focused almost exclusively on stocks added to the S&P 500, largely because stocks were added only when other stocks had to be removed due to merger, acquisition, bankruptcy, or restructuring. In the past six years, however, S&P has proactively removed stocks from the index. An examination of the price behavior of stocks after deletion from the index may provide new insight into whether price changes are permanent or temporary.

Our sample consists of all stocks added to or deleted from the S&P 500 index during the period January 1996 through December 2001. Evidence on the abnormal returns and trading volumes associated with stocks that are added to the index is directly comparable to that in past studies, but we also examine the abnormal returns and trading volumes of stocks removed from the index.

BACKGROUND

Fund indexing originated with the Sharpe [1964] and Lintner [1965] capital asset pricing model (CAPM). An implication of the CAPM is that investors should buy and hold a portfolio that includes all risky securities in the marketplace, with the proportion of wealth invested in each security equal to that security's value relative to the total market value of all securities. Any cash income generated while holding the market portfolio should immediately be reinvested in the market portfolio at the prevailing index weights.

In principle, the universe of risky securities in the CAPM includes all risky assets—stocks, bonds, and commodities—domestic as well as international. In practice, however, fund indexing is most commonly applied to domestic common stock portfolios, and not all stocks in the universe are held. In the U.S., for example, the most popular index funds are linked to the market value S&P 500 portfolio. As Exhibit 1 shows, the S&P 500 portfolio represented only 72.2% of the market value of all U.S. stocks as of December 31, 2000.

Exhibit 2 shows the growth in the net asset value of Vanguard's Index Trust-500 Portfolio relative to the increase

EXHIBIT 1
Market Capitalization Statistics—December 31, 2000 (millions)

Description	S&P 500 Index Portfolio	Highest 500 Market Cap Portfolio	Universe of Stocks
Market Capitalization	11,477,938	12,943,374	15,886,439
Percent of Universe	72.2%	81.5%	
Number of S&P 500 Stocks	500	361	500

EXHIBIT 2
Vanguard S&P 500 Fund and S&P 500 Index Level

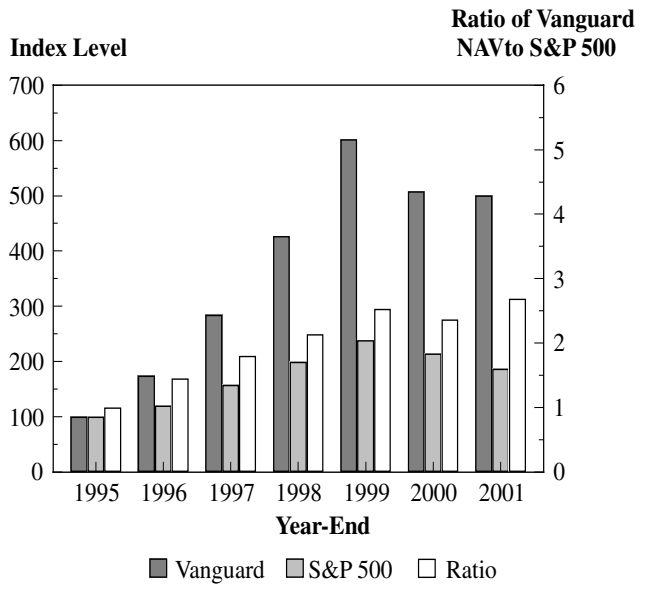
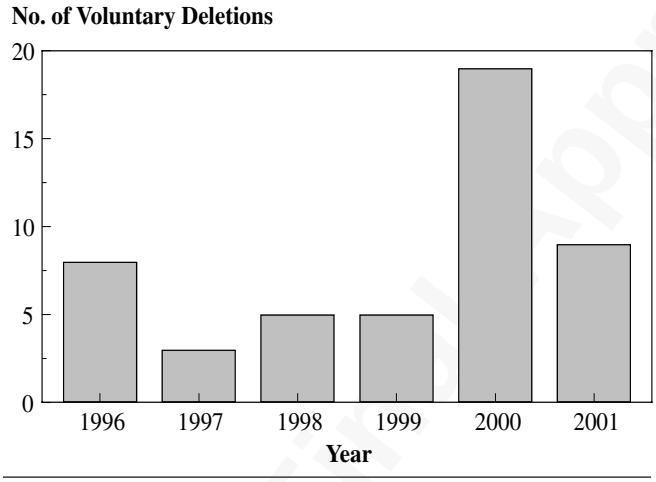


EXHIBIT 3
Voluntary Deletions from S&P 500 Index—1996–2001



in the value of the S&P 500 index portfolio from year-end 1995 through year-end 2001. The values of the Vanguard fund and the S&P 500 portfolio are set equal to 100 at year-end 1995, as is shown on the left-hand vertical axis. On the right-hand vertical axis is the ratio of the Vanguard portfolio value to the S&P 500 portfolio value. At the end of 1995, the ratio is obviously equal to 1.0.

Note that the asset value of the Vanguard falls from 1999 to 2000, and then holds approximately steady for 2001. Interestingly, the ratio of the value of the Vanguard fund to the S&P 500 portfolio holds steady from 1999 to 2000, and then increases in 2001. What this shows is that, although the S&P 500 portfolio declined in these years, the wealth invested in the Vanguard fund continued to grow. Indeed, the growth in investment from the end of 1995 to the end of 2001 is more than 150%.

Changes to the S&P 500 Portfolio

Prior to 1996, changes to the S&P 500 index were made *only* when a stock had to be removed. The most common reason for removal was that a company had merged with or had been acquired by another company. In these cases, the stock is removed as close as possible to the tender offer expiration date or to the shareholder vote date. Corporate restructuring may also cause removal. Whether the firm or any of its spin-offs stays in the index after restructuring is decided on a case-by-case basis. Bankruptcy is another potential cause. Removal occurs if a shareholder-approved recapitalization dramatically changes the firm's debt ratio, or when a firm files for Chapter 11.

Breaking with tradition in 1996, S&P began to actively replace firms that it deemed to no longer represent the U.S. market in general or not represent the industry within which they operated in particular. Exhibit 3 shows the number of such "active" deletions made by S&P year-by-year from 1996 through 2001.

While virtually no such deletions took place previously, there were 8 in 1996, 3 in 1997, 5 each in 1998 and 1999, 19 in 2000, and 9 in 2001. The attributes of the stocks deleted together with the attributes of their replacements are shown later.

Finally, to put the past empirical evidence into proper perspective, we need to describe the change in S&P announcement policy that occurred in October 1989. Before October 1989, S&P followed the practice of changing the index composition overnight. After the market close, S&P announced the names of the stocks added to or dropped from the S&P 500. By the open on the following morning, the change was complete.

After October 1989, S&P began to preannounce the change in composition to ease the order imbalances that would occur on the morning after the announcement. In general, the announcement has been made about five days before the change becomes effective. Sometimes it is shorter due to a bankruptcy filing or uncertainty about the timing of regulatory approval of a merger or acquisition. For stocks with particularly high market capitalizations, the interval may be longer.

Exhibit 4 shows the number of days between the announcement day and the effective day for index changes made during the period January 1996 through December 2001.

Past Evidence on Index Changes

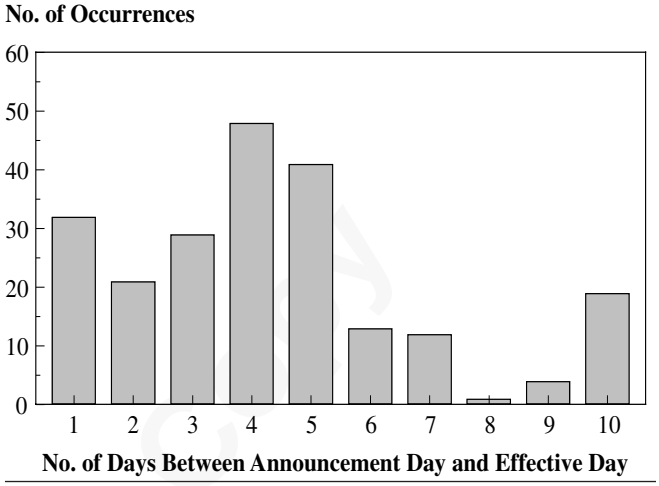
The evidence from stocks added to the S&P 500 index appears to indicate that the price effect has increased over time. Shleifer [1986], for example, examines additions to the index made during the period 1976 through 1983, and finds an average abnormal return of 2.79% from the close of trading on the announcement day to the close on the next day. The price increase appears to be permanent. Harris and Gurel [1986] use roughly the same sample period, and report an average abnormal return of 3.13%. They conclude that the price effect is temporary, however.

Beneish and Whaley [1996, 1997] use more recent changes to reexamine the issue in light of S&P's decision to preannounce changes in the index starting in October 1989. In the period before the change in announcement policy, we find in Beneish and Whaley [1996] that prices of newly added stocks rise about 3.7% (after market adjustment) from the close on announcement day until the open the next morning. This premium is about 23% higher than that reported in past work, reflecting growth in the amount of wealth indexed to the S&P 500. Our evidence, like that of Shleifer, supports the notion that the price increase is permanent.

In Beneish and Whaley [1997], we document abnormal returns for stocks added to the index starting with the change in policy in October 1989 through December 1995. For stocks with only one day between announcement and effective date, we find a significantly positive abnormal risk-adjusted return of 5.94% from the close of trading on the announcement day until the opening the next morning, and a positive but insignificant return of 1.10% from the opening until the close. For stocks with more than one day between the announcement day and effective day, the average overnight risk-adjusted return is 2.55%, and the abnormal return from the open on the day following the announcement until the close on the effective day is 3.70%; both returns are significant in a statistical and an economic sense.

Interestingly, we also provide evidence that suggests that index funds begin to make changes to their portfolios earlier than the effective day. The overnight return of newly added stock, for example, increases over the return from the open on the day following the announcement until the close on the effective day. We conclude that the S&P game (and the adverse effects of S&P's new announcement policy) will disappear. We examine here, among other things, whether it has.

EXHIBIT 4
Number of Days Between Announcement Day and Effective Day for Index Changes—1996–2001



In Beneish and Whaley [1986] we also report abnormal trading volume figures. For the sample of additions prior to the change in preannouncement policy, we find that trading volume is 7.3 times normal on the day following the announcement. After the change in policy, the trading volume is 10.8 times normal for the sample of additions with only one day between the announcement day and the effective day.

Most interesting, however, are results for the sample of replacements after October 1989 and with more than one day between the announcement day and the effective day. In this case, trading volume is 3.5 times higher on the day following the announcement, 7.2 times higher than normal in all of the days from two days after the announcement until the day before the effective day, and 10.6 times higher than normal on the effective day.

In other words, the trading volume on the effective day exceeds the total trading volume in all days after the announcement but before the effective day. Apparently index funds are waiting until the effective day to rebalance in order to minimize tracking error between their portfolios and the S&P 500 index level.

DATA AND METHODOLOGY

The sample used in this study consists of all changes to the S&P 500 index from January 1996 through Decem-

ber 2001, picking up where we stop in Beneish and Whaley [1997]. Announcement and effective dates for changes during the period January 1996 through December 1997 are taken from monthly issues of the *S&P 500 Information Bulletin*. The announcement and effective dates for subsequent changes are drawn from monthly issues of *S&P 500 Index Focus.*

Each date is then verified against press releases appearing in the *Dow Jones News Retrieval* service. Aside from providing the relevant dates, the press releases usually include the motivation for making a particular deletion, and we record the shares outstanding for the stocks added to or dropped from the index.

Our assessment of abnormal trading behavior involves examining returns in the days surrounding a change to the index. The daily returns for the two years prior to the announcement day and the 40 trading days following the effective day come from the CRSP daily return file.[1]

More refined data are required for the interval in between so as to be able to distinguish between tradable and untradable profit opportunities. Standard & Poor's makes the announcement regarding a change in composition after the market closes. Thus, any price change between the close on the announcement day and the open on the day following the announcement is untradable. Any movement after the open on the day after the announcement until the effective day represents a profitable trading opportunity.

Opening and closing prices in the days between the close on the announcement day and the close on the effective day are drawn from the New York Stock Exchange's trade and quote (TAQ) file.

Abnormal Return Measurement

To assess whether a stock return is abnormal, we use the definition:

$$Abnormal\ Return_i = \left(\prod_{t_i=1}^{T} (1 + R_{i,t_i}) - 1 \right) - \left(\prod_{t_i=1}^{T} (1 + R_{m,t_i}) - 1 \right)$$

where T is the length of the trading interval, and $R_{i,t}$ and $R_{m,t}$ are returns of the stock i and the S&P 500 futures, respectively. As the equation shows, the holding-period return of stock i is abnormal only to the extent it exceeds the holding-period return of a market proxy. Our proxy for the market is the American Stock Exchange SPDRs.

The equation therefore represents the abnormal return on a portfolio formed by going long the stock under consideration and selling SPDRs short in an equal dollar amount. Of course, if the abnormal return is negative, an abnormal positive return can be earned by selling the stock short and buying an equal dollar amount of SPDRs.

Abnormal Trading Volume

To gauge whether the trading volume is abnormal in the days surrounding change to the composition of the S&P 500 portfolio, we compute the average dollar trading volume across the 60 trading days immediately prior to the announcement day. We then compute the ratio of dollar trading volume in each day (from the announcement day to the effective day) to the average. Trading activity is higher than normal when the ratio exceeds 1.0.

EFFECTS ON STOCKS ADDED TO S&P 500

Abnormal Returns

Exhibit 5 summarizes the abnormal return results for 220 stocks added to the index from January 1996 through December 2001. The stocks are divided into two groups. In the first, the day the change became effective was the day after the announcement (Panel A). In the second, there were at least two days between announcement day and the day the change became effective (Panel B).

There are many interesting results. In Panel A, for example, the abnormal return from the announcement-day close until the close on the next day is 8.15% on average across the 32 stocks in this subsample. The same statistic we report in Beneish and Whaley [1997] for October 1989 through December 1995 is 5.94%. The most likely reason for the increase in return is growth in the level of funds tied to the S&P 500 index. Abnormal returns after the effective day tend to be negative, although insignificant in a statistical sense.

The results in Panel B document changed behavior. While we report in Beneish and Whaley [1997] an abnormal return of 2.55% from the close on the announcement day until the open on the next morning and an abnormal return of 3.70% from the open on the day after the announcement until the close on the effective day for October 1989 through December 1995, Panel B shows the corresponding returns are 5.76% and 3.11%.

EXHIBIT 5
Mean Statistics for Stocks Added to S&P 500 Index—1996–2001

Interval	Begins	Ends	No. of Obs.	Mean Return	t-ratio	Mean Abnormal Return	t-ratio
PANEL A. SINGLE DAY BETWEEN ANNOUNCEMENT DAY AND EFFECTIVE DAY							
Pre-Announcement Day							
	close AD-504	close AD	31	1.0837	6.19	0.6897	3.77
	close AD-252	close AD	31	0.6784	5.61	0.5086	4.26
	close AD-40	close AD	31	0.0955	2.05	0.0785	1.79
	close AD-20	close AD	31	0.0406	1.75	0.0293	1.47
	close AD-10	close AD	31	0.0259	1.52	0.0214	1.29
	close AD-5	close AD	31	0.0177	1.14	0.0150	1.07
	close AD-1	close AD	31	-0.0032	-0.51	-0.0040	-0.68
Day After Announcement (effective) Day							
	close AD	open AD+1 (ED)	31	0.0814	10.51	0.0815	10.83
	open AD+1 (ED)	close AD+1 (ED)	32	0.0001	0.02	0.0045	0.60
Post-Effective Day							
	close ED	close ED+5	32	-0.0128	-1.27	-0.0143	-1.65
	close ED	close ED+10	32	-0.0201	-1.51	-0.0179	-1.46
	close ED	close ED+20	32	-0.0253	-1.15	-0.0309	-1.60
	close ED	close ED+40	32	-0.0421	-1.16	-0.0495	-1.50
Abnormal Trading Volume				**Mean Abnormal Volume**	**t-ratio**		
	open AD	close AD	31	1.138	1.40		
	open ED	close ED	31	33.188	4.80		
PANEL B. MORE THAN ONE DAY BETWEEN ANNOUNCEMENT DAY AND EFFECTIVE DAY							
Pre-Announcement Day							
	close AD-504	close AD	156	2.1828	6.79	1.7850	5.52
	close AD-252	close AD	166	0.7430	7.56	0.5985	6.09
	close AD-40	close AD	174	0.0444	2.66	0.0317	2.08
	close AD-20	close AD	174	0.0268	2.39	0.0227	2.21
	close AD-10	close AD	174	0.0315	3.58	0.0284	3.45
	close AD-5	close AD	175	0.0210	3.21	0.0178	2.96
	close AD-1	close AD	175	0.0044	1.36	0.0046	1.59
Day After Announcement Through Effective Day							
	close AD	open AD+1	186	0.0584	18.04	0.0576	18.16
	open AD+1	close AD+1	187	-0.0085	-3.72	-0.0080	-3.73
	open AD+1	close ED	187	0.0306	3.75	0.0311	4.09
	open ED	close ED	188	0.0060	1.70	0.0082	2.36
Post-Effective Day							
	close ED	close ED+5	188	-0.0173	-2.75	-0.0218	-3.82
	close ED	close ED+10	188	-0.0199	-2.22	-0.0242	-3.02
	close ED	close ED+20	188	-0.0146	-1.43	-0.0265	-2.81
	close ED	close ED+40	188	0.0065	0.42	-0.0159	-1.11
Abnormal Trading Volume				**Mean Abnormal Volume**	**t-ratio**		
	open AD	close AD	174	1.222	3.51		
	open AD+1	close AD+1	174	4.624	11.64		
	open AD+2	close ED-1	154	9.122	8.84		
	open ED	close ED	174	16.460	17.11		

AMEX SPDRs used as market proxy for abnormal returns. Abnormal trading volume defined as dollar value of trading during the interval divided by mean daily dollar trading volume over the past 60 trading days.

This comparison is important for two reasons. First, the sum of the returns in the more recent period is nearly 9% (i.e., 8.87%), compared to the 6.25% return in the earlier period. Like the results in Panel A, these results support the notion that the increase in indexing has caused more exaggerated price reactions for stocks added to the index.

Second, the proportion of the abnormal return from the close of trading on the announcement day to the close of trading on the effective day following the announcement has risen (i.e., 2.55%/6.25% = 0.41 versus 5.76%/8.87% = 0.65). This suggests that index funds have become smarter in their rebalancing activities. While most funds appear to have waited until the effective day to rebalance their portfolios, funds do not appear to be rebalancing either in the after-hours markets after the announcement is made or with market on open orders on the following day. The evidence in Panel B also suggests that prices fall in the days following the effective day, but the price rebound is on the order of only 2% compared with the 9% price run-up.

Panels A and B are interesting in another respect. While Standard & Poor's suggests that additions to or deletions from the index do not reflect an opinion on the investment merits of the company, stocks added to the index have (coincidently?) had extraordinary performance in the period prior to their inclusion. Over the two years prior to announcement of their addition to the index, the average abnormal return was 69.0% for the stocks in Panel A and 178.5% for the stocks in Panel B. The difference between the two sets of stocks is that the first set of additions is motivated largely by the need to add a new stock because another must be withdrawn, while the second set represents more deliberate replacements.

Trading Volume

Abnormal trading volume results are also reported in each panel in Exhibit 5. In Beneish and Whaley [1986], we report trading volume 10.8 times normal for additions to the S&P 500 with only one day between the announcement day and the effective day, but Panel A of Exhibit 5 shows that the trading volume for recent additions is 33.2 times normal. Again, this result is to be expected, given growth in the assets of index funds pegged to the S&P 500 over time.

With more than one day between the announcement day and the effective day, the evidence suggests that the preponderance of index fund rebalancing continues to occur on the effective day. Panel B of Exhibit 5 shows that trading volume is 4.6 times higher on the day following the announcement and 9.1 times normal in all days afterward but before the effective day. On the effective day, however, trading volume is 16.5 times normal, well in excess of the total trading volume across all days after the announcement is made.

EFFECTS ON STOCKS DELETED FROM S&P 500

Over the past six years, at least 49 stocks have been withdrawn from the S&P 500 index. As Exhibit 3 shows, the first year with an extraordinary number of voluntary deletions was 1996, with eight. A modest number occurred in the years 1997 through 1999, but then there were 19 in 2000 and 9 in 2001. These changes afford us the opportunity not only to document the effect of deletions on stock prices and trading volumes, but also to characterize the nature of the stocks used as replacements.

Exhibit 6 documents the mean returns and mean abnormal returns of stocks deleted from the index (Panel A) and stocks that served as their replacements (Panel B). Again there are many interesting results. First, looking at Panel A, the stocks deleted from the index appear to have been recent poor performers. Over the past two years, for example, the deleted stocks experienced an abnormal return of –77%. Second, adjusting for market effects, the stock price of a deleted stock falls by 6.21% from the close of trading on announcement day until the open of trading on the day after the announcement, and then by another 8.31% from the open on the announcement day until the close on the effective day. One can imagine the shareholders' economic shock when they learn their firm has been dropped.[2]

The –8.31% mean abnormal return reported in Panel A of Exhibit 6 gives rise to the "new game in town." Since this return is earned over the interval from the open of trading on the day following the announcement until the close of trading on the effective day, it represents a tradable return opportunity.

Exhibit 7 shows the abnormal returns for all 49 hypothetical trades in which we bought the deleted stock and sold short an equal dollar amount of S&P 500 SPDRs. The median abnormal return is –6.74%, and the mode is –21.74%. The lowest return is –62.0% and the highest 12.58%. The vast majority of the returns are negative; only 8 of the 49 returns are positive.

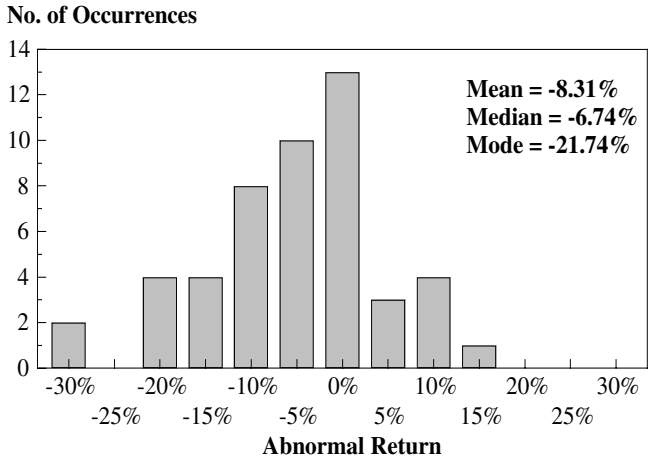
To earn a positive return, one simply shorts the deleted stock and buys SPDRs. Or, given that over one-

EXHIBIT 6
Mean Statistics for Stocks Voluntarily Deleted from and Added to S&P 500 Index—1996–2001

Interval	Begins	Ends	No. of Obs.	Mean Return	t-ratio	Mean Abnormal Return	t-ratio
PANEL A. VOLUNTARY DELETIONS							
Pre-Announcement Day							
	close AD-504	close AD	49	-0.4525	-9.14	-0.7700	-14.10
	close AD-252	close AD	49	-0.3559	-6.48	-0.4471	-8.13
	close AD-40	close AD	49	-0.1724	-4.51	-0.1845	-5.19
	close AD-20	close AD	49	-0.1061	-2.89	-0.1050	-2.97
	close AD-10	close AD	49	-0.0698	-2.32	-0.0739	-2.45
	close AD-5	close AD	49	-0.0700	-2.93	-0.0722	-3.06
	close AD-1	close AD	49	-0.0348	-1.56	-0.0379	-1.73
Day After Announcement Through Effective Day							
	close AD	open AD+1	49	-0.0610	-9.60	-0.0621	-9.43
	open AD+1	close AD+1	49	-0.0372	-4.26	-0.0374	-4.04
	open AD+1	close ED	49	-0.0839	-4.76	-0.0831	-4.68
	open ED	close ED	49	-0.0479	-2.95	-0.0445	-2.75
Post-Effective Day							
	close ED	close ED+5	49	0.0739	1.21	0.0741	1.23
	close ED	close ED+10	49	0.0741	1.29	0.0800	1.41
	close ED	close ED+20	49	0.1449	2.06	0.1454	2.05
	close ED	close ED+40	48	0.2499	2.82	0.2369	2.67
Abnormal Trading Volume				**Mean Abnormal Volume**	**t-ratio**		
	open AD	close AD	49	0.839	-2.56		
	open AD+1	close AD+1	47	3.400	7.07		
	open AD +2	close ED-1	43	6.055	8.39		
	open ED	close ED	49	16.015	6.95		
Mean Share Price at Announcement Day Close						10.69	
Mean Market Capitalization at Announcement Day Close (in millions)						550	
PANEL B. ADDITIONS THAT MATCH VOLUNTARY DELETIONS							
Pre-Announcement Day							
	close AD-504	close AD	32	3.1930	3.62	2.8996	3.30
	close AD-252	close AD	34	0.9974	3.49	0.9136	3.23
	close AD-40	close AD	40	0.0854	1.66	0.0762	1.54
	close AD-20	close AD	40	0.0189	0.62	0.0240	0.83
	close AD-10	close AD	40	0.0365	1.60	0.0313	1.40
	close AD-5	close AD	40	0.0245	1.32	0.0234	1.31
	close AD-1	close AD	40	0.0103	0.97	0.0068	0.71
Day After Announcement Through Effective Day							
	close AD	open AD+1	48	0.0620	7.51	0.0609	7.54
	open AD+1	close AD+1	49	-0.0065	-1.36	-0.0066	-1.43
	open AD+1	close ED	49	0.0278	1.71	0.0285	1.83
	open ED	close ED	49	0.0051	0.67	0.0084	1.08
Post-Effective Day							
	close ED	close ED+5	49	-0.0442	-3.34	-0.0440	-3.44
	close ED	close ED+10	49	-0.0525	-2.65	-0.0466	-2.51
	close ED	close ED+20	49	-0.0438	-2.09	-0.0433	-2.17
	close ED	close ED+40	49	0.0075	0.24	-0.0045	-0.15
Mean Share Price at Announcement Day Close						58.48	
Mean Market Capitalization at Announcement Day Close (in millions)						15,530	

AMEX SPDRs used as market proxy for abnormal returns. Abnormal trading volume defined as dollar value of trading during the interval divided by mean daily dollar trading volume over the past 60 trading days. Sample of additions includes stocks added at the time of a voluntary deletion.

EXHIBIT 7
Abnormal Returns for Voluntary S&P 500 Index Deletions—1995–2001



Abnormal return measured from open of trading on day following announcement until close on effective day. Labels on the horizontal axis are upper bound on the range. The bar with the label 0%, for example, represents the number of occurrences of an abnormal return between –5% and 0%.

third of the stocks in this sample had exchange-traded put options listed, buying puts is also an effective means of shorting the stock.

Note in Panel A of Exhibit 6 that there appear to be extraordinarily high positive abnormal returns in the period following the effective day. In the 40 trading days following the effective day, for example, the mean abnormal return for the deleted stocks is 23.69%, significant in a statistical sense. A closer examination of the data reveals that this abnormal return is driven by a handful of outliers—Battle Mountain Gold with a return of 110.3%, Owens-Illinois with 148.9%, Crown Cork and Seal with 177.8%, Armstrong Holdings Inc. with 222.2%, and Global Crossing with 250.0%. Without these stocks, the abnormal returns remain positive, but low and insignificant in a statistical sense.

Panel B of Exhibit 6 provides some interesting insights regarding the returns of the firms added when the 49 voluntary deletions took place. Several results here are striking. First, over the two years preceding the stocks' introduction to the index, their average abnormal returns were a whopping 289.96%; during the last year alone, they were 91.36%. Consequently, it is unclear whether firms were deleted due to lack of representation or simply dumped to make room for an up-and-comer.

The price reactions of the matched-addition sample are comparable to the full-addition sample in the days surrounding the replacement. The overnight abnormal return following the announcement is 6.09%, and the abnormal return from the open on the day after announcement until the close on the effective day is 2.85%. The stocks appear to suffer a temporary price decline following the effective day, but seem to recover by 40 days following the announcement.

SUMMARY

There are a number of reasons to think that stock market reactions to alterations in the composition of the S&P 500 may have changed from those reported earlier. For one thing, the amount of wealth tied to the S&P 500 index portfolio has continued to grow at an extraordinary rate. For another, increased awareness of the S&P game and the advent of after-hours trading may have caused reactions to the change announcements to appear more quickly than before. Finally, the S&P has over the past six years voluntarily removed stocks for a variety of reasons. This means that there is now a large sample of S&P 500 deletions in which the deleted stock continues to trade.

We have examined price and trading volume effects of stocks added to and deleted from the S&P 500 during the past six years. The results are consistent with our hypotheses. First, the enormous growth in index funds pegged to the S&P 500 has made price reactions to additions to the index greater. The mean abnormal return from the close of trading on the announcement day until the close of trading on the effective day is over 8%, considerably higher than the 3% reported by Harris and Gurel [1986] and Shleifer [1986] for the period 1978 through 1983 and the 6% reported by Beneish and Whaley [1997] for October 1989 through December 1995.

Second, a greater proportion of the return from the close of trading on the announcement day until the close of trading on the effective day is accounted for by the return from the close on the announcement day until the open on the next morning. Increased awareness of the S&P game and additional trading hours are likely the cause.

Perhaps our most intriguing results are associated with the 49 voluntary deletions. For these stocks, the mean abnormal return from the close of trading on the announcement day until the open the next morning was –6.21%, and from the open on the day after the announcement until the close on the effective another –8.31%. This latter period in particular offers a tradable opportunity, in

the sense that the position is not opened until the morning on the day following the announcement. By shorting the deleted stock and hedging using a long position in SPDRs, a simulation of the new game in town earns a mean abnormal risk-adjusted return of over 8% on average.

ENDNOTES

The authors gratefully acknowledge comments by Jonathon Markman, Al Neuberg, and Thomas Smith.

[1]By convention, the CRSP daily return is computed using the price at the normal close of trading (i.e., 4:00 PM EST) each day. Toward the end of the sample period, trading hours were extended.

[2]The number of stocks in the period from the close on the effective day until the close 40 days after the effective day drops to 48 as a result of the delisting of Enron at the NYSE.

REFERENCES

Beneish, Messod D., and Robert E. Whaley. "An Anatomy of the 'S&P Game': The Effects of Changing the Rules." *Journal of Finance,* 51 (December 1996), pp. 1909-1930.

——. "A Scorecard from the S&P Game." *The Journal of Portfolio Management,* 23 (Winter 1997), pp. 16-23.

Dhillon, U., and H. Johnson. "Changes in the Standard & Poor's 500 List." *Journal of Business,* 64 (1991), pp. 75-85.

Goetzmann, W.N., and M. Garry. "Does Delisting from the S&P 500 Affect Stock Price?" *Financial Analysts Journal* (March-April 1986), pp. 64-69.

Harris, Lawrence, and Eitan Gurel. "Price and Volume Effects Associated with Changes in the S&P 500 List: New Evidence for the Existence of Price Pressures." *Journal of Finance,* 41 (1986), pp. 815-829.

Jain, P.C. "The Effect on Stock Price of Inclusion or Exclusion from the S&P 500." *Financial Analysts Journal,* January-February 1987, pp. 58-65.

Lintner, John. "The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets." *Review of Economics and Statistics,* 47 (1965), pp. 13-37.

Pruitt, Stephen W., and K.C. John Wei. "Institutional Ownership and Changes in the S&P 500." *Journal of Finance,* 44 (1989), pp. 509-513.

Sharpe, William F. "Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk." *Journal of Finance,* 19 (1964), pp. 425-442.

Shleifer, Andrei. "Do Demand Curves for Stocks Slope Down?" *Journal of Finance,* 41 (1986), pp. 579-590.