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An Examination of the Super Bowl Stock Market Predictor

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ABSTRACT

Few prediction schemes have been more accurate, and at the same time more perplexing, than the Super Bowl Stock Market Predictor, which asserts that the league affiliation of the Super Bowl winner predicts stock market direction. In this study, we examine the record and statistical significance of this anomaly and demonstrate that an investor would have clearly outperformed the market by reacting to Super Bowl game outcomes.

THE SUPER BOWL STOCK Market Predictor (SB SMP) states that, if the Super Bowl is won by a team from the old National Football League, the stock market will finish the year higher than it began (Stovall (1989)). If the game is won by a team from the old American Football League, the market will finish lower than it began. Because of the incredible accuracy of this prediction strategy, the SB SMP has received considerable attention in the financial press and has begun appearing in college-level textbooks (Gitman and Joehnk (1988) and Kolb (1989)). Yet, there has not been a rigorous examination of this anomaly in academic journals. This article is an attempt at filling this void and proceeds along the following lines. The next section documents the incredible accuracy of the SB SMP. A simulation included in a subsequent section demonstrates that an investment strategy based on the SB SMP would have beaten the market over the 1967–1988 period. Finally, the authors offer two possible explanations of this phenomenon.

I. Accuracy of the SB SMP

Five popular stock market indexes were selected in order to examine the performance of the SB SMP over the history of the Super Bowl, 1967–1988. The results of this analysis are presented in Table I. The SB SMP correctly predicted the sign of the annual return 20 out of 22 times, a ninety-one percent accuracy rate, for all but the Financial Times Index. The mean annual index change during years in which the NFL team won ranged from 14.4 to 22.8 percent, as exhibited in the bottom rows of Table I. If the AFL team was victorious, the average decline ranged from −7.1 to −13.1 percent. Larger companies, contained in the Dow Jones Industrial Average, tended to have lower returns during NFL years but approximately the same loss as small, OTC stocks during AFL years.

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Table I

Super Bowl Outcomes and Stock Market Behavior

Super Bowl outcomes and percentage annual changes in selected indexes over the 1967–1988 period. Accuracy figures represent the percentage of time the Super Bowl Stock Market Predictor has correctly forecast the directional change in the specified index. AMEX returns are based on Price Change Index values from 1967–1973 and Market Value Index values from 1974–1988, with adjustment in 1983 to one half of the Indexes' previous level. OTC returns are based on Industrial OTC Index values from 1967–1970 and OTC Composite Index values from 1971–1988.

Year	Super Bowl Victor	Prediction	Percentage Annual Index Changes					
			NYSE	S&P 500	DJIA	AMEX	OTC	FTI
1967	Green Bay	Advance	23.1	20.1	11.9	5.6	54.0	25.4
1968	Green Bay	Advance	9.4	7.7	7.4	33.4	20.6	30.1
1969	N.Y. Jets	Decline	−12.5	−11.4	−15.2	−18.8	−0.8	−19.5
1970	Kansas City	Decline	−2.5	0.1	4.8	−18.0	−13.7	−16.4
1971	Baltimore[a]	Advance	12.3	10.8	6.1	18.9	14.1	39.9
1972	Dallas	Advance	14.3	15.6	14.6	10.3	17.7	6.1
1973	Miami	Decline	−19.6	−17.4	−16.6	−21.2	−31.1	−31.9
1974	Miami	Decline	−30.3	−29.7	−27.6	−33.2	−35.1	−53.1
1975	Pittsburgh[a]	Advance	31.9	31.5	38.3	38.4	29.8	132.8
1976	Pittsburgh[a]	Advance	21.5	19.1	17.9	31.6	26.1	−5.6
1977	Oakland	Decline	−9.3	−11.5	−17.3	16.4	7.3	36.8
1978	Dallas	Advance	2.1	1.1	−3.2	17.7	12.3	−3.0
1979	Pittsburgh[a]	Advance	15.5	12.3	4.2	64.1	28.1	−15.1
1980	Pittsburgh[a]	Advance	25.7	25.8	14.9	41.3	33.9	18.7
1981	Oakland	Decline	−8.7	−9.8	−9.8	−8.1	−3.2	11.8
1982	San Francisco	Advance	14.0	13.2	19.6	6.2	18.7	12.5
1983	Washington	Advance	17.5	15.0	20.3	31.0	19.9	30.0
1984	L.A. Raiders	Decline	1.3	3.4	−3.7	−8.5	−11.7	22.8
1985	San Francisco	Advance	26.2	26.3	27.7	20.6	32.1	18.8
1986	Chicago	Advance	14.0	14.6	22.6	7.0	7.4	16.1
1987	N. Y. Giants	Advance	−0.2	2.0	2.3	−1.1	−5.3	4.6
1988	Washington	Advance	13.4	12.4	11.8	17.5	15.4	5.9
Mean Annual Return When:								
National League Wins Super Bowl			14.4	15.2	16.0	22.8	21.7	21.1
(Standard Deviation)			(10.6)	(8.5)	(8.7)	(17.3)	(13.6)	(34.3)
American League Wins Super Bowl			−12.2	−10.9	−11.7	−13.1	−12.6	−7.1
(Standard Deviation)			(10.5)	(11.0)	(10.6)	(15.1)	(15.7)	(32.0)
Accuracy			91%	91%	91%	91%	91%	73%

[a] Although representing the American Football Conference, the Baltimore Colts and Pittsburgh Steelers were members of the National Football League prior to the 1970 merger.

Table II

Changes in the Standard & Poor's 500 Index as a Function of Super Bowl Victor

Arithmetic mean changes in the Standard & Poor's 500 Index as a function of whether the NFL or AFL representative won the Super Bowl. Values are given in percentage terms. *t*-Statistic asterisks indicate the significance of the return differences based on the following scale: * = 0.05 ** = 0.01. 1967–1988.

	NFL Wins	AFL Wins	*t*-Statistic
Prior to Super Bowl	3.34	−1.27	2.11*
Monday After Super Bowl	0.28	−0.45	2.31*
Remainder of Year	11.45	−9.41	4.96**
Entire Year	15.24	−10.93	6.13**

In order to determine the statistical significance of the SB SMP, annual percentage changes of the Standard & Poor's 500 Index were divided into two groups on the basis of which team won that year's Super Bowl. Annual returns within each grouping were then divided into their "Before Super Bowl," "Monday Following Super Bowl," and "Remainder of Year" components. *t*-Tests were then performed on each pair of arithmetic returns, with the results given in Table II.

The annual mean change in the Standard & Poor's Index was significantly different at the 0.01 level. Furthermore, return differences during NFL and AFL years were also significantly different in all annual subperiods. The least significant difference occurs prior to the Super Bowl. A portion of the return difference may be the result of investors investing/disinvesting in anticipation of an NFL/AFL victory, a topic discussed in the third section.

In addition to the tests described above, we also evaluated the forecasting ability of the SB SMP using a nonparametric test suggested by Henriksson and Merton (1981). Based on this procedure, the null hypothesis that the SB SMP has no forecasting ability was rejected at the ninety-nine percent confidence level for the NYSE, S&P 500, DJIA, AMEX, and OTC Indices. It was rejected at the ninety-five percent confidence level for the Financial Times Index.

According to Reinganum (1981), for an anomaly to have credence, it must be persistent through time. Applying this concern to the present case, the question is whether there has been a variation in the forecasting ability of the SB SMP. If there is a significant variation, the implication would be that another factor is causing the SB SMP phenomenon.

In order to study this question, the 22 Super Bowls were divided into three periods, with results in Table III. There appears to be little variation in the predictive ability of the SB SMP. In each subperiod, at least one index's movement is perfectly predicted.

II. Simulated Portfolio Performance Using the SB SMP

Two portfolios, each consisting initially of $1,000 dollars, were established in order to simulate the relative performance of a strategy based on a buy-and-hold versus the SB SMP strategy. In the case of the buy-and-hold strategy, it was

Table III

SB SMP Persistence Analysis

Frequency of the Super Bowl Stock Market Predictor's correct predictions of annual changes in given indexes within specified time periods.

Period	NYSE	S&P 500	DJIA	AMEX	OTC
1967–1973	7	6	6	7	7
1974–1980	7	7	6	6	6
1981–1988	6	7	8	7	7
1967–1988	20	20	20	20	20

assumed that the initial $1,000 was invested on January 1, 1967 in a mutual fund whose returns mirrored those of the Standard & Poor's 500 Index. Returns were based on annual changes in the index plus dividends, as reported in the *Security Price Record.* Dividends were reinvested.

In the case of the SB SMP-based strategy, one investment decision was made each year based on the outcome of the Super Bowl. If an NFL team won, funds were transferred from a money market fund to the stock market mutual fund on the Monday following the Super Bowl. If funds were already invested in the stock market, they remained there. If an AFL team won, funds were transferred from the stock market to the money market or were left in the money market if an AFL team had won the prior year.

SB SMP portfolio returns included changes in the value of the Standard & Poor's 500 Index, estimated dividends, and money market fund yields where appropriate. If the strategy called for an investment in the stock market for less than the full year, the portion of the full year's dividends received was estimated to equal the fraction of the year invested in the stock market. Money market fund returns were based on the average commercial paper rate for that year, with the same adjustment if not invested in the fund throughout the entire year. Both dividends and interest were reinvested.

The geometric mean gross return for the buy-and-hold strategy, given in the first row, first column, in Table IV, was 9.97 percent for the January 1, 1967 through December 31, 1988 period. The geometric mean gross return using the SB SMP was over five percent higher, while the standard deviation of returns was only about half as great.

These portfolios were also examined under the assumption that interest, dividends, and realized capital gains were taxed annually at forty percent. Investors using the SB SMP would face taxes on their capital gains every time they liquidated their position following an AFL victory. In order to put terminal portfolio values on an equivalent basis, accrued but unpaid capital gains taxes were assessed on both portfolios in the final year.

A statistical comparison of the mean returns, under small sample and unequal variance constraints, indicated that the before-tax mean returns were significantly different at the 0.10 level. Due to the more extensive taxation encountered using the SB SMP, the predictor did not provide statistically greater mean returns on an after-tax basis. However, an examination of the two sample variances, based upon Ott (1977), determined that the variance of after-tax

Table IV

Standard & Poor's 500-Based Portfolio Simulation Results

Geometric mean before-tax and after-tax returns for a buy-and-hold and the Super Bowl Stock Market Predictor strategies. The S&P 500 served as the market surrogate. A forty percent tax rate is assumed. Dividends and realized capital gains are taxed annually. Taxes are assessed against not previously recognized capital gains in the final year. 1967–1988. If taxes were not assessed against unrecognized capital gains, the terminal portfolio value for the buy-and-hold and SB SMP strategies would be $5,761 and $8,748, respectively. The mean annual returns (standard deviations) would be 8.28 (15.65) and 10.39 (11.45) percent, respectively.

	Before Tax[a]		After Tax	
	Buy-and-Hold	SB SMP	Buy-and-Hold	SB SMP
Geometric Mean (%)	9.97	15.07	6.90	9.64
Standard Deviation (%)	15.82	8.33	16.34	11.70
Number of Years Portfolio Value Declined (N)	5	0	6	6
Terminal Dollar Value ($1000 Initial Investment)	$8,095	$21,952	$4,337	$7,528

[a] The difference in before-tax returns was significant at the 0.10 level. The difference in the variance of before-tax returns was significant at the 0.01 level.

returns using the SB SMP was significantly smaller at the 0.01 level. Hence, use of the SB SMP entailed less risk than buying and holding the S&P 500.

In addition to return variance, investors would be interested in how many times their portfolio value declines. As shown in the third row, first column, in Table IV, the buy-and-hold strategy resulted in a decline in value in 5 of 22 years before taxes. Capital gains tax in 1988 on previously untaxed capital gains adds another year to the total number of declines after taxes.

On a before-tax basis, those using the SB SMP would never have seen the value of their portfolio decline. Interestingly, in the two years that the SB SMP erroneously predicted a stock market decline, the return earned on the money market fund equaled or exceeded the change in the S&P 500 Index plus dividends. In the SB SMP after-tax case, all six portfolio value declines are the result of capital gains tax payments.

Before taxes, the increase in portfolio values was three times greater ($7,095 versus $20,952) when the SB SMP was employed. On an after-tax basis, the increase was still approximately twice as great. During the 22-year period, the buy-and-hold strategy generated results greater than those realized using the SB SMP in three instances before taxes. In each of these instances, the lower SB SMP return resulted from being invested in the money market fund during part of the year. In nine years, an NFL victory followed an NFL victory, resulting in an equal rate of return. During the remaining ten years, the SB SMP portfolio would have been dominant.

The relative advantage of the SB SMP would not be eliminated by transactions costs. An assumed 1.0 percent transactions cost results in an after-tax terminal value of the SB SMP portfolio of $7,245. This value is almost $3,000 greater than the after-tax and transactions cost terminal value of the buy-and-hold portfolio, which would be $4,302.

III. Discussion

The statistical and simulation results contained in the previous sections show that an investment strategy using the SB SMP dominated a buy-and-hold strategy over the 1967–1988 period. An investor would have received significantly higher returns and encountered much lower return variance using the SB SMP technique. Such a finding is inconsistent with the semi-strong form of the efficient market hypothesis.

How can this phenomenon be explained? A proponent of the efficient market hypothesis might attribute the dominance of the SB SMP over the 1967–1988 period to coincidence. If the league affiliation and sign of the change in the stock market were random, each with a probability of 0.50, the probability of the SB SMP being correct 20 out of 22 times is only 1 in 18,157. However, there was a tendency for the NFL to win and the stock market to advance. Consequently, the posterior probability of the SB SMP being correct 20 out of 22 times is a more feasible 1 in 761.

Another possibility is that the phenomenon exists because a sufficient number of investors believe it exists. While the relationship between the Super Bowl outcome and subsequent stock market behavior might initially have been the result of coincidence, it subsequently may have taken on a life of its own as more investors came to act on it. In order to examine this possibility, average changes in the NYSE Composite Index were obtained for the day following the game and the following week.

Over both periods, the average NYSE Composite change on the day following the Super Bowl is greater than zero after an NFL victory and less than zero following an AFL victory. The average change on the day after an NFL victory exceeded the return following an AFL victory by 58 and 94 basis points during the 1967–1979 and 1980–1989 periods, respectively. The return difference occurring during the week following the Super Bowl increased from 0.63 percent prior to 1980, to 3.63 percent during the 1980s.

If investors began to believe in the Super Bowl as a predictor of stock prices, for whatever reason, we would expect to see changes in the stock market prior to the Super Bowl in conjunction with changes in the betting line on the game. In order to investigate this occurrence, we captured information on "odds" changes during the 1973–1989 period, as well as the change in the NYSE Composite between the opening on the Monday following the Conference Championships and the close on the Friday prior to the Super Bowl. Prior years are not included in this analysis because the *New York Times*, which served as our measure of investor knowledge, published odds data soon after the Conference playoff games beginning with the 1973 Super Bowl.

Over the entire period, there are twelve instances wherein the odds reported in the *New York Times* changed between the Conference playoffs and Super Bowl. In ten of these instances the stock market moved in agreement with the SB SMP—up when the likelihood of an NFL victory increased and down when the expectation of an AFL victory increased. Both occurrences where the market did not follow this "anticipatory" SB SMP strategy took place prior to 1980. If the direction of change in the betting line and the change in the NYSE were

random, the change of the "anticipatory" SB SMP relationship occurring each of the seven times the odds changed during the 1980s would be 0.0078.

While the SB SMP has been extremely accurate over the past 22 years, there is no assurance that the predictor's accuracy will continue in the future, particularly because the theoretical relationship connecting the Super Bowl and subsequent stock market movements is not obvious.

REFERENCES

Gitman, L. J. and M. D. Joehnk, 1988, *Fundamentals of Investing* (Harper & Row, New York).

Henriksson, R. D. and R. C. Merton, 1981, On market timing and investment performance. II. Statistical procedures for evaluating forecasting skills, *Journal of Business* 54, 513–533.

Kolb, W. R., 1989, *A Practical Approach to Investing* (Scott, Foresman and Company, Glenview, IL).

Ott, L., 1977, *An Introduction to Statistical Methods and Data Analysis* (Duxbury Press, North Scituate, MA).

Reinganum, M. R., 1981, Abnormal returns in small firm portfolios, *Financial Analysts Journal* 37, 52–56.

Stovall, R., January 24, 1989, The Super Bowl predictor, *Financial World* 158, 72.