A Scorecard from the S&P Game

Can I play?

Messod D. Beneish and Robert E. Whaley

The S&P game started in October 1989, when Standard & Poor's began its practice of pre-announcing changes to the S&P 500. Before then, S&P had announced the change in composition after the close of trading, with the change becoming effective by the next morning's open. With no lead time, index funds bought the shares of the newly included stock on the day following the announcement.

To ease order imbalances on the day following the announcement, S&P began, in October 1989, to pre-announce changes in index composition. Under the new policy, the announcement takes place after the market close, although the change does not become effective until about five days later. Since many index funds wait until the effective day to rebalance, "risk arbitrageurs" step in ahead of the index funds — buying on the day following the announcement, and selling, presumably at a higher price, a few days later.

The purpose of this study is to report on the profitability of the S&P game.[1]

FUND INDEXING

Fund indexing originated with the Sharpe [1964]–Lintner [1965] capital asset pricing model (CAPM). An implication of the CAPM is that investors should buy and hold all risky securities in the marketplace, with the proportion of wealth invested in each security equal to that security's market value relative to

MESSOD D. BENEISH is associate professor of accounting at the School of Business at Indiana University in Bloomington (IN 47405).

ROBERT E. WHALEY is the T. Austin Finch Foundation professor of business administration at the Fuqua School of Business at Duke University in Durham (NC 27708).

the total market value of all risky securities. Any cash income generated by their stock investments is reinvested in the proportions dictated by the current index market value weights.

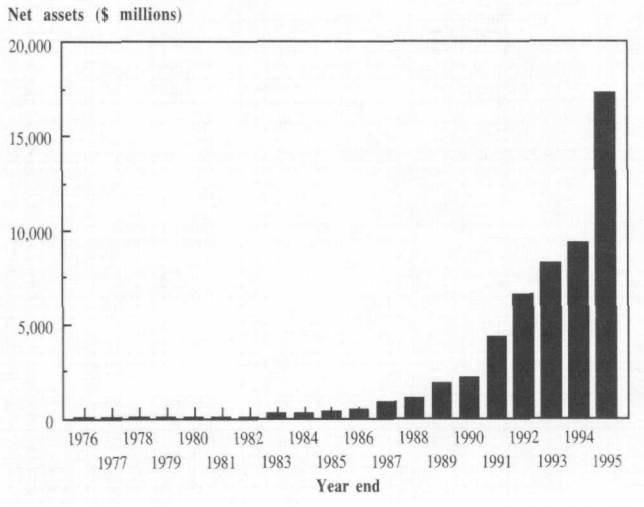
In the U.S., the most widely known market value-weighted stock index is the S&P 500. It includes approximately 70% of the market capitalization of all U.S. stocks. Of the publicly traded funds pegged to the S&P 500, perhaps the most well-known is the Vanguard Index Trust–500 Portfolio.

Exhibit 1 shows how the asset value of the 500 Portfolio has grown through time. At the end of 1976, the asset value was $14 million; at the end of 1995, the value was $17,290 million. Assuming that the growth in Vanguard's net asset value is indicative of the growth of all S&P 500 index funds, asset value increased by more than 123,000%. Last year alone, the value of the fund increased by 85%, well in excess of the S&P 500 index gain of 34%.[2]

Vanguard's 500 Portfolio is just one publicly traded S&P 500 fund of one investment company; there are many others. Conversations with fund advisors indicate that privately held funds pegged to the S&P 500 have even greater value than public funds.

One investment advisor estimates that the value of all of the S&P 500 funds (both public and private) is about 10% of the index portfolio value. At the end of 1995, the S&P 500 portfolio had a market value of $4.59 trillion, so his estimate of S&P 500 fund investment is $459 billion. With as much as 10% of outstanding shares being acquired, it is not surprising that an addition to the S&P 500 composition produces abnormal stock price behavior.

EXHIBIT 1
ASSET VALUE IN MILLIONS OF DOLLARS OF THE VANGUARD INDEX TRUST-500 PORTFOLIO AT THE END OF DECEMBER OF EACH YEAR 1976–1995



CHANGES IN S&P 500 COMPOSITION

The S&P 500 Composite Stock Price Index (or simply "the S&P 500") is a market value-weighted index composed of 500 stocks from the New York Stock Exchange, the American Stock Exchange, and the Nasdaq National Market System. Additions to the S&P 500 are made *only* when stocks must be removed.[3]

The most common reason for a stock's removal is that the company has merged with or been acquired by another firm. 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 case by case. Bankruptcy is another potential cause. Removal occurs if a shareholder-approved recapitalization dramatically changes a firm's debt ratio, or when Chapter 11 is filed. Finally, a firm may be removed when it no longer meets the criteria for inclusion in the index.

Until October 1989, S&P followed the practice of changing index composition overnight. After the close, S&P announced the names of the stocks added to or dropped from the S&P 500. By the following morning, the change was complete. Under the old announcement policy, the first opportunity to buy the shares of the newly added stock was at the open on the day following the announcement.

Beginning October 1989, S&P began the practice of pre-announcing the change in composition of the S&P 500 "to ease order imbalances that typically happen to stocks just added to the '500' " ("S&P 500 Index Directory" [1992, p. 6]). Under the new announcement policy, S&P announces after the close not only the identity of the added and deleted firms but also the date on which the change will become effective.

As a matter of policy, S&P announces the change five business days beforehand. On occasion, S&P must use a shorter interval due to a bankruptcy filing or uncertainty about the timing of regulatory approval of a merger or acquisition. For the Prime

Motors Inns replacement in 1990, for example, there was only one day separating the announcement day and the effective day. Prime Motors announced its Chapter 11 filing on September 18, 1990. Just after the close on that day, S&P announced that Prime Motors would be dropped and JWP, Inc., added to the index as of the close on September 19.

On rare occasions, S&P chooses to use an announcement interval longer than five days. One instance is Microsoft's addition in June 1994. Given Microsoft's high market capitalization, S&P chose to use a sixteen-trading day interval.[4]

SAMPLE, DATA, AND ABNORMAL RETURN MEASUREMENT

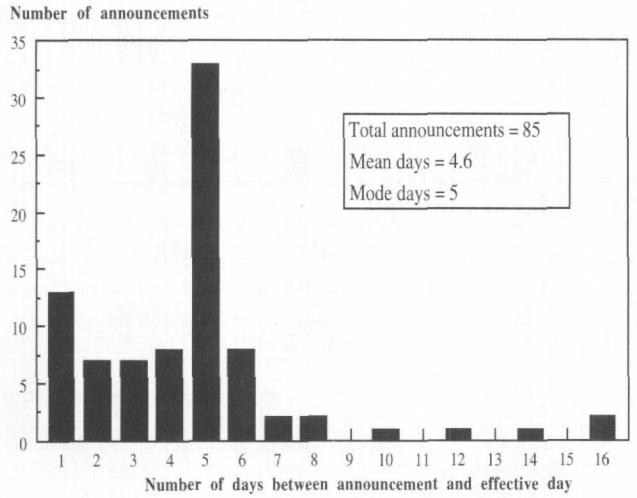
During the period October 1989 through December 1995, Standard & Poor's "S&P 500 Information Bulletin" reports ninety-eight changes in the S&P 500 index. In conducting our return analysis, we impose the constraint that each newly added stock has to have opening and closing price data for a period beginning one day before the announcement until ten days after the effective day. This eliminates thirteen stocks. The final sample consists of eighty-five additions. Seventy-four stocks are traded on the NYSE, and eleven are Nasdaq-traded.

Earlier we noted that S&P's policy is to announce changes to the S&P 500 index five days beforehand. On occasion, however, it departs from this policy. Exhibit 2 shows a frequency distribution of the number of trading days between the announcement day and the effective day. The range is from one to sixteen trading days, and the mode, as expected, is five.

Of the eighty-five additions, thirty-three had announcement intervals shorter than five days. Seventeen had announcement intervals longer than five days. The outliers at sixteen trading days are the Microsoft addition in June 1994 and the Laidlaw, Inc., addition in March 1995.

Both opening and closing prices are used in the abnormal return analysis. Other than Beneish and Whaley [1996], all past studies of the price effects of S&P 500 additions use daily closing price data, and thus are unable to distinguish whether the abnormal return

EXHIBIT 2
NUMBER OF TRADING DAYS BETWEEN ANNOUNCEMENT DAY AND EFFECTIVE DAY FOR S&P 500 INDEX CHANGES OCTOBER 1989–DECEMBER 1995



on the day following the announcement is attributable to overnight price movement or to price movement during the following day. If the close-to-close return following the announcement is largely driven by the close-to-open price movement, the efficacy of price-setting in the marketplace is supported. If the close-to-close return is largely driven by the price movement after the open on the day following the announcement, a case can be made for market inefficiency.

To separate the two components, we use intraday data. The opening and closing stock price data come from three sources. For the years 1989 through 1992, the NYSE stock prices are taken from ISSM, and the Nasdaq stock prices from Bloomberg. Opening and closing prices for the period 1993 through 1995 are taken from the NYSE's Trade and Quote (TAQ) data base, which includes both NYSE and Nasdaq stocks. Cash dividend and stock split/dividend information on the ISSM and TAQ files are verified against the Center for Research in Securities Prices (CRSP) daily master file. Where discrepancies are detected, the CRSP information is used.

Using intraday data poses a problem in measuring abnormal return. Normally market return is proxied for using the reported return of a cash index like the S&P 500. While measuring daily returns according to a cash index may be reasonable, measuring overnight returns is not. The problem arises from the fact that the reported S&P 500 cash index level is based on last trade prices. When the cash index is computed and reported for the first time at the beginning of the day (9:30 EST), its level is based almost entirely on the prices of the stocks at the previous day's close.[5]

To circumvent this problem, we use returns of the nearby (with at least one week to expiration) S&P 500 futures contract. Unlike the reported S&P 500 cash index level, the opening price of the S&P 500 futures is the price of a *single* security at the time of the opening trade of the day. This generally occurs only seconds after 9:30 EST. Time and sales data for the futures are provided by the Chicago Mercantile Exchange for the period 1989 through 1993 and by Tick Data, Inc., for 1994 and 1995.

The abnormal return computed using our futures-based approach has a second important feature — it measures the return on a *viable* trading strategy. The strategy is to buy the newly added stock and to sell an appropriate number of S&P 500 futures. When the trading interval ends, the positions are closed.[6]

The holding-period return of this strategy is

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

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.

ABNORMAL RETURN ANALYSIS

Mean realized returns and mean realized abnormal returns for stocks added to the S&P 500 index during the period October 1989 through December 1995 are reported in Exhibit 3. While both returns and abnormal returns are reported, only the abnormal return results are discussed here.

Consistent with past studies, the post-announcement price increase is large and significant. The mean abnormal return from the announcement day close until the close on the day the change becomes effective is 6.84% with a t-ratio of 12.62. This return is more than double those reported in past studies. Shleifer [1986] and Harris and Gurel [1986], for example,

EXHIBIT 3
MEAN RETURNS/ABNORMAL RETURNS OF STOCKS ADDED TO S&P 500 INDEX IN DAYS SURROUNDING ANNOUNCEMENT AND EFFECTIVE DAYS

Interval		Realized Returns			Realized Abnormal Returns		
Begins	Ends	Mean (%)	t-Ratio	No. of Obs.	Mean (%)	t-Ratio	No. of Obs.
Close-to-Close Returns							
Announcement Day − 1 Close	Announcement Day Close	−0.05	−0.27	85	−0.13	−0.66	85
Announcement Day Close	Effective Day Close	7.15	11.05	85	6.84	12.62	85
Announcement Day Close	Effective Day + 5 Close	4.62	5.27	85	4.11	5.43	85
Announcement Day Close	Effective Day + 10 Close	4.68	4.88	85	3.99	4.77	85
Intraday Returns							
Announcement Day Close	Announcement Day + 1 Open	3.08	10.27	85	3.06	10.20	85
(One Day Between Announcement Day and Effective Day)							
Announcement Day Close	Effective Day Open	5.92	6.75	13	5.94	6.83	13
Effective Day Open	Effective Day Close	0.84	1.10	13	1.10	1.33	13
(More Than One Day Between Announcement Day and Effective Day)							
Announcement Day Close	Announcement Day + 1 Open	2.56	9.21	72	2.55	9.10	72
Announcement Day + 1 Open	Effective Day − 1 Close	2.68	4.67	72	2.14	4.51	72
Effective Day − 1 Close	Effective Day Open	0.38	3.18	72	0.38	3.33	72
Effective Day Open	Effective Day Close	1.46	3.55	72	1.60	3.97	72
Open-to-Close Returns							
Announcement Day + 1 Open	Effective Day Close	3.99	6.26	85	3.70	6.81	85
Announcement Day + 1 Open	Effective Day + 5 Close	1.51	1.81	85	1.01	1.41	85
Announcement Day + 1 Open	Effective Day + 10 Close	1.57	1.71	85	0.90	1.11	85

report mean realized abnormal returns of about 3% for the period 1976 through 1983.[7]

The increased return is in all likelihood driven by the dramatic growth in fund indexing. Investment in S&P 500 index funds, as reflected by the asset value of Vanguard's 500 Portfolio in Exhibit 1, has increased by a factor of 60 since the end of 1983.

The results reported in Exhibit 3 appear to indicate that at least part of the abnormal price increase following the announcement is permanent (does not reverse).[8] Indeed, the mean abnormal return from announcement day close until ten days after the change becomes effective remains significantly different from zero (i.e., 3.99% with a t-ratio of 4.77). Inclusion in the S&P 500 seems to imply a permanent stock price increase of nearly 4%.

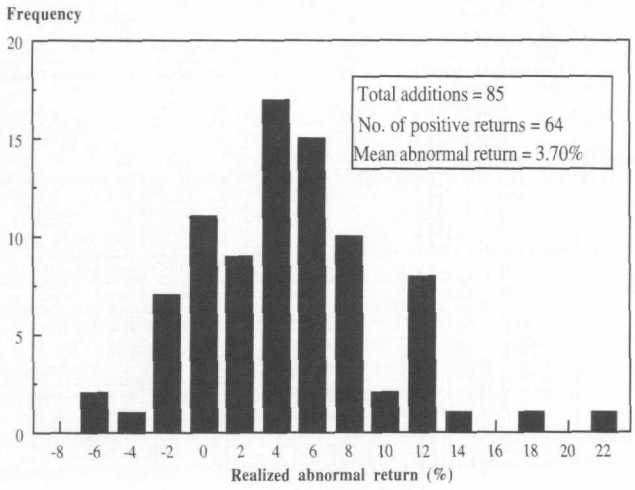
Using intraday data, we also distinguish between overnight and intraday returns. The mean abnormal return from the close on the announcement day until the open of trading the following morning is 3.06% with a t-ratio of 10.20, while the mean abnormal return from the open on the day following the announcement to the close on the effective day is 3.70% with a t-ratio of 6.81.

The close-to-open return does not present a profitable trading opportunity. Since the announcement is made after the market close, the first opportunity to trade is not until the following morning's open. The return afterward, however, can be traded.

The mean abnormal return of the strategy of buying the stock and shorting the S&P 500 futures at the open on the day after the announcement day and closing the position at the close on the effective day is 3.70%. Assuming the average share price of the stocks added to the index is $40 per share, the 3.70% mean realized abnormal return implies a break-even trading cost of $0.74 per share. Since trading costs are not nearly this high, the abnormal return remains positive on average.

The S&P game is not without risk, however. Sixty-four of the eighty-five additions (75%) have positive abnormal rates of return before trading costs, as is shown in Exhibit 4. Only fifty-seven of eighty-five (67%) have positive abnormal returns after costs, assuming a one-way trading cost of $0.25 per share.

EXHIBIT 4
REALIZED ABNORMAL RETURNS FOR STOCKS ADDED TO THE S&P 500 INDEX OCTOBER 1989–DECEMBER 1995



THE CHANGING NATURE OF THE S&P GAME

The abnormal price increase from the close of trading on the announcement day until the close of trading on the effective day is 6.84%. Most of this increase presumably arises from the buying pressure exerted by S&P 500 index funds. Many index funds, however, wait until the close of trading on the effective day to acquire the newly added stock's shares in order to minimize tracking error with the S&P 500 portfolio.[9] This leaves a window of opportunity for risk arbitrageurs, who can step in ahead of index funds and earn a 3.70% return over about five days by buying at the open on the day following the announcement and selling at the close on the effective day.

Will index funds alter the timing of their trades? Alternatively, will the S&P game remain profitable?

To answer these questions, we perform two abnormal return regressions. In both regressions, we use the number of days between the announcement day and the effective day (DAYS) and a trend variable (TREND) as explanatory variables. The number of days may be an important determinant of the abnormal return in the sense that a longer interval may provide more opportunity for risk arbitrage. The trend variable, measured as the length of time in years from October 1989 to the effective day, may also be important if a large component of the abnormal return is attributable to risk arbitrageurs.

Awareness of the S&P game has grown through time, as is demonstrated by the number of popular press articles alone. If the game is profitable, it should draw more participants through time, and the magnitude of the abnormal return should diminish. Moreover, as index funds become aware of the premium paid as a result of waiting until the close of trading on the effective day, 3.70%, they, too, should initiate their buying earlier in the announcement interval — in the extreme, with market-on-open orders on the day following the announcement.

The only difference between the two regressions is the dependent variable. In the first regression, we use abnormal return from the close of trading on the announcement day until the close of trading on the effective day ($ABRET_{ctc}$), and in the second we use abnormal return from the open of trading on the day after the announcement day until the close of trading on the effective day ($ABRET_{otc}$).

The results of the first regression are:

$$ABRET_{ctc,i} = 7.448 + 0.1003\ DAYS_i - 0.2795\ TREND_i$$
$$(5.48) \quad (0.51) \quad (-0.92)$$

The abnormal return from the close of the announcement day until the close on the effective day appears unrelated to either the number of days or the trend variables. In other words, a stock's addition to the index produces a significantly positive abnormal return, and the size of the return is unrelated to the number of days between the announcement day and the effective day, and does not appear to diminish through time.

The results of the second regression, however, are more revealing:

$$ABRET_{otc,i} = 4.546 + 0.4671\ DAYS_i - 0.7873\ TREND_i$$
$$(3.54) \quad (2.53) \quad (-2.76)$$

The coefficient on the number-of-days variable is now significantly positive, while the trend variable has a significantly negative coefficient.[10]

What this estimated relation indicates is that the longer the interval between the announcement day and the effective day, the greater the abnormal return. This should not be surprising. The longer the interval, the greater the opportunity for risk arbitrageurs to step in ahead of the index funds.

The negative coefficient on the trend variable, however, is reassuring. It suggests that either 1) index funds are becoming more aware of the S&P game (and the premium that they implicitly pay for the newly added stocks if they delay rebalancing until the effective day), and are rebalancing earlier in the announcement interval, or 2) risk arbitrageurs have become more efficient in their trading and have market-on-open orders in place by the open on the day following the announcement. Either way, the pricing inefficiency is slowly disappearing.

SUMMARY AND CONCLUSIONS

Since October 1989, buying the shares of stocks added to the S&P 500 on the morning following the announcement, and selling them five days later when the stock is finally placed in the index, has produced significantly positive rates of return. The average size of the return is 3.70%, large enough to cover reasonable trading costs. The trading opportunity, however, is slowly disappearing as more index funds rebalance earlier in the announcement interval, or as risk arbitrageurs become more efficient in timing their trades.

ENDNOTES

The authors gratefully acknowledge information provided by Richard Wolff and David Brown of The Vanguard Group of Investment Companies, Rick Kilcollin, Andrew Olma, and Jeff Reyburn of Wells Fargo Nikko Investment Advisors, and Elliott Shurgin of Standard & Poor's.

[1]Beneish and Whaley [1996] provide a detailed analysis of the market effects of S&P's change in announcement policy. This study extends the sample period and focuses exclusively on return behavior.

[2]For a lucid description of the virtues of index funds, see Bogle [1994].

[3]For a more detailed discussion of the motivations for changes in the S&P 500 index, see Beneish and Whaley [1996].

[4]We are grateful to Elliott Shurgin of Standard & Poor's for describing the new announcement procedure in detail.

[5]For a detailed description of the computation and dissemination of S&P 500 index levels, see Stoll and Whaley [1990]. For a discussion of the implications of infrequent trading on the statistical properties of stock index returns, see Miller, Muthuswamy, and Whaley [1994].

[6]Defining abnormal return as the stock return less the S&P 500 futures return has two drawbacks. First, the futures basis is ignored. The S&P 500 futures return differs from the cash index return by the short-term interest rate. Second, we implicitly assume that each newly added stock has a beta equal to one rather than estimate systematic risk and risk-adjust the abnormal returns. Neither of these considerations is consequential, however, for the short measurement intervals used in this study.

[7]For additions during the period 1976 through 1983, Shleifer [1986] finds an abnormal price increase of 2.79% on the day following the announcement. Using roughly the same sample period, Harris and Gurel [1986] report a 3.13% average increase.

[8]This result is consistent with the findings of Shleifer [1986] and Beneish and Whaley [1996].

[9]Beneish and Whaley [1996] show that more trading volume occurs on the effective day than on all post-announcement/pre-effective trading days combined.

[10]The correlation between the regressors is only 0.10, so multicollinearity is unlikely to be driving the significance of the coefficients.

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).

Bogle, John C. *Bogle on Mutual Funds: New Perspectives for Intelligent Investors*. Burr Ridge, IL: Irwin Professional Publishing, 1994.

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 (September 1986), pp. 815-829.

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 (February 1965), pp. 3-37.

Miller, Merton H., Jay Muthuswamy, and Robert E. Whaley. "Mean Reversion of S&P 500 Index Basis Changes: Arbitrage-Induced or Statistical Illusion?" *Journal of Finance*, 49 (June 1994), pp. 479-513.

"S&P 500 Index Directory." Standard & Poor's, 1992.

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

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

Stoll, Hans R., and Robert E. Whaley. "The Dynamics of Stock Index and Stock Index Futures Returns." *Journal of Financial and Quantitative Analysis*, 25 (December 1990), pp. 441-468.