AN ANALYSIS OF A STRATEGY FOR PURCHASING STRADDLE OPTIONS

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ABSTRACT

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By

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The purpose of this study was to develop, test and analyze an investment strategy to take advantage of an increasingly volatile stock market. Straddle options appeared to be the best investment vehicle for this as they provide unparalled leverage and the possibility of large returns, the maximum loss is limited and known with certainty and the direction of future price change is unimportant.

First a systematic random sample of forty stocks was drawn each year from 1961 to 1970 from the industrial common stocks listed on the NYSE. Each sample was divided into quartiles based on annual price volatility for that year. Eight types of investment factors believed to have some influence on volatility were collected for the prior year on the ten upper quartile (high volatility) and ten lower quartile (low volatility) stocks of each sample. The hypotheses of significant differences between the average investment characteristics preceding the upper and

lower quartile stocks were statistically tested at a level of significance of .01. The results showed that upper quartile stocks were on the average preceded by higher volatility, higher turnover, lower number of shares outstanding and lower investment quality than the lower quartile stocks.

Next, the industrial common stocks listed on the NYSE possessing the above investment characteristics were selected at the end of each year from 1961 to 1969 if the year-end closing price was above $30 per share. Six-month straddle options were then purchased on the first trading day of each quarter in the year following the stock's selection if the price per share was within the $30 to $100 range. Investments were made beginning with the first quarter of 1962 and ending with the fourth quarter of 1970.

Rates of return were calculated for each holding period and each year with adjustments made for stock splits, dividends and commissions. It was also assumed that all straddles were held for six months and the investor enjoyed a tax-exempt position.

Finally, the returns were analyzed and compared with other studies involving the purchase of straddle options, with market performance and with mutual fund performance. Risk comparisons were also made using the coefficient of variation as a measure of risk.

Annual rates of return were positive in six years

and negative in three, resulting in an average annual rate of return of 39.5 per cent over the nine year period. Only one year, 1968, in the last six was unprofitable which is significant because the market has been more volatile since 1965. Rates of return were positive in twenty-two of the thirty-six possible holding periods and negative in the other fourteen.

Two other empirical studies involving the purchase of six-month straddles were available for comparative purposes. One study had a larger average rate of return than this study which could be explained by differences in purchase and exercise dates and the quality of stocks involved. The second study had a smaller average annual rate of return and higher risk than this study.

Comparisons were also made with the returns available on the Dow-Jones Industrial Average and Standard and Poor's 500 Stock Index over the nine year time period. The 39.5 per cent average annual return in this study was approximately six times larger than the average market return and risk was lower.

A final comparison was made with growth oriented mutual funds and the average annual return in this study was approximately four times larger while risk again was lower.

In summary, this strategy for purchasing straddle options has achieved superior returns in a manner that

contradicts much of current financial theory. It used past, public information to consistently generate returns much larger than either market or mutual fund returns; something the broad version of the random-walk theory says is difficult to achieve. Also, these high rates of return were not earned at the expense of higher risk. Just the opposite was true, because risk was lower in all cases. This contradicts the risk-return proposition that investors can realize higher rates of return only by assuming greater risk.

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CHAPTER 1

INTRODUCTION

Purpose of Study

The purpose of this study is to develop and test an investment strategy that takes advantage of important changes that have occurred in common stock investing over the past decade.

One development has been a stock market that has come more and more under the influence of institutional investors. The latest New York Stock Exchange statistics reveal that they now account for 65 to 70 per cent of total NYSE volume which is quite an increase over their 31.4 per cent share in 1960 and only 43.0 per cent as recently as 1966.[1] This is also reflected in the number of block transactions of 10,000 shares or more on the New York Stock Exchange which totaled 15,132 in 1969 versus only 2,171 in 1965.[2] This block volume as a per cent of total NYSE volume rose to 14.1 per cent in 1969 from only 3.1 per cent in 1965.[3]

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[1] New York Stock Exchange 1970 Fact Book, June, 1970, p. 50.

[2] Ibid., p. 12.

[3] Ibid., p. 12.

Another important development has been the change in investment philosophies by many of todays institutional investors. For many, this investment philosophy can be summed up by one word--performance. The quest for short-term performance has undoubtedly increased the pace of the stock market. Trends which used to take years to run their course now do so in months and the whole process of stock prices discounting future developments has accelerated. As a consequence, institutional portfolio turnover rates have increased dramatically; there are at least triple the 1965 rates for most institutions.[4]

The impact of this increased institutionalization of investing and increased turnover activity has been a more volatile stock market. This is illustrated by Table 1-1 which shows the percentage price changes of common stock issues in comparable bull and bear market years.

The number of issues changing by forty per cent or more in 1967 was twice as great as that in 1961 and nearly three times as great in 1969 compared to 1962.

A recent Twentieth Century Fund study also supports the hypothesis that institutional investors have an impact on short-term price changes of specific stocks,

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[4]Alan Abelson, "Up and Down Wall Street", Barron's, June 21, 1971, p. 1.

especially high risk stocks.[5]

Table 1-1

Percentage Price Changes of NYSE Common Issues

Percentage Price Change	Bull Markets 1961	Bull Markets 1967	Bear Markets 1962	Bear Markets 1969
50% and Over	171	426	44	156
40-49.9%	74	87	72	166
30-39.9%	151	126	169	196
20-29.9%	191	139	235	287
10-19.9%	234	214	304	175
Under 10.0%	14	6	10	3
Total Issues	1088	1206	1120	1202

Source: 1970 New York Stock Exchange Fact Book, p. 18, and 1966 New York Stock Exchange Fact Book, p. 24.

Straddle options appear to be ideal investment vehicles for taking advantage of this increased price volatility. They provide unparalled leverage and the possibility of large returns. Yet the maximum loss is small and certain; it can't be greater than the premium paid. And perhaps their most important feature is indifference to the direction of future price changes. They should fare well in increasingly volatile markets, especially since 1965.

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[5]Irwin Friend, Marshall Blume and Jean Crockett, Mutual Funds and Other Institutional Investors: A New Perspective, (New York: McGraw-Hill Book Co., 1970), Chapter 5.

Two empirical studies have shown that buyers of straddle options have enjoyed positive rates of return over various time periods. This study will attempt to devise a strategy for purchasing straddle options to improve upon these results as well as market and mutual fund performance.

Option Terminology

The following terms are essential for understanding this study.

Call Option. A call option gives the holder or buyer the right to purchase a specified number of shares-usually one hundred-at a fixed price anytime within a specified period of time. The maker or writer of a call option is obligated to sell the shares at a specified price if the buyer chooses to exercise the option. The premium paid for a call option is essentially payment for the possibility of being able to buy one hundred shares of stock at less than its current market value.

Put Option. A put option gives the holder or buyer the right to sell a specified number of shares-usually one hundred-at a fixed price anytime within a specified period of time. The maker or writer of the put option is obligated to buy stock at a specified price if the buyer chooses to exercise the option. The premium paid for a put option is payment for the possibility of being able to sell one hundred shares of stock at a price above its current market value.

Straddle Option. A straddle is a combination of one call and one put option on the same stock, exercisable at the same price and having the same maturity dates. The buyer of the straddle has the option of exercising either the put, the call, or both at the market price existing at the time of purchase. The seller or writer of the straddle is obligated to buy one hundred shares at a specified price if the buyer exercises the put option, to sell one hundred shares at the same specified price if the buyer exercises the call option or to both buy and sell at the same price if the buyer chooses to exercise both sides of the straddle. Option writers usually sell straddles because the premiums are higher than put or call premiums and the probability of both sides being exercised is very small.

Writer. One who sells options against either a long, short or cash position. The writer of a call option protects himself against extraordinary losses by maintaining a long position in the stock while the put writer would maintain a short position for protection. Cash can be substituted for either the long or short position by writers but the protection is not as adequate. Writers are usually large individual stockholders or institutions wanting to increase rates of return on their portfolios.

Striking Price. This is the specified price at which the option may be exercised and is usually the market price existing at the time the contract is negotiated.

Special options are available where the striking price is not the same as the market price and are frequently advertised for sale in the Wall Street Journal and the financial section of the New York Times.

Premium. The premium is the consideration paid by the buyer to the seller for the privilege of purchasing the option. The premium is paid by the buyer because only he has the right to exercise the option anytime within the length of the contract. Also, the buyer's potential returns are unlimited and losses limited. Conversely, the seller's gains are limited to the amount of the premium received plus the possibility exists that he may have to sell in an advancing market or buy in a declining market.

The price of the option premium is determined by the following factors:

1) The absolute price of the underlying stock.
2) The expected rate of appreciation or depreciation of the stock and current market trends.
3) The variance or volatility of the underlying stocks.
4) The length of the option contract.
5) Investment quality of the underlying stock.
6) Cost of capital and Federal Reserve margin requirements.
7) The floating supply and trading turnover of the underlying stock.

8) Supply of and demand for options in general.

Time Period. The time period in which an option expires is usually 65 days, 95 days or six months and ten days (190 days) although 35 day and one year options are available. The additional 10 days on the six-month option are necessary to take advantage of the long-term capital gains tax.

Endorser. Every option contract must be endorsed by a member firm of the New York Stock Exchange. This means that the member firm guarantees completion of the contract on the part of the writer. The writer of a call option usually has a long position in the stock or maintains an initial minimum margin requirement of thirty per cent cash while the writer of a put option must be short the stock or maintain an initial minimum margin requirement of twenty-five per cent cash. Most member firms generally require a larger margin requirement than that stated above.

Brokers and Dealers. There are thirty members of the Put and Call Brokers and Dealers Association with about twenty actively engaged in the option business. All of the members are brokers in options but only some are also dealers who take a position on one side of the option contract and thus undertake additional risk. Most option business generally starts with a stockbroker who uses the option broker to facilitate his order whether it be on the buying or selling side.

Bid Sheets. These are sheets sent out daily by the active members of the Put and Call Brokers and Dealers Association and are summaries of bids made to option writers on that particular day. Each bid sheet contains the ticker symbols for the securities involved, the type of option being bid for, the option life desired, and the actual premium, net of endorsement fees, the bidder is willing to pay the writer. The writer can either accept the terms as stated on the bid sheet or negotiate for changes.

Conversion. The demand of buyers is generally much greater for call options than put options whereas writers prefer to sell straddles because of the higher premium. This creates an excess supply of put options and explains why call premiums are always larger than put premiums, other things equal. However, the possibility of option conversion limits the spread between put and call premiums irrespective of buyer's demands. This conversion is accomplished in the following manner: the conversion house simultaneously buys a put, buys 100 shares of the associated security and writes a call option. Since this position is unaffected by any possible price change, the converter assumes no risk and still brings about equilibrium in the option market.

Purpose of Options

Two main reasons for purchasing options are (1) protection and (2) speculation. First, options can be

used to reduce risk in normal stock market transactions through a hedging process. For example, an investor with a profitable long position in a common stock may purchase a put option to protect against a price decline. If this happens, the put option gives him the privilege of selling his stock to the option writer at the striking price which would be above the market price. If the stock continues to advance, the investor lets the option expire without exercising it and makes money on his long position. Likewise, an investor who sells a stock short may purchase a call option to protect against a dramatic price increase. If this happens, he can call or buy the stock at the striking price which would be below the market price to cover his short position. If the price declines as anticipated, he will let the call expire and make money on the short sale. Many books such as Herbert Filer's Understanding Put and Call Options are available which explain numerous other ways in which options can be used to reduce risk in stock market operations.

These all sound good in theory, but available evidence indicates that protection is not very often a motivating factor for purchasing options.[6]

The second and most important reason for purchasing

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[6]A. James Boness, analyzed 490 actual option transactions and found no instances of using options for protection. The Random Character of Stock Market Prices, ed. Paul H. Cootner, (Cambridge, Mass.: The M.I.T. Press, 1964), p. 475-496.

options is speculation. Options provide unparalleled leverage to the buyer and thus the possibility of unlimited returns. But they also provide limited and certain risk because any loss can not be greater than the premium paid. Additionally, straddle buyers can be indifferent to the direction of future price changes because they can exercise either the put or call side. Considering the speculative appetite of many investors, it is easy to understand why options are appealing.

Writers usually sell options to increase rates of return on their portfolios. Because the majority of options are either not exercised or are exercised at a loss to the buyer, the option premiums are additional income to the writers. Option writing appeals to large individual stockholders with a percentage-minded investment philosophy since any gain is limited to the option premium and the possibility of unlimited losses exists. Writers generally prefer to sell straddle options since the premium is larger and the probability of both sides of the option being exercised is low.

Historical Background and Future Developments

Although the option market is one of the fastest growing segments of the investment field, it is not readily understood by the investment community nor has it received much attention from academicians. This may be because options have been considered as the "black sheep" of the securities field, a reputation which could have been

justified prior to the 1930's but certainly not since that time.

Options made their first major economic impact during the tulip bulb craze in seventeenth-century Holland.[7] They were first used for hedging purposes by the traders and growers but later became a favored instrument of speculation. The major attention of the traders became the writing and trading of options rather than the buying and delivery of tulips. The put writing traders and call buyers amassed fortunes as tulip prices continued to spirale while the call writing traders and put buyers, though fortunately few in number, lost money. When tulip prices collapsed, put writers could not meet their committments to purchase tulips at prices far above current market prices and thousands of investors went bankrupt. During the subsequent economic depression, much discredit was placed upon put and call options as they acquired their first taint of disrepute.

In London, there has been a well organized option market since the 1690's, although options dealings were banned several times over this time period.[8] Since WWII, options activity has declined considerably compared to

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[7]Anthony M. Reinach, The Nature of Puts and Calls, (New York: The Bookmailer, Inc., 1961), p. 6-23.

[8]E. Victor Morgan and W. A. Thomas, The Stock Exchange, (London: Elek Books, 1962), p. 21.

prewar activity and London is no longer the major option market center it once was.

In this country, stock options unfortunately first enjoyed wide popularity during the bull market of the 1920's; unfortunate because this was also the period when there were many abuses related to the use of options. Pool operators using options to manipulate stock prices, brokers given options for pushing certain stocks and the use of one-day or two-day options were a few of the abuses cited in those days. Congress came close to banning all options but in the end the Securities and Exchange Commission was empowered to regulate the option brokers and dealers. After passage of the Securities Act of 1934, the Put and Call Brokers and Dealers Association (P & C B & DA) was formed to represent the option firms and to impose self-regulation on the option business. The new powers of the S.E.C. and the P & C B & DA have been very effective in eliminating past abuses because since 1935 the option business had had an untarnished record.

In response to this added confidence, Table 1-2 shows that absolute option volume has increased dramatically between 1937 and 1969 but relative option volume has not grown since 1960.

Continuance of this past growth will be assured if four things can be accomplished. One is the development of a central market place which can increase the

Table 1-2

Total Option Volume and Relation to Total Volume on the NYSE, 1937-1969

Year	Total Shares Optioned (000's)	Ratio of Option Volume to NYSE Volume
1937	2,246	.55
1940	1,205	.58
1945	2,108	.56
1950	2,631	.50
1955	6,012	.93
1960	8,561	1.12
1965	15,256	.98
1968	30,284	1.05
1969	28,265	1.03

Source: Securities and Exchange Commission, Report on Put and Call Options, p. 20, and Barron's, November 30, 1970, p. 5.

efficiency of bringing buyer and seller together. The present system is costly and laborious as well as time-consuming. What is needed is an auction type market to replace the present system. The Chicago Board of Trade is studying the possibility of starting a future type market for puts and calls on active option stocks with the objective of attracting institutional business.[9] Also, a firm called Market Monitor Data, Inc., has already set up a computerized network to furnish bids and offers on puts and calls to hopefully facilitate the process of

[9]Margaret D. Pacey, "Options Pick Up", Barron's, September 21, 1969, p. 11.

bringing option writers and buyers together.[10]

A second requirement is the development of a secondary market for the trading of existing options. Under the present system, the vast majority of options are exercised or allowed to expire by the original purchaser which is due to the inefficiency and lack of knowledge about trading existing options. The former Goodbody and Co. (now part of Merrill, Lynch, Pierce, Fenner and Smith Inc.) began in 1968 to make a continuous secondary market in options on a limited number of issues.

A third requirement is for the Put and Call Brokers and Dealers Association to educate the investing public and professional investment managers about the merits of both buying and selling option contracts. Laurence Botts, partner of Thomas, Haab & Botts, the largest option firm, estimates that 80 per cent of everyone interested in the stock market doesn't know what puts and calls are.[11] An information gap of this magnitude must be closed by those in the business.

The last requirement is that the traditional and legal constraints confronting institutions wanting to deal in options must be removed. Many states prevent institutional investors under their jurisdiction from

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[10] Ibid.

[11] "Traders Take to an Arcane Art", Business Week, MCMLXVll (May 13, 1967), p. 157.

writing or buying options and the tax rulings of the Internal Revenue Service certainly haven't helped to promote option writing. Perhaps if the first three requirements are met, this one will follow in place.

Review of Literature and Research

Most research on options has attempted to determine the general experience of option writers and buyers. Since writers are generally large stockholders and buyers small stockholders, most people naturally assume that option writing is profitable and option buying unprofitable. Others believe that both writers and buyers lose and the only winners are the brokers and dealers. This is the question that researchers have attempted to answer and the results thus far are inconclusive.

Richard Kruizenga was the first to attempt an answer to this question when he wrote his Ph.D. dissertation on this topic in 1956.[12] He used nominal option quotations submitted weekly during 1946-1956 to the S.E.C. by the P & C B & DA to ascertain the returns from purchasing or writing put and call options and concluded the following:

1) Purchasing 90-day call options over the ten year period was profitable (9% annual return

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[12]Richard J. Kruizenga, "Profit Returns from Purchasing Puts and Calls", The Random Character of Stock Market Prices, ed. Paul H. Cootner, (Cambridge, Mass.: The M.I.T. Press, 1964), pp. 392-411.

on investment) and purchasing 90-day put options over the same time period was unprofitable. By eliminating the 1953-1956 bull market period from the study, purchasing 90-day puts and calls were both unprofitable.

2) Purchasing 6-month call options over the ten year time period was profitable (35% annual return) and again - purchasing 6-month put options was unprofitable. Six month call options were still profitable after eliminating the 1953-1956 bull market period.

3) Option writers would have shown losses when the results of their option writing were compared to the opportunities available by just holding the stock.

This study has some limitations which should be pointed out. First, nominal quotations were used instead of actual quotations and since these are usually higher, this produced a downward bias to the returns from purchasing options. And second, the sample is heavily weighted with blue chip stocks having low volatility and no implications from this study should be made toward highly volatile stocks.

James Boness disagreed with Kruizenga in his

study.[13] He analyzed 490 actual option transactions from July, 1957 to July, 1960, and found that purchasing options of any type was tremendously unprofitable (82.2% annual loss on investment). The shorter the duration of the option contract the greater the annual loss and purchasing puts on the average was more unprofitable than calls.

Boness assumes three different strategies for the option writer. The adventurous strategy was to sell the options naked, meaning to simply deposit the minimum required margins. The conservative strategy was to sell the options and maintain a long or short position in the stock depending on the type of option. And the sophisticated strategy employed a filter technique whereby a naked position was covered by a long or short position if the price of the stock changed by ten per cent in either direction. Using the adventurous and conservative strategies, the writer would not do as well as simply buying and holding the stock while the sophisticated strategy would earn the writer an average annual rate of return of 32.9 per cent.

Limitations of this study are the short time period involved, three years, and the small number of transactions used in the analysis.

The S.E.C., in its 1961 Report on Put and Call

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[13] A. James Boness, "Some Evidence on the Profitability of Trading in Put and Call Options", in Cootner, op. cit., pp. 475-496.

Options, studied all call options either outstanding or sold during June, 1959 and verified some long-standing beliefs about the option business.[14]

First, call buyers exercised only forty-two per cent of options purchased and half of these were exercised at a loss, meaning a profit was made only twenty per cent of the time. Second, a marked contrast between option buyers and option writers was noted as option writers consisted primarily of wealthy individuals and a few institutions whereas option buyers generally were individual investors possessing limited amounts of funds. And third, option activity had increased about six-fold between 1934 and 1960.

The major drawback of this study is that only a short period of time and one type of market is covered. Since the market peaked in July, 1959, and fell continuously until September, 1960, it is not surprising that call buyers fared poorly. It should have estimated the profitability of put and straddle buying as well as all types of option writing.

Richard Katz studied 851 option contracts sold by 76 writers between April, 1960 and January, 1962 and concluded that both option writers and buyers lost slightly

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[14]Securities and Exchange Commission, Report on Put and Call Options, (Washington, D.C.: U.S. Government Printing Office, August, 1961).

on their option dealings.[15] However, writers would earn a slight profit if they received the entire premium paid by the buyers.

Zieg attempted to improve upon the S.E.C. study by calculating average rates of return accruing to option writers and buyers for six different types of markets instead of one.[16] He choose the following dates to represent his six market types:

1) September 23, 26, and 27, 1965 to represent a top-turn-around market which continues to rise for four months, peaks, and declines.

2) February 8, 9, and 10, 1966 to represent the highest point of the bull market. (Dow-Jones Industrial Average 995.15).

3) April 20, 21, and 22, 1966 to represent a down market which continues to decline for six more months.

4) May 23, 24, and 25, 1966 to represent a bottom-turn-around market which continues to fall for four months, hits a low point and recovers.

5) October 6, 7, and 10, 1966 to represent the

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[15]Richard Katz, "The Probability of Put and Call Option Writing", Industrial Management Review, V (Fall, 1963), p. 55-69.

[16]Kermit C. Zieg, Jr., A Study of Common Stock Options from the Standpoint of the Returns Accruing to the Buying and Selling Sides, (published Ph.D. Thesis, Dept. of Business Organization, The Ohio State University, Columbus, Ohio, 1968).

lowest point of this bear market. (Dow-Jones Industrial Average 744.32).

6) January 11, 12, and 13, 1967 to represent an up market which continues to advance for at least six months.

All options (2,212) appearing on the bid sheets received by the Chicago office of Francis I. duPont and Co. for these eighteen days were then assumed to have been purchased and written simultaneously under the terms called for on the bid sheets except that buyers' premiums are adjusted upward.

Zieg's results showed that option writers would have lost an average of 7.3 per cent on their investment in puts, 1.3 per cent in calls and 12.7 per cent on straddles. Conversely, option buyers would have earned large average rates of return on investment; put buyers enjoyed a return of 69.0 per cent, call buyers 41.5 per cent and straddle buyers 61.4 per cent. Because straddle buyers earned positive rates of return for all eighteen writing dates versus six for the put buyer and nine for the call buyer, there was less risk involved in purchasing straddles, assuming risk is measured by variance of return.

There are some serious limitations to this study. First, the time period covered was too short (21 months) to make any generalizations about option writing versus option buying. Second, this market was not very representative because it was more volatile than normal; the

Dow-Jones Industrial Average dropped 250 points in eight months and then quickly recovered to approach the former highs. And thirdly, the results are biased because the market is not at a peak or trough two-thirds of the time as his market dates are. Under these circumstances, it is not surprising that option buyers fared so well.

Probably the most conclusive empirical study was done by Martin Zweig who calculated return-risk ratio's for fifty-seven different investment strategies.[17] The option buying strategies were classified by type of option, put, call or straddle, length of option, three months or six months, and volatility, low, medium, or high, giving eighteen possible combinations of buying strategies. The option writing strategies were classified similarly except that positions could be covered naked or with stock, resulting in thirty-six possible combinations of writing strategies. The control strategies consisted of investing in low, medium, and high volatile stocks. His methodology was to randomly select ten stocks each year in each volatility class from those stocks appearing on the bid sheets of Thomas, Haab & Botts. He then wrote and purchased options on a monthly basis for one year after selecting the thirty stocks and repeated this for seven years, from

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[17]Martin E. Zweig, An analysis of Risk and Return on Put and Call Option Strategies, (unpublished Ph.D. Thesis, Department of Accounting and Financial Administration, Michigan State University, East Lansing, Michigan, 1969).

mid-1961 to mid-1968. Returns and return-risk ratios were computed annually for each of the fifty-four option strategies and three control strategies and then averaged over the seven year time period. Return-risk ratios were calculated by subtracting a risk-free rate of return from each annual rate of return and dividing by the seven year standard deviation of returns.

Zweig concluded that investors had superior performance investing in stocks as opposed to either buying or writing options when performance was measured by the return-risk ratio. Five of the eighteen option buying strategies had positive average return-risk ratios while only one of the thirty-six writing strategies had. If performance was measured by average rate of return on investment, purchasing calls or straddles on highly volatile stocks as well as purchasing medium and high volatile stocks were the superior strategies. Four option writing strategies had positive average rates of return but all were low.

Finally, Malkiel and Quandt developed the most theoretical study of option strategies to date.[18] Their approach incorporated hypothetical investor utility functions and decision making under uncertainty into an

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[18]Burton G. Malkiel and Richard E. Quandt, Strategies and Rational Decisions in the Securities Options Markets, (Princeton, New Jersey: Princeton University Financial Research Center, 1968).

analysis of option strategies under different market conditions and states of expectations. They compute the returns from sixteen different investment strategies of which eleven pertain to buying or writing options, four to buying or shorting the stock and one to a cash position.

The authors conclude that the use of stock options by both buyers and sellers is rational and should be part of overall portfolio strategy. Generally, strategies involving option writing predominated over option buying strategies.

This study also has some serious drawbacks. First, only NYSE stocks selling between $45 and $55 per share on January 1, 1960 thru 1964 were used for possible option transactions. This sample may not be representative of all NYSE stocks and perhaps no option activity existed on some of the stocks in the sample. Second, option premium data were gathered from 1964 through 1966 and then applied to hypothetical transactions from 1960 to 1964. Option premiums in the period 1964 to 1966 may not be representative of option premiums in the period of 1960 to 1964. And third, Malkiel and Quandt ignore the extreme tails of theoretical probability distributions of stock prices and it is these extreme fluctuations that make option writing hazardous and option buying profitable.

Some limited research has been done on the determinants of option premiums with three published studies thus far. Franklin and Colberg used simple linear

regression to test the relationship between thirty-eight put and call premiums and the absolute prices of the associated stocks on October 17, 1955.[19] They found that for both puts and calls, the relationships were linear, coefficients of correlation high and standard errors of estimate low. In other words, the absolute price of the stock was a good predictor of the put or call premium.

In a more sophisticated study, Malkiel and Quandt used multiple regression analysis to find the determinants of prices paid to option writers of 106 calls and 61 straddles during the year-end periods of 1964, 1965 and 1966.[20] They found the market price of the stock, the past volatility, the number of shares outstanding, the turnover ratio and the expected long-term growth rate for earnings to be important determinants of call premiums. The same factors with the exception of the expected long-term growth rate of earnings were significant in determining straddle premiums.

Finally, Stoll tested to see if an arbitrage mechanism existed to keep put and call prices in line with each other irrespective of the demands of buyers.[21] He

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[19]Charles B. Franklin and Marshall R. Colberg, "Puts and Calls: A Factual Survey", Journal of Finance, Vol. XIII, No. 1 (March, 1958), p. 21-34.

[20]Malkiel and Quandt, op. cit., pp. 26-31.

[21]Hans R. Stoll, "The Relationship Between Put and Call Option Prices", Journal of Finance, Vol. XXIV, No. 5 (December, 1969), pp. 801-824.

found a parity between put and call prices and concluded that relative put and call prices differ by the pure rate of interest.

The vast majority of literature on options has appeared in the widely read business magazines and newspapers such as Business Week, the Magazine of Wall Street, Forbes, Financial World, Barron's, the Wall Street Journal and the Commercial and Financial Chronicle. With very few exceptions, these articles have been explanatory in nature and of little help to the sophisticated investor.

CHAPTER 2

RESEARCH DESIGN

Methodology

The methodology consists of three main parts: statistical testing (Step 1), application (Steps 2 and 3) and analysis (Steps 4 and 5).

Step 1. Isolate those investment factors that are statistically significant in predicting annual price volatility. A systematic random sample of forty stocks is drawn at the end of each year from 1961 to 1970, from the population of industrial common stocks listed on the New York Stock Exchange. Each sample is divided into quartiles based upon volatility for that year and differences between the investment characteristics preceding the upper (high volatility) and lower (low volatility) quartile stocks are tested using a nonparametric statistical test.

Step 2. Select annually from the population of industrial common stocks listed on the NYSE and selling above $30 per share, those having the investment characteristics associated with high volatility as established in Step 1.

Step 3. Purchase one six-month straddle option on the first trading day of each period (January, April, July

and October) on each stock selected in Step 2. If the market price falls below $30 or rises above $100 per share on any purchase date, a straddle is not bought at that time. The premiums paid for the straddle options are estimated as actual premiums are difficult to obtain.

Step 4. Calculate and analyze the rate of return on investment for each period and an annual rate of return for each year. Assumptions are made about holding periods, investment bases and the tax status and adjustments are made for dividends, splits and brokerage commissions.

Step 5. Compare the rates of return in the study with the results of other empirical studies involving the purchase of straddle options, with market performance and also with mutual fund performance. The riskiness of these annual rates of returns are also calculated using a relative measure of dispersion as a measure of risk.

Research Terminology

Some of the terminology and measurements used in this research design are as follows:

Volatility. This will always refer to annual price volatility unless stated otherwise. It is measured by the annual price range divided by the mid-range or in algebraic terms,

$$V = \frac{Ph - Pl}{1/2(Ph + Pl)}$$

where Ph is the high price for the year and Pl is the low price of the year.

Holding Period. All holding periods are of six months duration and commence on the first trading day of

one quarter and end on the first trading day of the following second quarter. Each year will thus consist of four holding periods as follows:

1) The first period starts on the first trading day of the first quarter (January) and ends on the first trading day of the third quarter (July).
2) The second period starts on the first trading day of the second quarter (April) and ends on the first trading day of the fourth quarter (October).
3) The third period starts on the first trading day of the third quarter (July) and ends on the first trading day of the first quarter (January) of the following year.
4) The fourth period starts on the first trading day of the fourth quarter (October) and ends on the first trading day of the second quarter (April) of the following year.

Since this study covers nine years, there are thirty-six holding periods in which investments are made and rates of return calculated.

Investment Quality. The ratings assigned by Financial World are used as measures of investment quality. They are based not only on earnings and dividend stability but also on financial condition.

A+ and A stocks are investment grade issues which

have such attributes as a conservative capitalization, consistent dividend record and substantial earning power even under the most adverse general business conditions. Those in the A+ category have shown greater earnings consistency than stocks rated A.

B+ and B stocks are upper medium to medium grade issues of semi-investment quality. They are fortified by a good financial position and satisfactory average earnings.

C+ and C stocks are those in fair to good financial position. Earnings of both the semi-speculative C+ and the more speculative C rated issues depend upon general business conditions.

D+ and D issues are highly speculative and unsuited for the average investor. The D issues are in a somewhat more marginal position than the D+ issues.

Turnover. This is measured by dividing annual volume by the number of shares outstanding at the year-end with adjustments made for stock splits and large stocks dividends but not for other minor changes in shares outstanding.

Price/Earnings Ratio and Dividend Yield. These are obtained from Value Line's Survey and are average annual amounts, calculated from quarterly figures. They are more representative than a figure based on a single point of time such as year-end.

Shares Outstanding. These are the number of shares

outstanding at a point in time and are not average figures. The point in time is usually the end of the third quarter (September 30) for the majority of companies and is used because the year-end amounts are not usually published until some time in the following year.

Percentage Move. This is measured by dividing the net price change for the year by the beginning of the year price. Again adjustments are made for stock splits and large stock dividends.

Risk. This is measured by the coefficient of variation which is a relative measure of dispersion. It is calculated by dividing the standard deviation by the corresponding mean.

Ho and H_1. These are standard statistical notations for the null hypothesis and the alternative hypothesis respectively.

Wilcoxon Matched-Pairs Test. This test uses both the magnitude and the direction of differences between pairs of data, by first finding the absolute differences between data and then ranking them from smallest to largest. Then the signs of the original differences are attached to the ranks and the ranks having (+) signs and (-) signs are each summed. The statistic for this test is usually denoted by T(+) - T(-) where T(+) represents the sum of the positive ranks and T(-) the sum of the negative ranks. Small absolute values of the difference T(+) - T(-) favor the hypothesis of symmetry or identity

of the distribution while large absolute values indicate differences in the distribution.

Procedural Steps

Step 1. Statistical Testing. A systematic random sample of forty stocks is drawn each year-end from 1961 to 1970. Only the industrial common stocks listed on the NYSE having a year-end closing price of $30 per share or above are included in the population from which the random sample is drawn because most of the option activity is centered in these stocks and many of the highly volatile stocks are included in this group also. The number of stocks in each sample and the number of samples drawn are of sufficient size to test for the factors that are statistically significant in predicting future volatility.

Each random sample is divided into quartiles based on annual price volatility. Investment information for the year preceding each sample year is then collected on the ten upper and ten low quartile stocks of each sample. For example, 1965 investment information is gathered on the ten upper and lower quartile stocks from the 1966 random sample and a similar procedure is repeated for the other nine years. It is hoped that the average investment characteristics preceding highly volatile stocks are significantly different from those preceding low volatile stocks.

The investment characteristics and the reasons for testing include the following fundamental and technical

factors.

Volatility. There appears to be a relationship between a stock's volatility one year and its volatility the following year. Altman and Schwartz studied weekly volatility measures on twenty stocks from 1962-68 and concluded that interfirm volatility rankings remain quite consistent over time; firms which rank low (high) in volatility at one point in time are expected to rank low (high) at other points of time.[1] Pratt also found considerable evidence that the relative volatility exhibited by any stock has tended to persist over time.[2]

Turnover. The general idea here is that actively traded stocks respond more readily to general market movements than inactively traded ones. This is substantiated by a 1966 study by Heins and Allison which found that highly active stocks had greater price variability than less active stocks.[3]

Price/Earnings Ratio. Market practioners generally relate the risk of a specific stock to its

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[1]Edward I. Altman and Robert A Schwartz, "Common Stock Price Volatility Measures and Patterns", Journal of Financial and Quantitative Analysis, Vol. IV, No. 5 (January, 1970), p. 603-625.

[2]Shannon P. Pratt, Relationship Between Risk and Rate of Return for Common Stocks, (Unpublished D.B.A. dissertation, Indiana University, 1966).

[3]A. James Heins and Stephen L. Allison, "Some Factors Affecting Stock Price Variability", Journal of Business, Vol. XXXIX, No. 1 (January, 1966), pp. 21-22.

price/earnings ratio. Heins and Allison found some evidence that A rated stocks with a higher price-earnings ratio tended to experience greater price variability than their lower ratio counterparts, but this effect did not show up in the B rated group.[4]

Dividend Yield. The total return to the common stockholder consists of the dividend yield plus the capital gains yield. The larger the dividend yield relative to the expected capital gains yield, the less volatile the market price should be. Thus stocks having low dividend yields should be more volatile than those having high dividend yields.

Investment Quality. Heins and Allison also found that relative price variability is not related to the average price of the stock but to its investment grade which is highly correlated with average price.[5] Thus the stocks of lower investment grade should be more volatile than high grade stocks.

Percentage Move. There have been numerous instances where stocks enjoyed large percentage price moves upward one year only to fall sharply the following year and vice versa. This could be in response to the general market or to specific company or industry developments which are over-discounted. The idea is that the stocks

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[4] Ibid., p. 22

[5] Ibid., pp. 19-21.

having large percentage price moves one year are highly volatile the next year.

Absolute Price. Although Heins and Allison found that relative price variability is not related to the average price of the stock, this is tested again in a different manner.[6] The preceding year-end closing prices are used to determine if a relationship exists between these prices and volatility the following year.

After collecting this data, averages for each of the eight investment characteristics are computed on the ten upper and ten lower quartile stocks of each sample. For example, the 1965 turnover ratios are averaged for the upper quartile stocks of the 1966 sample and the lower quartile stocks of the same sample and this is repeated for the other nine years.

The Wilcoxon matched-pairs test is used to test the hypothesis of a significant directional difference between the average investment characteristics preceding the upper and lower quartile stocks.[7]

1) Ho: The average volatility preceding upper quartile stocks is less than or equal to the average volatility preceding lower quartile stocks.

H1: The average volatility preceding upper

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[6] Ibid. pp. 19-21.

[7] See W. J. Conover, Practical Nonparametric Statistics, (John Wiley & Sons Inc., New York: 1971), pp. 206-215.

quartile stocks is greater than the average volatility preceding lower quartile stocks.

2) Ho: The average turnover preceding upper quartile stocks is less than or equal to the average turnover preceding lower quartile stocks.

H1: The average turnover preceding upper quartile stocks is greater than the average turnover preceding lower quartile stocks.

3) Ho: The average number of shares outstanding preceding upper quartile stocks is greater than or equal to the average number of shares outstanding preceding lower quartile stocks.

H1: The average number of shares outstanding preceding upper quartile stocks is less than the average number of shares outstanding preceding lower quartile stocks.

4) Ho: The average P/E ratio preceding upper quartile stocks is less than or equal to the average P/E ratio preceding lower quartile stocks.

H1: The average P/E ratio preceding upper quartile stocks is greater than the average P/E ratio preceding lower quartile stocks.

5) Ho: The average dividend yield preceding upper quartile stocks is greater than or equal to the average dividend yield preceding lower quartile stocks.

H1: The average dividend yield preceding upper quartile stocks is less than the average dividend

yield preceding lower quartile stocks.

6)* Ho: The average investment quality preceding upper quartile stocks is greater than or equal to the average investment quality preceding lower quartile stocks.

H1: The average investment quality preceding upper quartile stocks is less than the average investment quality preceding lower quartile stocks.

7) Ho: The average percentage move preceding upper quartile stocks is less than or equal to the average percentage move preceding lower quartile stocks.

H1: The average percentage move preceding upper quartile stocks is greater than the average percentage move preceding lower quartile stocks.

8) Ho: The average absolute price preceding upper quartile stocks is greater than or equal to the average absolute price preceding lower quartile stocks.

H1: The average absolute price preceding upper quartile stocks is less than the average absolute price preceding lower quartile stocks.

*Since high quality stocks are assigned small numbers and low quality stocks have high numbers, the upper quartile stocks will have higher average numerical ratings than the lower quartile stocks if the null hypothesis is to be rejected and the alternative accepted.

Step 2. Selection of Stocks. The stocks that are selected for purchasing straddles each year will possess all of the investment characteristics that are found

statistically significant in preceding the upper quartile stocks of the random samples. First, the market is sifted each year and all stocks having the investment characteristic deemed most significant in predicting high volatility are selected. A second sift is then performed on the stocks selected by the first sift with the result that the stocks selected possess the two most important investment characteristics that precede highly volatile stocks. The industrial common stocks listed on the NYSE having a year-end closing price of $30 per share or above are sifted each year as many times as there are significant investment characteristics as determined in Step 1.

The probabilities are good that the stocks making it through all the sifts in any one year will have high relative volatility the following year. It is on these stocks that straddle options are purchased.

Step 3. Purchase of Straddles. One six-month straddle option is purchased on the first trading day of each holding period (January, April, July, and October) on each stock selected and held until maturity when it is either exercised or allowed to expire. If the market price of the stock is below $30 or above $100 per share on any of the purchase dates, a straddle is not purchased at that time. But if the market price should close within the $30 to $100 range on any of the subsequent purchase dates, one would be purchased. A minimum of zero and a maximum of four straddles can be purchased each year on

each stock selected. In a strong bull market such as 1967 many of the market prices could advance beyond $100 per share whereas in a bear market such as 1969 many prices could fall below $30 per share. A stock split or large stock dividend could conceivably adjust the market price into or out of the allowable price range.

Price Range. A straddle will not be purchased on any stock selling under $30 per share because the cost is prohibitive. The option premium expressed as a per cent of the cost of 100 shares of the stock at the striking price decreases as the striking price increases. As shown in Tables 2-1 this per cent cost declines rapidly until the striking price reaches $30, then the rate of decline slows and becomes a constant at a striking price of $50. Information in Table 2-2, although not as precise, also verifies this fact.

Likewise, a straddle will not be purchased on any stock selling above $100 per share. First, as shown in Table 2-2, there is not much option activity on these stocks either in straddles or puts and calls.[8] Apparently, the willingness on the part of writers or buyers to deal in options on high priced stock is lacking.

Secondly, the costs are prohibitive in terms of

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[8]The S.E.C. Report found only three puts and four calls written during the month of June, 1959, having a striking price above $100. Source: Security and Exchange Commission, op. cit., Table 30, p. 86.

Table 2-1

Conversion of Dadekian's Evaluation of Option Bids into Bids Expressed as a Per Cent of the Striking Price

Striking Price	Percentile**	Bids to Straddle Option Sellers*	
		190-Day Options	95-Day Options
10	25	26.0	18.0
	50	27.0	19.5
	75	28.0	20.5
20	25	21.0	15.0
	50	22.0	16.0
	75	24.0	17.0
30	25	17.5	13.0
	50	19.0	14.5
	75	21.0	16.0
40	25	16.0	12.5
	50	18.0	14.0
	75	19.5	15.0
50	25	15.5	12.0
	50	17.0	13.5
	75	19.0	14.5
60	25	15.5	12.0
	50	17.0	13.0
	75	19.0	14.5
70	25	15.5	11.5
	50	17.0	13.0
	75	19.0	14.5

Source: Zaven A. Dadekian, The Strategy of Puts and Calls-Selling Options for Maximum Profit With Minimum Risk, (New York: Corinthian Editions, 1968), pp. 98-103. Conversion performed by Zweig, op. cit., p. 190.

*Premium bids to option writers expressed as a per cent of the cost of 100 shares at the striking price.

**Bids for a stock with a given striking price are shown at three different percentile levels. The 25th percentile means that 25 per cent of the bids at a particular striking price are below the corresponding bid listed in the table. The 50th and 75th percentiles mean that 50 and 75 per cent of the bids respectively are below the corresponding amounts in the table.

Table 2-2

Average Premiums on Three-Month and Six-Month Straddle Options Classified by Price of Stock Optioned**

Price Class	3-Month Options			6-Month Options		
	No. of Stocks	Average Premium	Per Cent Cost*	No. of Stocks	Average Premium	Per Cent Cost*
Less than $10.00	4	$ 402	NC	9	$ 244	NC
$10.00 to $19.99	17	303	20.2	60	381	25.4
$20.00 to $29.99	36	350	14.0	41	514	20.5
$30.00 to $39.99	26	475	13.6	35	683	19.5
$40.00 to $49.99	13	506	11.3	22	739	16.4
$50.00 to $59.99	14	652	11.8	14	1,043	19.0
$60.00 to $79.99	13	784	11.2	18	1,161	16.6
$80.00 to $99.99	6	1,002	11.1	3	1,408	15.6
$100.00 and over	1	1,650	NC	2	2,017	NC

Source: Securities and Exchange Commission, op. cit., Table 30, p. 86.

*The average premium as a per cent of the cost of 100 shares at the mid-range price.

**Average premiums received by writers during June, 1959 on straddle options on common stocks traded on the New York and American Stock Exchanges.

the dollar consequences a buyer pays if the option expires without being exercised. Since only one straddle option per stock is purchased, the loss of the entire premium on a high priced stock more than offsets the profits on a few lower priced stocks.

Length of Option. Only six-month straddle options are purchased because all evidence indicates they are more profitable relative to shorter term options. All nine of Zweig's buying strategies involving six-month options had better returns than the corresponding three month strategy.[9] In Zieg's study, investments in six-month options had superior returns over investments in 95-day options.[10] These results were also substantiated by the studies of Boness, Kruizenga and Katz. The explanation for this is that 90-day options, while maturing in one-half the time of 6-month options, are not one-half the price of 6-month options; the premium in a 90-day option averages between 65-70 per cent of the premium on a 6-month premium all other things equal.[11]

Premium. The premiums on the straddle options are estimated at a constant twenty-three per cent of the cost of 100 shares at the striking price. Table 2-1 shows that

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[9]Zweig, op. cit., Table 3-7, p. 113.

[10]Zieg, op. cit., Tables 45-51, pp. 288-294.

[11]Securities and Exchange Commission, op. cit., Table 29, p. 84.

at the 75th percentile on striking prices of $30 and above, 75 per cent of the bids to straddle option sellers on 190-day options are below 19.5 per cent of the cost of 100 shares at the striking price. Because actual premiums paid to writers are usually a little above bid quotes, this figure was rounded to twenty per cent. To ascertain the buyer's premium, the dealer's markup must be added to the writer's premium. The S.E.C. Report On Put and Call Options found that fifty-five per cent of the calls sold during June, 1959 had percentage markups of less than fifteen per cent and an average per cent markup of 14.8 per cent.[12] Thus the writers percentage premium of twenty per cent is increased by fifteen per cent to arrive at the twenty-three per cent as the buyer's premium. For example, the writer's premium for selling a straddle option on a stock having a striking price of $50 would be twenty per cent of the cost of 100 shares at $50 per share or $1000. The dealer's markup is fifteen per cent of $1000 or $150 which when added to the writer's premium means the buyer pays an $1150 premium. This is exactly twenty-three per cent of the cost of 100 shares at the striking price of $50 per share.

Step 4. Rates of Return. Rates of return on investment are calculated for each of the thirty-six periods

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[12]Securities and Exchange Commission, op. cit., Table 33, p. 92.

that straddles are purchased. The following assumptions and adjustments are made to get realistic results.

Purchase Dates. It is assumed that straddle options are purchased on the first trading day of each period (January, April, July and October) beginning with the first period of 1962 and ending with the fourth period of 1970.

Striking Price. All straddles are assumed to have been purchased at striking prices which are equal to the closing prices of the stocks on the first trading day of each period, adjusted upward or downward to the nearest whole dollar.

Holding Periods. It is assumed that all options are held for a full six months and no part of it can be exercised in the interim; conceivably both the put and call sides of the straddles could be exercised but this very rarely happens. The assumption is realistic because the S.E.C. Report found that seventy-five per cent of call options were exercised on their expiration date or less than a week before expiration and only about fifteen per cent were exercised more than thirty days before expiration.[13]

Tax Status. A tax-exempt position is assumed for the buyer in computing rates of return.

Cash Dividends. The effect of a cash dividend is

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[13]Securities and Exchange Commission, op. cit., p. 51.

to reduce the striking price of all outstanding put and call options by the amount of the dividend on the day the stock sells ex-dividend. A cash dividend benefits the holder of a call option because the price at which the stock can be purchased is reduced whereas it works against the put holder because the price at which he can sell is reduced. In other words, the benefits of a cash dividend go to the potential owner, buyer of a call option or seller of a put option. All striking prices have been adjusted for cash dividends.

Stock Dividends and Splits. A stock dividend or stock split reduces the striking price by means of the following formula:

$$\text{New Striking Price} = \frac{\text{Old striking price}}{1 + \text{number of new shares per each old share}}$$

The owner of a call option with an original striking price of $50, after a 5 per cent stock dividend, would buy 105 shares for $5,000. The holder of a put option will deliver or sell 105 shares for $5,000.

A stock split would have the following effect on the above situation. If the split was two-for-one, the new striking price is $25 and 200 shares are purchased or delivered instead of the 100 in the original contract.

All striking prices have been adjusted for stock dividends and stock splits.

Investment Base. It is assumed that the buyer

maintains no other position in the stock except for the rights associated with the straddle; no long or short positions are maintained. If the call side of the straddle is exercised, the stock purchased from the writer is immediately sold and if the put side is exercised, the stock sold to the writer is purchased at that time. Therefore the investment base assumed is simply 100 per cent of the cost of each straddle option purchased.

Brokerage Commissions. Since a cash-to-cash portfolio is maintained, a roundtrip commission schedule is used. Instead of using the exact commission schedule of the NYSE, Zweig's abbreviated schedule shown in Table 2-3 is used.[14]

Table 2-3

Commission Schedule

Stock Price*	Roundtrip Commission Per 100 Shares
Under $20	$ 50
$20 to $39	$ 75
$40 to $149	$100
$150 and above	$150

*The stock price is based on the average of the striking price and the market price at the time of exercising.

The exact one-way commission on 100 shares of a

[14]Zweig, op. cit., Table 2-4, p. 63.

$50 stock would be $19 plus 1/10% of the money amount or $44. The exact roundtrip commission of $88 is closely approximated by the amount of $100 in the abbreviated schedule.

Gross Proceeds. This is the difference between the adjusted striking price and the market price multiplied by the number of shares optioned which is always one hundred unless a stock split or stock dividend is declared.

If the market price at the date of exercising is above the adjusted striking price, the call side of the straddle is exercised and if the market price is below the adjusted striking price, the put side is exercised. If the gross proceeds in either case are not larger than the roundtrip commission, the option is not exercised.

Net Proceeds. Gross proceeds minus commissions equal net proceeds. If an option is not exercised, net proceeds are zero.

Profit or (Loss). Net proceeds minus the cost of the option equals profit or (loss). If the net proceeds are larger than the cost, the transaction is profitable. If the opposite is true, a loss is incurred. When an option is not exercised, the loss equals the cost of the option.

Rate of Return. The rate of return on investment is computed by dividing total profit or (loss) by the total cost of the options. Since the profit or (loss)

is realized exactly six months after purchasing the options, semi-annual rates of return are actually computed.

A weighted-average annual rate of return is calculated by weighting each of the four semi-annual rates of return by the proportion of the total annual cost expended in each period.

Step 5. Comparison. The annual rates of return in this study are compared with Zweig's returns on those strategies involving the purchase of six-month straddle options.[15] A comparison is also made with Zieg's returns from purchasing six-month straddle options although our purchase and exercise dates do not coincide in all periods.[16] As any portfolio manager would do, the annual rates of return are compared with general market returns and the returns on high risk mutual funds.

Risk comparisons are also made where risk is measured by the coefficient of variation, a relative measure of dispersion. If the annual rates of return generated by this strategy are higher with lower or equal risk or the returns are equal with lower risk, then the strategy is a success.

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[15]Zweig, op. cit., Table 3-7, p. 113.

[16]Zieg, op. cit., Table 54, p. 139.

CHAPTER 3

ANALYSIS OF RESULTS

Hypotheses Testing

The first, second, third and sixth null hypotheses are rejected using the Wilcoxon matched-pairs test at a level of significance of .01 and the following alternative hypotheses accepted.

1) H_1: The average volatility preceding upper quartile stocks is greater than the average volatility preceding lower quartile stocks.

2) H_1: The average turnover preceding upper quartile stocks is greater than the average turnover preceding lower quartile stocks.

3) H_1: The average number of shares outstanding preceding upper quartile stocks is less than the average number of shares outstanding preceding lower quartile stocks.

6) H_1: The average investment quality preceding upper quartile stocks is less than the average investment quality preceding lower quartile stocks.

This means that highly volatile stocks are on the average preceded by higher volatility, higher turnover, lower number of shares outstanding and lower investment quality than lower volatile stocks. Table 3-1 shows the averages for each of these four investment variables.

The average volatility preceding upper quartile

stocks is significantly larger each year than that preceding the lower quartile stocks except one year, 1969, when the difference was only a positive .0701. Of the 100 upper quartile stocks, 64 are preceded by above average prior volatility whereas only 13 of the 100 lower quartile stocks are. Thus there is a significant relationship between a stock's relative volatility one year and the following year, confirming the study mentioned in Chapter 2.[1] In selecting stocks, one of criterion will be the prior year's volatility.

Likewise, the average turnover preceding upper quartile stocks is significantly larger than that preceding lower quartile stocks in each of the ten years. Annual prior turnover ratios of greater than .3300 precede 55 of the 100 upper quartile stocks versus only 3 of the 100 lower quartile stocks. This substantiates the conclusion reached by Heins and Allison that high turnover causes volatility, so it will be another criterion for selecting highly volatile stocks.[2]

The average number of shares outstanding preceding the upper quartile is significantly smaller than that preceding the lower quartile stocks in eight of the ten years. Using 10 million shares as an arbitrary cut-off

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[1]Pratt, op. cit.

[2]Heins and Allison, op. cit.

Table 3-1

Prior Year's Investment Characteristics of Upper and Lower Quartile Stocks

	Average Volatility		Average Turnover	
Year	Upper	Lower	Upper	Lower
1961	.5078	.3530	.4434	.0754
1962	.6447	.3262	.3661	.0989
1963	.6315	.4534	.5317	.1185
1964	.4213	.2570	.4977	.1300
1965	.4174	.2440	.3606	.0804
1966	.8152	.3221	1.3914	.1216
1967	.5966	.3351	.5890	.1098
1968	.8416	.4189	1.0015	.1653
1969	.4749	.4048	.4175	.1667
1970	.4509	.2824	.3553	.1360

	Average Shares Outstanding (000's)		Average Investment Rating*	
Year	Upper	Lower	Upper	Lower
1961	2,399	9,785	4.6	3.4
1962	4,351	12,350	4.4	3.4
1963	4,118	5,433	4.4	3.1
1964	1,879	11,047	4.7	3.0
1965	6,626	15,481	4.5	2.6
1966	3,308	23,938	4.5	3.2
1967	4,478	17,071	4.8	3.1
1968	5,802	17,705	4.8	2.8
1969	15,085	16,833	3.7	3.2
1970	10,633	24,275	4.0	2.8

*These numerical ratings are inversely related to investment quality: the higher the quality, the lower the numerical rating and vice versa.

point, only 14 of the upper quartile stocks have a greater number of shares outstanding versus 51 of the lower quartile stocks. This confirms the idea that the number of shares outstanding and volatility are inversely related

and thus becomes the third selection criterion.

Finally, the upper quartile stocks are on the average of lower investment quality (higher numerical rating) than the lower quartile stocks again confirming the findings of Heins and Allison.[3] The investment ratings of the lower quartile stocks average about 3 which is a B+ while the upper quartile stocks average approximately 4.5 which is between a B and C+. Whereas 87 per cent of the upper quartile stocks have an investment quality rating of B or less, 65 per cent of the lower quartile stocks have an investment rating of B+ or better. Investment quality becomes the fourth selection criterion.[4]

The other four null hypotheses are all accepted at a level of significance of .01, meaning that there is not a significant difference between the average price/earning ratio, dividend yield, percentage move and absolute price preceding upper quartile stocks and lower quartile stocks.

Selection Process

In a sample selection process, the four criteria established above are applied to the upper and lower quartile stocks as follows:

1) Prior year's volatility must be above average for that year.

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[3]Ibid.

[4]Ibid.

2) Prior year's annual turnover must be greater than .3300.

3) Number of shares outstanding at the end of the prior year must be below 10 million.

4) Investment quality rating must be B or less; numerical rating must be 4 or higher.

The results of this sample selection process are quite significant: 45 per cent of the upper quartile (highly volatile) stocks are selected versus only 2 per cent of the lower quartile stocks. This selection process obviously improves the probabilities of choosing stocks exhibiting high relative volatility and should work well in selecting stocks on which to purchase straddle options.

These criteria are modified slightly and applied to all industrial common stocks listed on the NYSE having a year-end closing price of $30 per share or above. Any stock having a year-end closing price below $30 per share but rising above that amount later in the following year would still not be eligible for selection. Stocks with year-end closing prices above $100 per share are eligible for selection even though straddles will not be purchased on them unless the stock closes below $100 per share on any subsequent purchase date.

The procedure for selecting stocks uses both relative and absolute criteria. As shown in Table 3-2, volatility and turnover are relative criteria while number of shares outstanding and investment quality are absolute

Table 3-2

Selection Criteria Applied to Eligible Stocks

Year	Minimum Turnover	Minimum Volatility	Maximum Number of Shares Out.	Maximum Investment Quality
1961	.5000	.500	15 Million	B
1962	.4800	.500	15 Million	B
1963	.5000	.500	15 Million	B
1964	.5000	.500	15 Million	B
1965	.6000	.600	15 Million	B
1966	.6000	.600	15 Million	B
1967	.8000	.800	15 Million	B
1968	.7000	.700	15 Million	B
1969	.5000	.500	15 Million	B

criteria.

The first step is to select the stocks having above average turnover ratios. Obviously, this ratio will vary from year to year, depending on market conditions. Since turnover ratios on the average were much higher in 1967 than in 1962, a higher ratio was required in the former year than the latter in the selection process.

The next step is to select from the stocks having above average turnover ratios, those that also have shown above average price volatility that year. This again is a relative measure, depending on the volatility of the market, but a minimum requirement of .500 is imposed which is adjusted upwards in highly volatile years such as 1965 thru 1968. A certain minimum amount of volatility is required to make straddle buying profitable regardless of its relative standing. Purchasing straddles on a stock

having a volatility ratio of .400 would not be profitable even if this is high on a relative basis, while purchasing straddles on a stock having a volatility measure of .700 would probably be profitable regardless of its relative standing.

Finally, all the stocks having less than 15 million shares outstanding and an investment quality of B or less are further selected from those passing the first two selection criteria. Table 3-3 shows the number of eligible stocks and the number actually selected each year.

Table 3-3

Number of Eligible Stocks and Actual Selections

Year	Number of Eligible Stocks	Number Actually Selected
1961	394	28
1962	315	21
1963	354	23
1964	392	22
1965	490	30
1966	392	31
1967	568	35
1968	689	28
1969	411	27

Purchase of Straddles

Straddle options are purchased on the first trading day of each period in the year following a stock's selection if the price on the purchase date is within the allowable price range, $30 to $100. For example, straddles

are purchased during 1962 on the stocks selected using 1961 year-end measures of turnover, volatility, shares outstanding, investment quality and closing price. This process begins with the first period (January) of 1962 and ends with the last period (October) of 1970.

Table 3-4 shows the number of straddle options purchased at the beginning of each period and the year.

Table 3-4

No. of Straddles Purchased Each Period

Year	First	Second	Third	Fourth	Total
1962	27	21	11	10	69
1963	18	17	18	17	70
1964	21	19	16	13	69
1965	22	21	18	17	78
1966	27	21	23	23	94
1967	26	23	23	23	95
1968	28	28	28	27	111
1969	27	17	8	4	56
1970	27	17	8	12	64

The number of stocks selected at the end of one year and the number of options purchased at the beginning of the first period the following year (at most three days later) are not always equal for obvious reasons. A stock selling above $100 per share is eligible for selection, but a straddle can't be purchased until the price falls below $100 on a subsequent purchase date. However, on the bottom side the same minimum requirement, $30 per share, applies to both selection of stocks and purchase of

straddles on stocks selected.

The dollar investment required to purchase these options is shown in Table 3-5.

Table 3-5

$ Investment in Options by Period and Year

Year	First	Second	Third	Fourth	Total
1962	$ 28,199	$ 21,523	$ 10,166	$ 9,951	$ 69,839
1963	19,479	19,907	20,181	19,688	79,255
1964	24,946	24,142	18,525	14,610	82,223
1965	22,788	24,543	20,236	22,422	89,989
1966	35,013	30,128	31,532	27,070	123,743
1967	31,900	30,023	32,652	33,318	127,893
1968	35,107	31,951	35,569	33,410	136,037
1969	31,573	17,220	7,095	5,016	60,904
1970	30,269	21,446	8,496	13,140	73,351
Total	$259,274	$220,883	$184,452	$178,625	$843,234

Actually, the amounts in the total column are not required because the net proceeds received on straddles purchased two periods earlier can be applied to the current period purchases. For example, the net proceeds from the first period purchases are realized at the beginning of the third period and applied to the cost of straddles purchased at that time. An initial investment of $50,000 to cover the first two periods plus an additional $5,000 in 1964 would have been sufficient to cover all purchases.

Returns on Investment

Table 3-6 shows the net proceeds generated on each periodical investment. These amounts are related back to

Table 3-6

Net Proceeds Per Period

Year	First	Second	Third	Fourth	Total
1962	$37,383	$26,478	$ 10,492	$ 9,731	$ 84,084
1963	14,818	20,896	13,755	22,530	71,999
1964	28,800	19,421	12,855	11,075	72,181
1965	15,768	25,571	52,678	49,829	143,846
1966	37,279	32,352	20,002	48,775	138,408
1967	65,573	37,769	38,184	30,396	171,922
1968	28,545	41,996	24,805	23,498	118,844
1969	50,911	24,740	5,314	6,753	87,718
1970	54,482	30,565	8,731	9,645	103,423

the beginning of the period the investment was made and not to when the proceeds are actually realized, which is always six months later.

Table 3-7 shows the profit or loss on each periodical investment, again referring to the beginning of the period when the investment was made and not when proceeds were received.

Table 3-8 shows the rate of return earned on each periodical investment. Since all options are held for a six month time period, each return is a semi-annual rate of return.

Conversion of these semi-annual rates of return to annual rates is shown in Table 3-9.

Average annual rates of return are positive in six years and negative in the other three, resulting in an average annual rate of return of 39.5 per cent over the nine year period. What is more encouraging is the fact

Table 3-7

Profit (Loss) Per Period

Year	First	Second	Third	Fourth	Total
1962	$ 9,184	$ 4,955	$ 326	$ (220)	$ 14,245
1963	(4,661)	989	(6,426)	2,842	(7,256)
1964	3,854	(4,721)	(5,640)	(3,535)	(10,042)
1965	(7,020)	1,028	32,442	27,407	53,857
1966	2,266	2,224	(11,530)	21,705	14,665
1967	33,673	7,746	5,532	(2,922)	44,029
1968	(6,562)	10,045	(10,764)	(9,912)	(17,193)
1969	19,338	7,520	(1,781)	1,737	26,814
1970	24,213	9,119	235	(3,495)	30,072
Total	$74,285	$38,905	$ 2,394	$33,607	$149,191

Table 3-8

Rate of Return Per Period

Year	First	Second	Third	Fourth	Weighted Average*
1962	32.6	23.0	3.2	-2.2	20.4
1963	-23.9	5.0	-31.8	14.4	-9.2
1964	15.5	-19.6	-30.5	-24.2	-12.2
1965	-30.8	4.2	160.3	122.2	59.9
1966	6.5	7.4	-36.6	80.2	11.9
1967	105.6	25.8	16.9	-8.8	34.4
1968	-18.7	31.4	-30.2	-29.7	-12.6
1969	61.3	43.7	-25.1	34.6	44.0
1970	80.0	42.5	2.8	-26.6	41.0
Average					19.7

*Returns each quarter are weighted by the proportion of the annual amount involved each period. As an example, it would not be fair to equate the returns earned on the first and fourth period investment of 1962 because the first period investment is three times more than the fourth period investment.

Table 3-9

Rate of Return Per Period Restated on Annual Basis

Year	First	Second	Third	Fourth	Weighted Average*
1962	65.2	46.0	6.4	-4.4	40.8
1963	-47.8	10.0	-63.6	28.8	-18.4
1964	31.0	-39.2	-61.0	-48.4	-24.4
1965	-61.6	8.4	320.6	244.4	119.8
1966	13.0	14.8	-73.2	160.4	23.8
1967	211.2	51.6	33.8	-17.6	68.8
1968	-37.4	62.8	-60.4	-59.4	-25.2
1969	122.6	87.4	-50.2	69.2	88.0
1970	160.0	95.0	5.6	-53.2	82.0
Average					39.5

that only one year in the last six (1965-1970) has been unprofitable, that being 1968. Because the market has been more volatile since 1965 than before, these results support the basic premise of this paper.

There are thirty-six possible six-month holding periods and rates of return are positive in twenty-two periods and negative in the other fourteen. The six years having positive average rates of return have common patterns; each experienced exactly one unprofitable holding period and three profitable ones. The three years having negative returns experienced either two or three unprofitable holding periods.

A form of sensitivity analysis is performed to determine if the above investment results can be improved. One type of analysis makes all the selection criteria

more restrictive each year than that listed in Table 3-2. Each year's minimum turnover and volatility ratio is increased by .100 and the maximum number of shares outstanding and investment quality is reduced to ten million shares and a C+ respectively. The average rate of return on investment using the more restrictive criteria is not significantly different from that using the original criteria.

The selection criteria are then made even more restrictive by increasing each year's minimum turnover and volatility by .200 and reducing the maximum number of shares outstanding and investment quality to five million and a C+ respectively. Again the results are not significantly different.

A second type of analysis makes only one selection criteria more restrictive while the other three remain at the levels listed in Table 3-2. For example, the minimum turnover ratio is increased each year while volatility, the number of shares outstanding and investment quality are not changed. This process is repeated for the other criteria but in all cases, the results are not significantly different from those appearing in Table 3-8.

Table 3-10 is used to facilitate the analysis of these period returns except for those periods when movements in the Dow-Jones Industrial Average do not coincide with or represent movements in the type of stocks on which straddles are purchased. The fourth period of 1965 is a

Table 3-10

Dow-Jones Industrial Average Percentage Moves*

Year	First	Second	Third	Fourth	Average**
1962	-23.2	-18.1	+10.5	+17.9	17.4
1963	+8.4	+7.4	+8.0	+6.9	7.7
1964	+9.0	+7.6	+5.1	+1.6	5.7
1965	-0.7	+4.7	+11.7	-0.6	4.4
1966	-10.2	-16.3	-9.7	+11.9	12.0
1967	+9.5	+7.0	+5.2	-9.3	7.8
1968	-0.8	+11.3	+5.1	-0.0	4.3
1969	-7.5	-13.1	-8.3	-3.4	8.1
1970	-14.6	-3.2	+23.1	+18.9	15.0

*Percentage moves are calculated over six month time periods, from the beginning of one quarter to the beginning of the third subsequent quarter.

**Absolute average of the quarterly percentage figures.

good example of the two groups not moving together; the Dow-Jones Industrial Average was almost constant, falling only six points, while in the same period, many of the glamor and speculative stocks continued to advance sharply and peaked out much later in 1966.

Table 3-11 ranks the average annual Dow-Jones Industrial Average price movements by absolute size and average annual rates of return on a scale from highest to lowest.

The only years when the rankings are far apart are 1962 and 1965. Both are years in which the Dow-Jones Industrial Average was not representative of the type of stocks straddles were purchased on. 1962 was a bear market

Table 3-11

Rankings of Average Percentage Moves
and Annual Rates of Return

Year	Average Percentage Moves*	Annual Rates of Return**
1962	1	5
1963	6	9
1964	7	8
1965	8	1
1966	3	6
1967	5	4
1968	9	7
1969	4	2
1970	2	3

*From Table 3-10.

**From Table 3-9.

year in which the Dow-Jones Industrial Average recovered in the third and fourth quarters but other stocks did not. The Dow-Jones Industrial Average peaked out in 1965 but other issues continued to advance sharply until later in 1966.

Tables 3-12 and 3-13 rank the absolute percentage movements of Table 3-10 and the rates of returns in Table 3-8 respectively. A comparison of the ranks for each of the thirty-six periods reveals that in twelve periods, the rankings are within adjacent quartiles. Only eight periods have rankings which are separated by one or more quartiles and five of these occur in 1969 and 1970.

In the first and fourth holdings periods of 1969,

Table 3-12

Rankings of D-J IA Percentage Movements

Year	First	Second	Third	Fourth
1962	1	4	12	5
1963	18	23	20	25
1964	17	21	20	32
1965	34	29	10	35
1966	13	6	14	9
1967	15	24	26	16
1968	33	11	28	36
1969	22	8	19	30
1970	7	31	2	3

Table 3-13

Rankings of Rates of Return Per Period

Year	First	Second	Third	Fourth
1962	10	13	21	23
1963	27	19	35	16
1964	15	26	27	28
1965	34	20	1	2
1966	18	17	36	4
1967	3	12	14	24
1968	25	11	32	31
1969	6	7	29	9
1970	5	8	22	30

the Dow-Jones Industrial Average fell 7.5 per cent (rank of 22) and 3.4 per cent (rank of 30) respectively while the rates of return rank 6 and 9 respectively. The stock market peaked in December, 1968 and started its decline, gradually at first and more rapidly later in the year. Meanwhile, the stocks on which straddles were purchased,

the glamor and speculative stocks, fell much more drastically which explains the high returns for this period. Since only four straddles are purchased in the fourth quarter of 1969, this period is not very significant in the analysis.

The rankings in the second, third and fourth periods of 1970 also differ by one or more quartiles. In the second period, the Dow-Jones Industrial Average fell gradually (rank of 31) while the glamor and speculative stocks continued their rapid decline which explains the high rate of return (rank of 8). In the third and fourth periods, the Dow-Jones Industrial Average recovered and advanced rapidly (ranks of 2 and 3 respectively) while the glamor and speculative stocks did not yet turn-around which explains the poor returns in those periods (ranks of 22 and 30 respectively).

The three other periods having wide differences in their rankings are the fourth period of 1962, the fourth period of 1965 and the third period of 1966. The fourth period of 1962 saw a rapid recovery from the bear market break by the Dow-Jones Industrial Average (rank of 5) which the glamor and speculative stocks didn't participate in, resulting in a poor return (rank of 23). As mentioned previously, the fourth period of 1965 saw the Dow-Jones Industrial Average lie dormant (rank of 35) while the glamor and speculative stocks continued to advance, resulting in a high rate of return (rank of 2). The third

period of 1966 included the famous "credit crunch" and entailed a Dow-Jones Industrial Average decline of 9.7 per cent (rank of 14). Apparently the glamor and speculative stocks fell rapidly and then recovered just as rapidly in the six-month period, resulting in a negative rate of return (rank of 36).

Returns in all other periods are adequately explained by movements in the Dow-Jones Industrial Average which is representative of movements in straddle option type stocks.

Since the direction of price change is unimportant and the fixed expenses to be covered are relatively small, a relatively large number of straddle options should be exercised either on the call side or put side. This is confirmed by Tables 3-14 and 3-15 which show that more than ninety per cent of all straddles purchased are exercised in twenty-seven periods whereas less than ninety per cent are exercised in only nine periods.

There are only three periods having more than two unexercised options: the second period of 1965 and the third and fourth periods of 1968. All three periods either coincide with a market peak or are close to a market peak; such periods are usually characterized by many cross currents in the market caused by uncertainty. Some stocks start to decline before the peak, others continue to advance after the peak and unfortunately for straddle buyers, some are stationary which means that the price

Table 3-14

Number of Straddle Options Exercised Each Period

Year	First	Second	Third	Fourth	Total
1962	26	20	11	10	67
1963	16	16	16	16	64
1964	21	18	14	11	64
1965	21	18	18	17	74
1966	25	19	22	22	88
1967	25	22	23	22	92
1968	27	26	23	24	100
1969	26	17	7	3	53
1970	26	16	8	12	62

Table 3-15

Percentage of Straddle Options Exercised Each Period*

Year	First	Second	Third	Fourth	Total
1962	96.3	95.3	100.0	100.0	97.1
1963	88.9	94.1	88.9	94.1	91.4
1964	100.0	94.7	87.5	84.6	92.7
1965	95.5	85.7	100.0	100.0	94.9
1966	92.6	90.4	95.7	95.7	93.6
1967	96.2	95.7	100.0	95.7	96.8
1968	96.4	92.9	82.1	88.9	90.1
1969	96.3	100.0	87.5	75.0	94.6
1970	96.3	94.1	100.0	100.0	96.9

*Calculated from Tables 3-10 and 3-14.

movement is not sufficient to cover roundtrip commissions.

A more relevant question is not how many options are exercised, but how many are exercised profitably versus unprofitably which is illustrated by Tables 3-16 and 3-17.

Table 3-16

Number of Options Exercised at a Profit Each Period

Year	First	Second	Third	Fourth	Total
1962	18	14	5	4	41
1963	4	5	5	7	21
1964	11	6	3	4	24
1965	7	10	16	15	48
1966	12	11	7	19	49
1967	16	12	9	10	47
1968	10	13	7	5	35
1969	21	12	2	2	37
1970	22	9	4	4	39

Table 3-17

Number of Options Exercised at a Loss Each Period

Year	First	Second	Third	Fourth	Total
1962	8	6	6	6	26
1963	12	11	11	9	43
1964	10	12	11	7	40
1965	14	8	2	2	26
1966	13	8	15	3	39
1967	9	10	14	12	45
1968	17	13	16	19	65
1969	5	5	5	2	17
1970	4	7	4	8	23

As expected, the years showing positive rates of return have more options exercised at a profit than at a loss while the years of negative returns show just the opposite. In fact, the negative return years have nearly twice as many options exercised unprofitably as profitably.

More options are exercised profitably in fourteen

periods, more unprofitably in nineteen periods and three periods are even. Positive rates of return are earned in all fourteen periods having a surplus of profitable options, in five of the nineteen periods having more unprofitable options and in all three of the periods having an even distribution. Apparently, the average profit per option exercised is larger than the average loss per option exercised which explains why the five periods having more unprofitable options and the three even periods show positive rates of return.

Tables 3-18 and 3-19 illustrate the number of straddles exercised on the call and put side each period. More calls than puts are exercised in twenty-one periods, more puts than call in thirteen periods, and two periods have an equal number exercised.

Which side dominates in any period will obviously depend to a great extent on the movement of the general market that period. Calls dominate in seventeen upward moving periods and four downward moving periods but in three of the four downward moving markets, the decline is less than one per cent. Conversely, puts dominate in eleven downward moving periods and only slightly in two upward moving periods. The two periods having an equal distribution of puts and calls include one upward and one downward moving period.

Another important question is which side, put or call, contributes the most to profits or losses? In the

nine periods having the highest returns, the exercization of calls dominate four periods and puts five periods but one only slightly. In the nine periods having the worst returns, calls dominate five periods, puts three and one is even. So it appears that puts and calls can contribute equally to profits and losses.

Table 3-18

Number of Options Exercised on the Call Side

Year	First	Second	Third	Fourth	Total
1962	0	2	9	8	19
1963	11	12	10	11	44
1964	12	12	6	10	40
1965	16	13	17	17	63
1966	21	4	11	20	56
1967	22	19	11	5	57
1968	17	22	14	6	59
1969	3	1	2	1	7
1970	2	4	4	11	21

Table 3-19

Number of Options Exercised on the Put Side

Year	First	Second	Third	Fourth	Total
1962	26	18	2	2	48
1963	5	4	6	5	20
1964	9	6	8	1	24
1965	5	5	1	0	11
1966	4	15	11	2	32
1967	3	3	12	17	35
1968	10	4	9	18	41
1969	23	16	5	2	46
1970	24	12	4	1	41

CHAPTER 4

COMPARISON OF RESULTS

The most meaningful comparison of this study's results should be with other empirical studies involving the purchase of six-month straddle options. Since this would narrow the comparison to only two studies, Zieg's and Zweig's, the general market indexes and mutual fund performance are also used for comparative purposes.

Zieg's Results. As mentioned previously, he purchased and sold 2,212 options under the terms called for on actual bid sheets received at six different three-day time periods from September, 1965 to January, 1967. Each time period supposedly represents a different type of market, the first starting just before a bull market peak and the last type ending after a bear market bottom. The information pertaining only to the purchase of six-month straddle options is summarized in Table 4-1.

The semi-annual rates of return on investments made in the period which most closely approximates his holding dates are used to make direct comparisons. Three of these periods are good approximations of his holding periods while the other three are not.

The first market type, represented by September

Table 4-1

Investment, Net Profit and Rate of Return By Market Type

Market Type		Date	Investment	Net Profit	Rate of Return
Top-Turn Around	1	9-65	$102,761	$50,806	49.4%
Top-Down	2	2-66	135,576	72,426	53.4
Down	3	4-66	66,102	68,290	103.3
Bottom Turn Around	4	5-66	79,419	29,553	37.2
Bottom-up	5	10-66	37,000	45,838	123.9
Up	6	1-67	29,487	20,469	69.4
Average					72.7

Source: Zieg, op. cit.; Tables 50-51, pp. 293-94.

23, 26, and 27, 1965, is closely approximated time wise by the fourth period of 1965 which starts October 1. Table 4-2 shows that the return of 122.2 per cent for this period is more than twice as large as his return of 49.4 per cent. Since the market did not change significantly in this one week difference, the superior results of this study must be attributed to the selection procedure used.

The second market type, represented by February 8, 9, and 10, 1966, is approximated, but not closely, by the first holding period of 1966 which began more than one month earlier on January 3. This big difference in purchase and exercise dates explains his return of 53.4 per cent versus 6.5 per cent in this study. His dates allow him to purchase straddles at the absolute high point of

the bull market (D-J I A closed at 995.15 on February 9) and to exercise after a drastic market decline of almost 100 D-J I A points in July and part of August, 1966. The Dow-Jones Industrial Average fell over 200 points during his holding period, 995.15 on February 9 to 792.03 on August 20, while the decline was less than 100 D-J I A points for this holding period, 968.54 on January 3 to 877.06 on July 1. This accounts for the large difference in returns by the two studies.

Table 4-2

Comparison of Semi-Annual Rates of Return

Market Type		Date	Zieg's Study	This Study**
Top-Turn-Around	1	9-65	49.4%	122.2%
Top-Down	2	2-66	53.4	6.5
Down	3	4-66	103.3	7.4
Bottom-Turn-Around	4	5-66	37.2	-36.6
Bottom-up	5	10-66	123.9	80.2
Up	6	1-67	69.4	105.6
Average			72.7	47.6
Coeff. of Variation			.466	1.343

*From Table 4-1.

**From Table 3-8.

The third market type, represented by April 20, 21 and 22, 1966, is best approximated by the second period of 1966 which starts three weeks earlier on April 1. His

return of 103.3 per cent is much larger than the 7.4 per cent return earned in this study which again can be partially explained by the difference in purchase and exercise dates. The Dow-Jones Industrial Average is 20 points higher on his purchase dates and his exercise dates fall right after the peak of the liquidity crisis in October, 1966, a period of sharp declines in stock prices, especially for glamor and speculative stocks.

Zieg's fourth market type, represented by May 23, 24, and 25, 1966 is compared with the third period of this study although it began more than one month later on July 1. The -36.6 per cent return in this period does not even come close to his return of 37.2 per cent.

The explanation for this large difference in returns can not be found in the Dow-Jones Industrial Averages which are relatively similar for both purchase and exercise dates. A possible explanation can be found in the movement of the American Stock Exchange Index which is more favorable during his holding period (16.8 in May to 13.2 in November) than this study's (15.7 in July to 15.8 in January). Since a large number of his straddles are on American Stock Exchange stocks, this could partially account for his superior results.

The fifth market type, represented by October 6, 7, and 10, 1966, is closely approximated by the fourth period of 1966 which starts on October 3. The return of 80.2 per cent compares favorably with his return of 123.9 per cent

considering that his purchase dates are at the extreme bottom of the bear market (D-J I A was 744.32) and his exercise dates are two weeks later, a period in which the market advanced 20 D-J I A points.

Finally, the sixth market type, represented by January 11, 12 and 13, 1967, is closely approximated by the first period of 1967. This return of 105.6 per cent is considerably larger than his return of 69.4 per cent and must be attributed to the selection procedure used.

In summary, the average rate of return of 72.7 per cent in Zieg's study is larger than the average of 47.6 per cent in this study. However, differences in purchase and exercise dates are undoubtedly responsible for part of his larger returns, especially for the second and third market types. In the three periods having similar purchase and exercise dates, the returns in the study are larger in two periods and comparable in the other. Another factor which could account for his larger average return is the type of stocks on which straddles are purchased. Many of the stocks involved in his study were listed on the American Stock Exchange whereas this study restricts purchases to NYSE listed stocks. Since the American Stock Exchange was more volatile over this time period, this probably improved his returns.

Zweig's Results. He selected ten stocks randomly from each of three volatility classes each year and wrote and purchased options monthly on each stock selected. His

study began in mid-1961 and ended in mid-1968, resulting in 2,520 hypothetical six-month straddle purchases. The pertinent information from this study is summarized in Table 4-3.

Table 4-3

Annual Rates of Return on Investment to Buyers of Six-Month Straddles

	Volatility Class		
Year	Low	Medium	High
61-62	4.70	-8.80	-13.70
62-63	-26.50	-77.70	74.90
63-64	-51.00	-26.10	24.00
64-65	-21.80	2.20	70.40
65-66	-7.60	68.10	100.00
66-67	-62.40	55.40	86.40
67-68	-100.10	-40.90	-8.50
7 Year Average	-37.81	-3.97	47.64

Source: Zweig, op. cit., Table 3-7, p. 113.

Zweig uses the premium as a per cent of the striking price to classify stocks by volatility class, making the assumption that the premium is highly correlated with price volatility. If the premium is below 14.5 per cent, the stock is placed in the low volatility class; if it is between 15.0 and 22.5 per cent, it is in the medium volatility class; and above 23.0 per cent, it is in the high volatility class.

The result of this stratification method is a low

volatility class comprised of "blue chips" and a high volatility class comprised mainly of stocks not traded on the New York Stock Exchange. Therefore the most meaningful comparison is with the medium volatility class which includes many of the same stocks as this study.

In order to make a direct comparison, the annual rates of return for this study had to be recalculated on a mid-year to mid-year time basis. Table 4-4 shows these returns and Zweig's returns on the medium volatility stocks. In comparison, the returns in this study are superior in four years, comparable in two years and inferior in only one year.

Table 4-4

Comparison of Annualized Rates of Return

Year	This Study	Zweig's Study
1961-62	55.6*	- 8.80
1962-63	-6.0	-77.70
1963-64	-5.0	-26.10
1964-65	-18.8	2.20
1965-66	59.7	68.10
1966-67	42.8	55.40
1967-68	4.6	-40.90
Average	19.0	-3.97
Coeff. of Variation	1.72	13.04

*Includes only the six months of 1962.

It appears that purchasing straddles on a monthly basis, as Zweig does, results in more volatile returns.

His negative returns are more negative in 1962-63 and 1963-64 and positive returns slightly more positive in 1965-66 and 1966-67. This is a logical consequence to purchasing on a monthly basis, because if price volatility remains low for a year, the more straddles purchased the greater the losses. Likewise, if a stock has high volatility, the more straddles purchased the greater the profits.

Zweig's results are a better test for comparative purposes than Zieg's for three reasons. First, the time period is much longer, seven years versus twenty-one months, and more representative of normal market conditions. Zieg's time period includes a bull market high, a bear market which lasts only eight months and a full recovery, all in twenty-one months. Most twenty-one month market periods have not been this volatile.

Second, the stocks in Zweig's medium volatility class each year include many of the same stocks selected in this study whereas Zieg's study includes many ASE and O-T-C stocks which were relatively more volatile during his time period than the NYSE stocks.

And third, Zweig's stocks are selected randomly each year from the bid sheets of the largest option broker and dealer in the country, while Zieg's stocks are those mentioned on the bid sheets received by the Chicago office of one brokerage firm.

By this comparison, the selection procedure used in this study is very effective. The average annual rate

rate of return is much larger and risk, as measured by the coefficient of variation, is much lower.

General Market Performance: The short-term goal of many a portfolio manager is to outperform the market using either the Dow-Jones Industrial Average or Standard and Poor's Index as the standard of comparison. Likewise, the performance of the straddle portfolios in this study will be compared with market performance to judge the effectiveness of this selection procedure.

Table 4-5 shows the comparison with the annual rates of return for the Dow-Jones Industrial Average and Standard and Poor's Index of 500 Stocks computed by the following formula:

$$\text{Annual Rate of Return} = \frac{\text{Annual change in market value + annual dividends}}{\text{Beginning of year value}}$$

$$= \text{Capital Gains Return + Dividend Return}$$

As expected, the average annual rate of return in this study is much larger than either the Dow-Jones Industrial Average or Standard and Poor's 500 Stock Index. What is not expected is the smaller coefficient of variation relative to that of the D-J I A and S & P 500 Stock Index.

Considering the fact that most mutual funds and individuals do not outperform the averages, the selection procedure in this study would have to be deemed a success.

Table 4-5

Comparison of Annual Rates of Return With Market Returns

Year	This Study	D-J I A	S & P 500
1962	40.8	-7.62	-8.82
1963	-18.4	20.59	22.50
1964	-24.4	18.66	16.30
1965	119.8	14.15	12.27
1966	23.8	-15.65	-9.99
1967	68.8	19.04	23.73
1968	-25.2	7.74	10.84
1969	88.0	-11.60	-8.32
1970	82.0	9.06	+3.20
Average	39.5	6.04	6.86
Coeff. of Var.	1.368	2.331	1.955

Mutual Fund Performance: The performance of these straddle option portfolios should logically be compared with the performance of funds of a similar risk, meaning funds that actually trade in options, warrants and other highly leveraged investment vehicles. Some of the private hedge funds would make good comparisons but unfortunately, their performance results are not published. The next best alternative would be those mutual funds that are classified as growth funds and have the objective of maximizing capital gains. This group is comprised mainly of the so-called "go'go funds or performance funds", noted for their high-risk, high-return investment philosophy.

Table 4-6 compares the average annual returns available on two of these groups with the returns from

this study. The return on a particular fund is measured by the percentage change in net asset value per share with capital gains (reinvested) plus dividend income (received in cash). The returns on all funds in a group are averaged each year to obtain an annual average rate of return per group.

Table 4-6

Comparison of Annual Rates of Return
With Mutual Fund Performance

Year	This Study	Growth Funds	
		Smaller	Larger*
1962	40.8	-19.4	-18.1
1963	-18.4	+20.3	+22.5
1964	-24.4	+11.6	+15.0
1965	119.8	+35.3	+32.4
1966	23.8	-2.4	-1.6
1967	68.8	+58.3	+39.1
1968	-25.2	+21.1	+10.1
1969	88.0	-16.3	-10.4
1970	82.0	-16.0	-6.4
Average	39.5	+10.28	+9.18
Coeff. of Var.	1.368	2.572	2.156

Source: Investment Companies 1970, (New York: Wiesenberger Financial Services, 1970), pp. 122-127.

*Includes only those funds with total assets greater than $300,000,000.

The average annual rate of return is approximately four times larger than the average of either the smaller or larger growth funds. The coefficient of variation is less, meaning that this investment strategy is effective

and successful in generating superior returns on the average with less risk.

Table 4-6 also points out the high negative correlation between the returns generated by this strategy and mutual fund returns. In the four years when mutual funds returns are negative, the rates of return using this strategy are all positive. Conversely, in the three negative return years using this strategy, the mutual fund returns are positive. In only two of the nine years are the returns related.

Summarizing the overall results, this investment strategy quite handily outperformed the general market, growth orientated mutual funds and a random selection procedure. It did not surpass Zieg's results mainly because of the time differences and type of stock differences. Based on these comparisons, it is a viable and effective investment strategy which can be expected to generate profitable returns in the future as long as the market continues under the influence of institutional investors and remains volatile.

CHAPTER 5

SUMMARY, QUALIFICATIONS AND IMPLICATIONS

Summary

The purpose of this study was to develop and test the results of an investment strategy that would take advantage of increasing price volatility in the stock market.

1. The first step was to find the investment characteristics that are statistically significant in predicting annual price volatility. A systematic random sample of forty stocks was drawn at the end of each year and divided into quartiles based on volatility. Eight types of investment information for the year preceding each sample year were collected on the upper and lower quartile stocks and averaged. The Wilcoxon matched-pairs test was used to test the hypothesis of a significant directional difference between the average investment characteristics preceding the upper and lower quartile stocks. The results showed that upper quartile stocks (highly volatile) were on the average preceded by higher volatility, higher turnover, lower number of shares outstanding and lower investment quality than the lower quartile stocks.

2. The second step was to select the stocks on which straddles are to be purchased which was accomplished by sifting the market each year. The first sift selected the stocks having above average turnover ratios. The second sift selected from the stocks having above average turnover ratios, those also possessing above average volatility ratios. Both turnover and volatility are relative criteria, dependent on other stocks that year. The third and fourth sifts were carried out simultaneously and selected all stocks having less than 15 million shares outstanding and an investment quality of B or less from those passing the first two sifts. This resulted in a high of thirty-five and a low of twenty-one stocks selected each year with an average of approximately twenty-seven.

3. In step three, six-month straddle options were purchased on the first trading day of each period on all stocks selected if the market price was within the $30 to $100 range. The premium as a per cent of the striking price is too expensive on stocks selling under $30 per share and there is not much option activity in stocks selling above $100 per share. Only six-month straddle options were purchased because all evidence indicates they are more profitable relative to shorter-term options.

The premiums on the straddle options were estimated at a constant twenty-three per cent of the cost of 100 shares at the striking price. This amount was justified by past empirical studies on option premiums.

4. Rates of return were calculated in the fourth step with adjustments made for dividends, stock splits and commissions. It was further assumed that all straddles were held for a full six-months and the investor enjoyed a tax-exempt position.

Average annual rates of return were positive in six years and negative in the other three, resulting in an average annual rate of return of 39.5 per cent over the nine year period. Only one year, 1968, in the last six has been unprofitable which is significant because the market has been more volatile since 1965.

There were thirty-six possible holding periods and rates of return were positive in twenty-two periods and negative in the other fourteen. Most of the returns were highly correlated with the absolute percentage price movements in the Dow-Jones Industrial Average, with the larger absolute percentage moves associated with high returns and the smaller absolute percentage moves associated with low or negative returns.

It was also shown that more than ninety per cent of all straddles purchased were exercised in twenty-seven periods whereas less than ninety per cent were exercised in only nine periods..

A more important question is not how many options were exercised, but how many were exercised profitably versus unprofitably. More options were exercised profitably in fourteen periods, more unprofitably in nineteen

periods and three periods were even. Because the average profit per option exercised was larger than the average loss per option exercised, positive rates of return were earned in five periods having more unprofitable options and the three even periods.

Finally, it was shown that upward and downward moving markets contributed equally to profits and losses.

5. In step five, the results of this study were compared with other studies involving the purchase of straddle options, with market performance and with mutual fund performance.

The first comparison was made with Zieg's results and his average rate of return of 72.7 per cent was much larger than the average of 47.6 per cent in this study. However, differences in purchase and exercise dates were partly responsible for some of his larger returns plus many of the stocks in his study were listed on the American Stock Exchange.

Next, the results, recalculated on a mid-year basis, were compared with Zweig's medium volatility class and the returns in this study were superior in four years, comparable in two year and inferior in only one year. The average annual rate of return was much larger and risk, measured by the coefficient of variation, was lower.

In comparing the returns with the returns from the Dow-Jones Industrial Average and Standard and Poor's 500 Stock Index, the average annual rate of return was much

larger and unexpectedly, risk was lower.

The final comparison was made with the growth oriented mutual funds because of their high-risk, high-return investment philosophy. The average annual rate of return for this study was approximately four times larger while risk was lower.

Qualifications

1. As is true of most historical studies, the possibility exists that past observations may not render valid generalizations about future results. This has been partially offset by a long time period, nine years, but a more important requirement is that the market remains as volatile in the future as it has been in the past. If this happens, these results could be duplicated in the future.

2. Another drawback is that straddle options may not be available on all stocks selected. Restricting the selection process to New York Stock Exchange stocks certainly improves the chances of being able to purchase straddle options as does the restriction that straddles are only purchased if the price is within the $30 to $100 range.

3. Another limitation is the constant premium of twenty-three per cent applied to all straddle purchases. Obviously, relative option premiums will vary depending upon many factors including some related to the stock specifically and others related to the market in general.

4. Another limitation is the assumption of a tax-less environment which certainly does not apply to most individuals and institutions.

5. The assumption that all options are not exercised until six months have lapsed is necessary to calculate rates of return. Allowing interim trading may have improved the results, but would have complicated the whole strategy.

6. A final limitation is the use of the coefficient of variation as a measure of risk. It is a relative measure of dispersion but perhaps a more meaningful measure might be the semi-variance which measures variability in one direction, in this case from the mean downward. Also, the arithmetic mean is used to calculate the standard deviation and this produces an upward bias because it gives greater weight to increases than decreases. The geometric mean should have been used as a measure of central tendency.

Implications

This study has some implications for the random-walk theory, mutual fund performance, and economic theory.

The broad version of the random-walk hypothesis states that present stock prices reflect all past public information and that superior performance is extremely difficult to obtain by using only past, public information. This study uses all past public information to make investment decisions and the high returns refute to some degree the broad version of this theory if the assumption can be

made that options are efficiently priced. While admittedly a unique way of empirically testing this theory, this study proves that special institutional situations do exist in the stock market where past, public information can be used to generate profits.

Most mutual funds have not outperformed either the general market indexes or portfolios comprised of randomly selected stocks. This statement is well supported by many empirical studies, the earliest of which is commonly referred to as the "Wharton Study." The authors found that from 1952-58, the Standard and Poor's Composite Common Stock Index was definately superior to the average performance of the funds.[1] But when adjustments were made for asset composition, the average performance by the funds did not differ appreciably from what would have been achieved by an unmanaged fund with the same division among asset types.

This study was recently updated to cover 136 mutual funds from January 1960 to June 1968 and comparisons were made with unmanaged portfolios selected at random.[2] These random portfolios were either unweighted-equal dollar investments made in all stocks-or weighted by the number of

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[1]Irwin Friend, F. E. Brown, Edward S. Herman and Douglas Vickers, A Study of Mutual Funds, (Washington, D.C.: U.S. Government Printing Office, 1962), pp. 9-21.

[2]Friend, Blume and Crockett, op. cit., pp. 50-69.

shares outstanding. The average rate of return on the unweighted portfolios was larger than the average rate of return on the mutual funds (12.4 per cent versus 10.7 per cent) while the average return on the weighted portfolios lagged behind both (9.9 per cent).

Sharpe compared the performance of thirty-four mutual funds with the Dow-Jones Industrial Average from 1954 to 1963.[3] He concluded that fund managers selected portfolios that were comparable to the Dow-Jones Industrial Average but fund holders received inferior returns because of management expenses.

In light of the above evidence, Tables 4-5 and 4-6 show that an investment in these straddles option portfolios is certainly a worthly alternative to either purchasing mutual funds or buying the averages. In all comparisons, the average rate of return was much higher and risk, measured by the coefficient of variation, was lower.

The results of this study also contradict economic theory which states that investors, on average, can realize higher rates of return only by assuming greater risk. In other words, a positive relationship exists between risk and return. This long-standing theory is generally accepted by most investors and has much empirical support.

The University of Chicago study found that

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[3]William F. Sharpe, "Mutual Fund Performance", Journal of Business, Vol. XXXIX, No. 1, (January, 1966), pp. 119-138.

investors received an annual rate of return of 9.3 per cent by making equal dollar investments in all common stocks listed on the New York Stock Exchange between 1926 and 1965.[4] This return is higher than the average yields on bonds over the same time period thus reaffirming the risk-return proposition. This is also supported by the Hickman bond study which found that realized yields on low-grade corporate bonds, on average, were higher than on high-grade bonds from 1900 to 1943.[5] Soldofsky and Miller found positive risk-premium curves for fifteen different risk classes of long-term securities from 1950 to 1966.[6] Sharpe came to the same conclusion in studying thirty-four mutual funds from 1954-63; those showing greater returns also had greater variability of returns.[7]

The average return in this study is approximately six times greater than the average market return, yet the risk is lower. It is approximately four times greater than the average growth fund return over the same time

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[4]Lawrence Fisher and James H. Lorie, "Rates of Return on Investments in Common Stock: The Year-By-Year Record, 1926-65.", The Journal of Business, Vol. XXXX, No. 3 (July, 1968), pp. 291-316.

[5]W. Braddock Hickman, Corporate Bond Quality and Investor Experience, (Princeton, New Jersey: Princeton University Press, 1958), Chapter 1.

[6]Robert M. Soldofsky and Roger L. Miller, "Risk-Premium Curves for Different Classes of Long-Term Securities, 1950-1966," Journal of Finance, Vol. XXIV, No. 3 (June, 1969), pp. 429-445.

[7]Sharpe, op. cit.

period and again the risk is lower. On a risk-return proposition, this has definitely been a superior investment strategy and contradicts the propositon that higher rates of return can be realized only by assuming greater risk.

This is not the only instance when this theory has been contradicted. Harold Fraine studied corporate bond performance during the same period covered by Hickman and concluded that realized yields on high quality bonds were substantially higher than those on speculative bonds even though promised yields on the high quality bonds were lower than on the speculative bonds.[8] He essentially eliminated the realized and unrealized capital gains due to the sharp drop in interest rates and corresponding rise in bond prices between 1932 and 1943 before calculating realized rates of return. His results were opposed to Hickman's and also to the risk-return proposition.

Many also believe that the results of the University of Chicago study may not be duplicated in the future.[9] Because of the availability of historically high bond yields and the past secular rise in price-earnings ratios, common stocks may not provide higher returns, on average,

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[8]Harold G. Fraine, Valuation of Securities Holdings of Life Insurance Companies, (Homewood, Illinois: Richard D. Irwin Inc., 1962) p. 46.

[9]Fisher and Lorie, Op. cit.

than bonds in the future even though they are riskier.[10]

In summary, this strategy for purchasing straddle options has achieved superior returns in a manner that contradicts much of current financial theory. It uses past, public information to consistently generate returns much larger than either market or growth orientated mutual fund returns; something the random-walk theory says is difficult to achieve. Others would say that these high rates of return must be earned at the expense of higher risk. But just the opposite is true, because the coefficient of variation is lower than that for the market and mutual funds, thus indicating lower risk.

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[10]Lemont K. Richardson, "Do High Risks Lead to High Returns?" Financial Analyst Journal, Vol. 26, No. 2 (March-April, 1970), pp. 88-99.

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APPENDICES

APPENDIX A

RANDOM SAMPLES: 1961-70

Table A-1

1961 Random Sample

	Company Name	Volatility
1)	Allied Mills Incorporated	.364
2)	American Can Company	.350
3)	AMF Industries	.553
4)	AMP Incorporated	.474
5)	Armstrong Rubber Company	.421
6)	Beatrice Foods Company	.462
7)	Borg-Warner Corporation	.335
8)	Carborundum Company	.324
9)	Cessna Aircraft Company	.394
10)	Cluett Peabody & Company	.421
11)	Continental Steel Corporation	.546
12)	Crown Cork & Seal Company	1.040
13)	Delta Air Lines Incorporated	.744
14)	Emerson Electric Manufacturing Co.	.554
15)	Falstaff Brewing Corporation	.257
16)	FMC Corporation	.450
17)	General Cable Corporation	.256
18)	Genesco Incorporated	.302
19)	Graniteville Company	.500
20)	Hammermill Paper Company	.297
21)	Hershey Chocolate Corporation	.578
22)	Inspiration Consolidated Copper	.553
23)	Interstate Department Stores	1.031
24)	Kelsey-Hayes Company	.377
25)	L-O-F Glass Company	.225
26)	Macy R.H. & Company	.503
27)	MCA Incorporated	.785
28)	Merck & Company	.252
29)	Mobil Oil Company	.300
30)	National Standard Company	.255
31)	Otis Elevator Company	.370
32)	Perkins-Elmer Corporation	.629
33)	Pittston Company	.359
34)	Republic Steel Corporation	.201
35)	Rohn & Haas Company	.290
36)	Signode Company	.311
37)	Standard Kollsman Industries	.718
38)	Stokely Van Camp Incorporated	.971
39)	TRW Incorporated	.398
40)	United Air Lines	.399

Table A-2

1962 Random Sample

	Company Name	Volatility
1)	Acme Markets Incorporated	.439
2)	Amerada Petroleum	.448
3)	American Enka Corporation	.563
4)	Amsted Industries Incorporated	.471
5)	Associated Dry Goods Corp.	.373
6)	Bendix Corporation	.447
7)	Brown Shoe Company	.347
8)	Celanese Corporation of America	.431
9)	Cleveland Cliffs Iron	.416
10)	Continental Oil Company	.254
11)	Cutler-Hammer Incorporated	.488
12)	Du Pont E.I.	.371
13)	Federal-Mogul Incorporated	.313
14)	Gamble-Skogmo Incorporated	.427
15)	General Mills Incorporated	.446
16)	Goodrick B.F.	.664
17)	Gould Incorporated	.562
18)	Hershey	.473
19)	Inmont Corporation	.442
20)	I.T. & T. Incorporated	.556
21)	Keebler Incorporated	.396
22)	Kraftco Incorporated	.437
23)	Magnavox Company	.546
24)	M C A Incorporated	.818
25)	M-G-M Incorporated	.754
26)	Monsanto Chemical	.398
27)	National Steel Company	.562
28)	Owens-Illinois Glass Company	.400
29)	Phelps Dodge Corporation	.333
30)	Polaroid Corporation	.923
31)	Revlon Incorporated	.743
32)	Safeway Stores Incorporated	.499
33)	Smith, Kline & French	.465
34)	Sterling Drug Incorporated	.496
35)	Talcott James Incorporated	.618
36)	Union Oil of California	.443
37)	U. S. Gypsum Company	.469
38)	Varian Associates	.688
39)	Whirlpool Corporation	.356
40)	Zenith Radio Corporation	.557

Table A-3

1963 Random Sample

	Company Name	Volatility
1)	Address-Multigraph	.444
2)	American Broadcasting-Par.	.312
3)	American Metal Climax	.266
4)	Armstrong Cork Company	.494
5)	Bausch & Lomb Incorporated	.365
6)	Borden Company	.167
7)	Carpenter Steel Company	.247
8)	Chrysler Corporation	.645
9)	CBS Incorporated	.665
10)	Crane Company	.380
11)	Delta Air Lines Incorporated	.645
12)	Eastern Gas & Fuel	.500
13)	Fairchild Camera & Instruments	.523
14)	First National Stores Inc.	.200
15)	General Cigar Company	.312
16)	Gimbel Brothers Incorporated	.265
17)	Gould Incorporated	.220
18)	Helme Company	.168
19)	Inland Steel Company	.252
20)	I T & T Incorporated	.286
21)	Keebler Incorporated	.294
22)	Leesona Corporation	.712
23)	Mallory PR & Company	.282
24)	McGraw-Edison Company	.163
25)	Mississippi Development Co.	.239
26)	National Gypsum Company	.212
27)	Olin Mathieson Chemical	.413
28)	Pepsi-Cola Company	.241
29)	P-P-G Industries	.151
30)	Ronson Corporation	.475
31)	Reynolds Metals Incorporated	.451
32)	St. Joseph Minerals	.721
33)	Simplicity Pattern Company	.557
34)	Standard Oil of New Jersey	.270
35)	Swift & Company	.158
36)	Trans-World Airlines	1.026
37)	United Shoe Machinery	.183
38)	Union Camp Corporation	.211
39)	Woolworth F. W.	.260
40)	Xerox Corporation	.995

Table A-4

1964 Random Sample

	Company Name	Volatility
1)	Air Reduction Company	.180
2)	American Cyanamid	.188
3)	American Airlines Inc.	.383
4)	Archer-Daniels-Midland	.177
5)	Bendix Corporation	.195
6)	Brown Shoe Company	.220
7)	Central Soya Company	.349
8)	Clark Equipment Company	.326
9)	Continental Can Company	.233
10)	Cutler-Hammer Incorporated	.406
11)	Deere & Company	.326
12)	Dover Corporation	.435
13)	Evans Products Company	.783
14)	Firestone Tire	.206
15)	General American Oil	.258
16)	Georgia Pacific Corporation	.387
17)	Gulf Oil Corporation	.289
18)	Hart Schnaffner & Marx	.522
19)	Houdaille Industries	.249
20)	International Minerals & Chemicals	.328
21)	Joy Manufacturing Company	.611
22)	Kroger Company	.365
23)	Marathon Oil	.211
24)	McDermott JR & Company	.606
25)	McGraw-Hill Company	.300
26)	Miles Labs. Incorporated	.212
27)	National Cash Register	.289
28)	National Airlines Inc.	.542
29)	Pennsalt Chemical	.199
30)	Pitney-Bowes Incorporated	.261
31)	Reliable Stores Corporation	.497
32)	Reynolds R. J. Tobacco	.297
33)	Schlumberger	.281
34)	Smith Kline & French	.239
35)	Sterling Drug	.209
36)	Storer Broadcasting	.322
37)	Trans Union Corporation	.455
38)	U.S. Gypsum	.265
39)	Vornado Incorporated	.714
40)	Wayne-Gossard Corporation	.200

Table A-5

1965 Random Sample

	Company Name	Volatility
1)	Addressograph-Multigraph	.479
2)	Amerada Petroleum	.231
3)	American Smelting	.454
4)	Armstrong Cork	.322
5)	Babcock & Wilcox	.283
6)	Bliss & Laughlin	.202
7)	Burndy Corporation	1.028
8)	Central Soya	.450
9)	Cleveland Cliff Iron	.470
10)	Continental Oil Co.	.204
11)	Crown Zellerback	.246
12)	Deere & Company	.335
13)	Dome Mines Ltd.	.280
14)	Evans Products	.579
15)	Firestone Tire	.209
16)	General American Trans.	.354
17)	General Dynamics Corp.	.643
18)	Getty Oil Company	.564
19)	Heublein Incorporated	.534
20)	Inland Steel Company	.150
21)	International Pipe	.431
22)	Kaiser Aluminum	.363
23)	Kraftco Incorporated	.170
24)	Macy R. H. & Company	.281
25)	McGraw-Edison	.610
26)	Metromedia Incorporated	.465
27)	Midwest Oil Corporation	.312
28)	North American Phillips	.308
29)	Phillips Petroleum	.202
30)	Pan-American Airways	.751
31)	Quaker Oats Company	.232
32)	Richardson-Merrell	.422
33)	Schering Corporation	.503
34)	Simplicity Pattern Co.	.277
35)	Stauffer Chemical	.276
36)	Storer Broadcasting	.707
37)	Timken Company	.236
38)	U. S. Freight	.340
39)	Vendo Company	.652
40)	Western Union	.552

Table A-6

1966 Random Sample

	Company Name	Volatility
1)	Acme Markets Inc.	.396
2)	American Air Filter Co.	.588
3)	A M P Incorporated	.364
4)	Atlantic-Richfield	.303
5)	Baxter Labs.	.611
6)	Boeing Company	.696
7)	Broadway-Hale Stores	.242
8)	Cerro Corporation	.632
9)	Coca-Cola Company	.252
10)	Copper Range Company	.727
11)	C T S Corporation	.593
12)	Donnelly R R & Sons	.467
13)	Emery Air Freight	.514
14)	Fairchild Camera	.765
15)	Freeport Sulphur	.476
16)	General Tire & Rubber	.309
17)	Grumman Aircraft	.614
18)	Hayes-Albion Corporation	.353
19)	Heinz H. J. Company	.528
20)	International Nickel	.317
21)	Kaiser Aluminum	.538
22)	K L M Airlines	.699
23)	Macy R. H. & Company	.252
24)	McDonnell Aircraft	.489
25)	Midwest Oil Corporation	.346
26)	National Cash Register	.431
27)	National Airlines	.606
28)	Pennsalt Chemical	.383
29)	Pittston Company	.576
30)	Rayette-Faberge	.624
31)	Rohn & Haas Company	.588
32)	Scovill Manufacturing Co.	.685
33)	Smith Kline & French	.608
34)	Stone & Webster Inc.	.412
35)	Tectronix Incorporated	.589
36)	Texaco Incorporated	.302
37)	U. S. Freight	.535
38)	Varian Associates	.581
39)	Victor Comptometer	.551
40)	White Consolidated	.629

Table A-7

1967 Random Sample

	Company Name	Volatility
1)	Aguirre Company	.360
2)	American Can	.327
3)	A M P Incorporated	.414
4)	American Export	.703
5)	Beckman Instrument	.626
6)	Borg-Warner	.473
7)	Capital Cities Broadcasting	.398
8)	Chicago Pneumatic	.495
9)	Combus. Engineering	.655
10)	Crowell-Collier	.427
11)	Cox Broadcasting	.519
12)	Donnelly R. R. & Sons	.296
13)	Emhart Corporation	.507
14)	Federated Department Stores	.333
15)	General American Oil	.428
16)	Goodrich B. F.	.288
17)	Heublein Incorporated	.627
18)	Indian Head Incorporated	.785
19)	I T & T Incorporated	.525
20)	Gulf & Western Industries	.713
21)	Kellogg Company	.254
22)	King's Department Stores	1.028
23)	Lear Siegler Incorporated	.774
24)	McDonnell-Douglas	.796
25)	Midwest Oil Corporation	.208
26)	Mattel Incorporated	1.315
27)	Norris Industries	.806
28)	Owens Corning Fiberglas	.334
29)	Pillsbury Company	.305
30)	Robertshaw Controls	.519
31)	Ryder Systems Incorporated	.694
32)	Schenley Industry	.775
33)	Signode Corporation	.364
34)	Standard Oil of Indiana	.321
35)	Sunshine Mining	.388
36)	Texas Instruments	.370
37)	Taft Broadcasting	.434
38)	U. S. Shoe Corporation	.395
39)	V S I Corporation	1.234
40)	West Point Pepperell	.530

Table A-8

1968 Random Sample

	Company Name	Volatility
1)	Acme Markets	.374
2)	American Can Company	.244
3)	American Brands	.318
4)	Atlantic Richfield	.921
5)	Beatrice Foods	.405
6)	Borg-Warner Corporation	.421
7)	Campbell Red Lake	.280
8)	Cheseborough Ponds	.347
9)	Collins Radio	.624
10)	C P C International	.235
11)	Colt Industries	.525
12)	Dow Chemical	.219
13)	Essex International	.466
14)	Fibreboard Paper	.564
15)	G A F Incorporated	.569
16)	Georgia Pacific	.621
17)	Gulton Industries	.655
18)	Hecla Mining	.467
19)	Holiday Inns	.692
20)	I T & T Incorporated	.331
21)	Keller Industries	.899
22)	Kinney Service	.503
23)	Leaseway Transportation	.563
24)	McDermott JR & Company	.460
25)	Miles Labs.	.473
26)	M E I Incorporated	1.271
27)	National Airlines	.609
28)	National Distillers	.261
29)	Pennsalt Chemical	.303
30)	Purex Corporation	.339
31)	Republic Corporated	.844
32)	Reeves Brothers Inc.	.514
33)	Seagrave Corporation	.826
34)	Smith A. O.	.478
35)	Sun Oil Company	.346
36)	Texas Gulf Sulphur	.526
37)	Trans Union Corporation	.598
38)	U. S. Industries	.652
39)	V S I Corporation	.430
40)	Whirlpool Corporation	.372

Table A-9

1969 Random Sample

	Company Name	Volatility
1)	Allied Pds. Incorporated	.686
2)	American Smelting	.585
3)	Archer-Daniels-Midland	.464
4)	A R A Service	.227
5)	Bendix Corporation	.444
6)	Burroughs Corp.	.412
7)	Caterpillar Tractor	.368
8)	Cinn. Milacron	.406
9)	C B S Inc.	.358
10)	Crown Zellerback	.334
11)	Deere & Company	.484
12)	Dome Mines Ltd.	.705
13)	Evans Products	.480
14)	Fischback & Moore	.392
15)	General Mills	.266
16)	Granby Mining	.398
17)	Halliburton	.366
18)	Hobart Manufacturing	.263
19)	International Flavors & Frag.	.398
20)	John-Mansville	.447
21)	Kendall Company	.641
22)	Kinney National Service	.733
23)	Lucky Stores	.444
24)	McDermott J. R.	.617
25)	M M M	.230
26)	McLean Trucking	.423
27)	National Standard	.423
28)	Narco Scientific	.441
29)	Pepsi Company	.226
30)	Polaroid Corporation	.347
31)	Raybestos-Mnkt.	.312
32)	Rohn & Haas	.364
33)	Scovill Manufacturing	.365
34)	Singer Manufacturing	.343
35)	Standard Oil of Indiana	.486
36)	Sun Oil Company	.528
37)	Texas Oil & Gas	.417
38)	Uarco Corporation	.354
39)	United Brands	.732
40)	Warner Lambert	.348

Table A-10

1970 Random Sample

	Company Name	Volatility
1)	Akzona	.371
2)	American Hospital	.568
3)	Arch-Daniels-Midland	.516
4)	Bearings Incorporated	.395
5)	Boise Cascade Corporation	.632
6)	Burroughs Corporation	.756
7)	Cleveland Cliffs Iron	.514
8)	Consolidated Foods	.529
9)	Copeland Refrigeration	.713
10)	Dow Chemical	.239
11)	Eckerd Jack Drugs	.826
12)	Farah Manufacturing	.471
13)	Ford Motor Co.	.417
14)	General Mills	.483
15)	Gillette Company	.524
16)	Hall Printing	.540
17)	Heublein Incorporated	.529
18)	Inspiration Consolidated Copper	.667
19)	Jewell Company	.369
20)	Keebler Incorporated	.630
21)	L-O-F Glass	.470
22)	Macy R. H. & Company	.513
23)	Masco Corporation	.477
24)	McLean Corporation	.450
25)	M M M	.473
26)	National Biscuit	.366
27)	Occidental Petroleum	.623
28)	Pepsi Company	.374
29)	Polaroid Corporation	.879
30)	Reeves Brothers	.615
31)	Rubbermaid	.276
32)	Scovill Manufacturing	.556
33)	Singer Company	.475
34)	Standard Brands	.344
35)	Sterling Drugs	.461
36)	Tandy Corporation	.756
37)	Union Oil California	.520
38)	V F Corporation	.622
39)	Wickes Corporation	.710
40)	Zapata Norness	1.098

APPENDIX B

INVESTMENT CHARACTERISTICS PRECEDING UPPER AND LOWER QUARTILE STOCKS: 1961-70

Table B-1

Investment Characteristics Preceding
Upper and Lower Quartile Stocks: 1961 Sample

Upper Quartile	1960 Volatility	1960 Turnover	1960 Shares Out. (000's)	1960 Rating
AMF Ind.	.600	.357	7769	3
Crown Cork & Seal	.459	.546	979	5
Emerson Electric	.513	.367	2188	5
Hershey Chocolate	.447	.031	2406	3
Inspir. Consol. Cop.	.380	.202	1182	5
Interstate D. Str.	.533	.852	391	5
MCA Inc.	.579	.101	3996	5
Delta Airlines	.437	.372	1122	5
Standard Kollsman	.830	1.503	2079	5
Stokely Van Camp	.300	.104	1880	5
Average	.508	.443	2399	4.6
Lower Quartile				
Falstaff Brewing	.454	.081	1972	4
General Cable	.336	.072	3062	5
Genesco Inc.	.453	.116	3711	3
Hammermill Paper	.228	.060	1468	4
L-O-F Glass Co.	.411	.099	10469	3
Merck & Co.	.276	.103	10666	3
Mobil Oil Co.	.197	.056	48601	2
National Standard	.446	.036	1051	3
Republic Steel	.476	.090	15708	3
Rohm & Haas	.253	.041	1139	4
Average	.353	.075	9785	3.4

Table B-2

Investment Characteristics Preceding
Upper and Lower Quartile Stocks: 1962 Sample

Upper Quartile	1961 Volatility	1961 Turnover	1961 Shares Out. (000's)	1961 Rating
Amer. Enka	.814	.358	1308	5
Goodrich B. F.	.429	.193	9163	3
Gould Inc.	.691	.173	1737	4
MCA Inc.	.785	.083	4041	5
M-G-M Inc.	.517	.871	2526	4
Revlon Inc.	.750	.587	5299	5
Polaroid	.307	.313	3897	5
Talcott Inc.	.599	.179	2677	4
Varian Assoc.	.679	.405	3832	5
Zenith Radio	.876	.498	9032	4
Average	.645	.366	4351	4.4
<u>Lower Quartile</u>				
Assoc. Dry Gd.	.495	.102	1905	4
Brown Shoe	.356	.039	1877	3
Cont. Oil	.266	.054	21395	3
Du Pont E.I.	.314	.030	45972	1
Federal Mogul	.381	.053	4889	4
Keebler Inc.	.339	.355	952	4
Monsanto	.279	.074	28023	2
Phelps Dodge	.335	.087	10143	4
Clev. Cliffs Iron	.240	.077	2083	5
Whirlpool	.257	.118	6261	4
Average	.326	.099	12350	3.4

Table B-3

Investment Characteristics Preceding
Upper and Lower Quartile Stocks: 1963 Sample

Upper Quartile	1962 Volatility	1962 Turnover	1962 Shares Out. (000's)	1962 Rating
Chrysler	.648	.825	9038	4
CBS Inc.	.391	.156	9151	3
Delta Air Lines	.727	.504	1700	5
Eastern G. & F.	.545	.382	2913	5
Fairchild Camera	.777	1.151	2535	5
Leesona Corp.	.989	.703	822	5
St. Jos. Minerals	.481	.158	2989	4
Simplicity Pattern	.503	.166	1506	4
TWA	.630	.073	6674	5
Xerox Corp.	.624	1.201	3852	4
Average	.632	.532	4118	4.4
Lower Quartile				
Borden Co.	.516	.060	10567	1
First Nat'l. Str.	.505	.158	1640	3
Gould Inc.	.562	.121	1737	4
Helme Corp.	.347	.098	654	4
McGraw-Edison	.348	.106	6431	3
Nat'l Gypsum	.519	.117	6567	3
P P G Ind.	.437	.089	10611	2
Swift & Co.	.444	.124	5999	3
USM	.537	.194	2323	4
Union Camp	.319	.117	7791	4
Average	.453	.119	5433	3.1

Table B-4

Investment Characteristics Preceding
Upper and Lower Quartile Stocks: 1964 Sample

Upper Quartile	1963 Volatility	1963 Turnover	1963 Shares Out. (000's)	1963 Rating
Cutler-Hammer	.261	.178	1552	4
Dover Corp.	.442	.339	1389	5
Evans Pds.	.787	.623	1460	5
Hart S & M	.242	.110	1138	5
Joy Mfg.	.411	.502	1864	5
McDermott J. R.	.392	.600	3888	5
National Airlines	.626	1.628	2045	5
Reliable Stores	.257	.096	586	5
Trans Union Corp.	.285	.226	3555	3
Vornado Inc.	.510	.675	1311	5
Average	.421	.498	1879	4.7
Lower Quartile				
Air Reduction	.204	.257	5033	3
Amer. Cyanamid	.269	.106	21934	2
Archer-Daniels	.129	.175	1598	3
Bendix Corp.	.230	.180	5424	4
Firestone Tire	.219	.057	28698	3
Marathon Oil	.333	.073	14867	3
Miles Lab.	.325	.090	4018	4
Pennsalt Chem.	.325	.090	4533	2
Sterling Drug	.385	.125	24013	2
Wayne-Gossard	.151	.103	360	4
Average	.257	.130	11047	3.0

Table B-5

Investment Characteristics Preceding
Upper and Lower Quartile Stocks: 1965 Sample

Upper Quartile	1964 Volatility	1964 Turnover	1964 Shares Out. (000's)	1964 Rating
Burndy Corp.	.237	.287	1186	5
Evans Pds.	.783	.906	1541	5
Getty Oil	.357	.129	15984	5
General Dynamics	.549	.542	10015	5
Heublein Inc.	.326	.117	4806	4
McGraw-Edison	.430	.128	6483	3
Pan Am. Airways	.472	.739	14065	4
Storer Brdcstg.	.322	.150	2035	5
Vendo Co.	.472	.329	2639	5
Western Union	.226	.280	7505	4
Average	.417	.361	6626	4.5
Lower Quartile				
Amerada Pet.	.360	.124	12670	3
Bliss & Laughlin	.258	.110	1007	4
Cont. Oil	.251	.043	21648	3
Crown Zellerback	.259	.078	15287	3
Firestone Tire	.206	.050	28743	3
Inland Steel	.184	.069	18170	2
Kraftco Inc.	.329	.058	14494	1
Quaker Oats	.167	.100	4004	2
Phillips Pet.	.182	.107	33464	2
Timken Co.	.244	.067	5327	3
Average	.244	.080	15481	2.6

Table B-6

Investment Characteristics Preceding
Upper and Lower Quartile Stocks: 1966 Sample

Upper Quartile	1965 Volatility	1965 Turnover	1965 Shares Out. (000's)	1965 Rating
Baxter Labs.	.606	.286	2750	4
Boeing Co.	.798	.641	8187	4
Cerro Corp.	.347	.493	5651	4
Copper Range	.667	.520	1982	5
Fairchild Camera	1.435	3.889	2576	5
Grumman Aircraft	.786	.771	4540	4
KLM Airlines	1.226	3.256	1999	5
Rayette-Faberge	.759	.595	2767	4
Scovill Mfg.	.525	.261	1549	4
White Consol.	1.003	.627	1077	6
Average	.815	1.391	3308	4.5
Lower Quartile				
AMP Inc.	.522	.135	6075	5
Atlantic-Richfield	.309	.135	11292	2
Broadway Hale	.227	.040	3691	4
Coca-Cola	.269	.036	28501	2
General Tire	.469	.327	16829	3
Hayes-Albion	.467	.404	1490	5
Int'l. Nickel	.191	.044	29635	2
Macy R. H.	.281	.014	4362	3
Midwest Oil	.312	.051	2392	5
Texaco Inc.	.174	.031	135117	1
Average	.322	.122	23938	3.2

Table B-7

Investment Characteristics Preceding
Upper and Lower Quartile Stocks: 1967 Sample

Upper Quartile	1966 Volatility	1966 Turnover	1966 Shares Out. (000's)	1966 Rating
American Export	.800	1.202	1354	5
Gulf & Western	.810	1.771	7114	5
Indian Head	.463	.237	2246	5
King's Dept. Str.	.517	.418	1691	5
Lear Siegler	.697	.930	4341	5
Mc-Donnell-D	.489	.277	16241	4
Mattel Inc.	.662	.243	2778	5
Norris Ind.	.556	.227	2638	5
Schenley Ind.	.553	.470	5022	4
VSI Corp.	.419	.115	1353	5
Average	.597	.589	4478	4.8
Lower Quartile				
Aguirre Co.	.366	.281	743	5
American Can	.288	.101	16436	2
Donnelly R. R.	.467	.063	12921	4
Federated Dept. Str.	.283	.061	20798	2
Goodrich B. F.	.252	.190	9182	3
Kellogg Co.	.347	.028	17971	2
Midwest Oil	.346	.044	2381	5
Owens-Corning	.288	.164	14795	4
Pillsbury Co.	.423	.117	4737	2
Std. Oil of Ind.	.291	.050	70647	2
Average	.335	.110	17071	3.1

Table B-8

Investment Characteristics Preceding
Upper and Lower Quartile Stocks: 1968 Sample

Upper Quartile	1967 Volatility	1967 Turnover	1967 Shares Out. (000's)	1967 Rating
Atlantic-Richfield	.275	.136	11739	2
Collins Radio	.736	1.970	2764	5
Georgia-Pac.	.504	.116	19021	4
Gulton Ind.	.935	1.434	3068	5
Holiday Inns	.974	.274	11304	5
Keller Ind.	.510	.222	1639	5
MEI	.507	.230	1116	5
Republic Corp.	1.776	1.814	2836	6
Seagrave Corp.	1.179	2.604	865	6
U.S. Industries	1.020	1.216	3672	5
Average	.842	1.002	5802	4.8
Lower Quartile				
American Can	.327	.151	17564	2
Amer. Brands	.266	.135	28107	2
Campbell Red Lake	.531	.239	3999	6
CPC Int'l.	.316	.129	22232	2
Dow Chemical	.414	.068	30081	2
IT & T Inc.	.525	.135	24970	3
Nat'l. Distillers	.276	.129	12723	3
Pennsalt Chem.	.394	.113	4702	2
Purex Corp.	.674	.542	7555	4
Sun Oil Co.	.466	.014	25118	2
Average	.419	.165	17705	2.8

Table B-9

Investment Characteristics Preceding
Upper and Lower Quartile Stocks: 1969 Sample

Upper Quartile	1968 Volatility	1968 Turnover	1968 Shares Out. (000's)	1968 Rating
Allied Pds.	.625	.935	1728	5
Amer. Smelting	.687	.344	14555	3
Deere & Co.	.263	.183	14794	3
Dome Mines	.561	.965	1947	5
Kendall Co.	.370	.122	3208	3
Kinney Nat'l. Svc.	.503	.377	2597	5
McDermott J. R.	.460	.360	6325	4
Std. Oil of Ind.	.289	.063	70856	2
Sun Oil Co.	.346	.015	26777	2
United Brands	.645	.812	8058	5
Average	.475	.418	15085	3.7
Lower Quartile				
ARA Services	.530	.179	4241	5
Crown Zellerback	.433	.154	15346	3
General Mills	.245	.136	17772	2
Hobart Mfg.	.475	.044	5605	4
MMM Inc.	.385	.052	54273	2
Pepsi Co.	.446	.118	22196	3
Polaroid Corp.	.417	.295	31712	4
Raybestos-Man.	.389	.330	1176	3
Singer Mfg.	.345	.221	13962	2
Narco Corp.	.383	.140	2051	4
Average	.405	.167	16833	3.2

Table B-10

Investment Characteristics Preceding
Upper and Lower Quartile Stocks: 1970 Sample

Upper Quartile	1969 Volatility	1969 Turnover	1969 Shares Out. (000's)	1969 Rating
Boise Cascade	.350	.270	29417	4
Burroughs	.412	.337	17232	3
Copeland Refrig.	.424	.151	1493	5
Eckerd Jack	.640	.227	6821	5
Inspir. Consol. Cop.	.329	.244	2406	5
Keebler Inc.	.397	.321	958	4
Polaroid	.347	.353	32828	4
Tandy Corp.	.500	.477	3982	6
Wickes Corp.	.387	.201	6974	4
Zapata Norness	.723	.973	4214	5
Average	.451	.355	10633	4.0
Lower Quartile				
Akzona	.367	.160	7994	4
Bearings Inc.	.371	.224	997	4
Dow Chemical	.222	.124	30216	2
Ford Motor	.298	.078	109317	3
Jewell Co.	.256	.154	6626	3
Nat'l. Biscuit	.157	.096	13602	1
Pepsi Co.	.226	.104	22386	3
Rubbermaid	.410	.217	1754	4
Std. Brands	.197	.106	13193	2
Sterling Drugs	.320	.079	36667	2
Average	.282	.136	24275	2.8

APPENDIX C

INVESTMENT CHARACTERISTICS PRECEDING STOCKS SELECTED: 1962-70

Table C-1

Investment Characteristics Preceding
Stocks Selected for 1962

Company	1961 Turnover	1961 Volatility	1961 Shares Out. (000's)	1961 Rating
ACF Ind.	.503	.566	1422	B
Amphenol Borg	.642	.622	1404	C+
Bliss E. W.	.772	.796	1235	C+
Certain-teed Pds.	1.757	1.188	2554	C+
Collins Radio	.701	.541	2213	C+
Comm. Solvents	.622	.586	2863	C+
Copeland Refrig.	.593	.580	831	C+
Crown Cork	.627	1.040	1020	C+
Delta Air Lines	.708	.744	1122	C+
Interstate D. Str.	1.663	1.031	1119	C+
Korvette E. J.	1.504	1.272	3989	C+
Leesona Corp.	.544	.548	821	C+
Lockheed Corp.	.671	.648	7544	C+
Loew's Th.	.658	.989	2670	C+
Magma Copper	.870	.593	1265	C
Mergen. Line.	.563	.648	2395	C+
Mays J. W.	.795	.693	920	C+
McDonnell	.598	.693	3425	C+
M-G-M Inc.	.871	.517	2522	B
Northrop Corp.	.585	.504	4152	C+
Northwest Airlines	.694	.716	1385	C+
Perkins-Elmer	.507	.629	1256	C
Revlon Inc.	.587	.750	5256	C+
Std. Kollsman	1.675	.718	2087	C+
Twentieth Cent.-Fox	.683	.589	2496	B
U M C Corp.	.671	.767	5011	B
Univ. Oil Pds.	.887	.780	2935	C
Vendo Co.	.599	.595	2623	B

Table C-2

Investment Characteristics Preceding
Stocks Selected for 1963

Company	1962 Turnover	1962 Volatility	1962 Shares Out. (000's)	1962 Rating
American Enka	.487	.563	1300	C+
Beckman Instrument	1.209	.843	1534	C+
Cenco Instruments	.785	.827	1109	C+
Chrysler	.825	.648	9035	B
Collins & Aikman	.708	.558	1101	C+
Crown Cork	.564	.572	4368	C+
Delta Air Lines	.504	.727	1700	C+
Fairchild Camera	1.151	.777	2526	C+
Financial Fed.	.493	.777	1869	NR
General Precision	.602	.744	1643	C+
Lilton Ind.	1.758	.666	9668	C+
Magnavox	.496	.546	7325	B
McDonnell	.535	.552	3475	C+
M-G-M Inc.	.608	.754	2569	B
Northwest Airlines	.491	.544	1385	C+
Perkins-Elmer	.569	.795	1287	C
Polaroid	2.175	.923	3921	C+
Texas Instruments	.734	.876	3947	C
Univ. Oil Pds.	.609	.705	2957	C
Varian Assoc.	.530	.688	3917	C+
Xerox Corp.	1.201	.624	3849	B

Table C-3

Investment Characteristics Preceding
Stocks Selected for 1964

Company	1963 Turnover	1963 Volatility	1963 Shares Out. (000's)	1963 Rating
Aguirre Co.	.923	.603	743	C+
Amer. Crystal Sug.	1.244	.833	372	B
Beckman Instruments	.959	.618	1559	C+
Control Data	1.973	1.027	4115	C
Eastern G. & F.	.531	.500	1601	C+
Electronic Assoc.	2.410	.888	1022	C+
Fairchild Camera	1.244	.523	2535	C+
Haveg Ind.	1.503	.824	1023	C+
High Voltage Eng.	1.812	.743	2374	C+
Holly Sugar	1.271	.646	678	C+
Interstate D. Str.	.752	.604	1263	B
Leesona Corp.	1.269	.712	822	C+
Metromedia Inc.	.999	.874	1746	C
Mueller Brass	1.481	.704	566	C+
National Airlines	1.628	.626	1689	C+
National Casting	.680	.519	624	C+
Northwest Airlines	.918	.699	1821	C+
Pan Am. Airways	.974	.879	6340	B
Polaroid	1.233	.549	3939	C+
Smith-Douglas	1.371	.720	1025	C+
U.S. Smelting	12.245	.708	545	C+
Western Airlines	.819	.925	1431	C
Youngstown S.D.	.825	.657	677	B

Table C-4

Investment Characteristics Preceding
Stocks Selected for 1965

Company	1964 Turnover	1964 Volatility	1964 Shares Out. (000's)	1964 Rating
American Export	1.033	.770	1421	C+
Arlans Dept. Str.	1.239	.727	1015	C
Boeing Co.	.501	.662	8024	B
Bucyrus Erie	1.001	.774	1874	C+
Cerro Corp.	.530	.890	5616	B
Eastern Airlines	1.496	.552	3235	C+
Evans Pds.	.906	.783	1539	C+
Financial Fed.	.517	.706	2467	NR
Fluor Corp.	.643	.796	911	C+
General Cigars	.509	.692	1527	B
General Dynamics	.542	.549	10001	C+
Joy Mfg.	.514	.611	1794	C+
Lukens Steel	1.368	.687	954	C+
McDermott J. R.	.807	.606	3873	C+
National Airlines	1.321	.542	1883	C+
Northwest Airlines	.722	.583	4564	C+
Pan Am. Sulphur	.806	.813	1354	C
Pitt Forging	.646	.804	695	C+
Texas Gulf Sulphur	2.406	1.023	10020	C+
United Artists	1.332	.838	1962	C+
Vornado Inc.	1.056	.714	1311	C+
Western Airlines	.932	.581	4292	C

Table C-5

Investment Characteristics Preceding
Stocks Selected for 1966

Company	1965 Turnover	1965 Volatility	1965 Shares Out. (000's)	1965 Rating
Admiral Corp.	2.178	1.316	2465	C+
Boeing Co.	.641	.798	8109	B
Burndy Corp.	1.143	1.028	1200	C+
Collins Radio	1.772	.975	2257	C+
Congol.-Nair	1.122	.792	1246	C+
Cont. Airlines	1.860	1.019	3196	C
Control Data	1.275	.720	7400	C+
Crowell Collier	.701	.603	3939	C+
Delta Air Lines	1.129	.887	6375	B
Douglas Aircraft	1.106	.973	4585	C+
Eastern Airlines	2.100	.820	4276	C+
Fairchild Camera	3.889	1.435	2563	C+
Fluro Corp.	1.026	.773	975	C+
General Dynamics	.759	.643	10091	C+
General Instruments	1.528	.911	2639	C
General Precision	1.204	.571	1633	C+
Grumman Aircraft	.771	.786	4518	B
Gulf & Western	.733	1.084	1932	C+
Int'l. Resistence	1.059	.723	1494	C+
KLM Airlines	3.256	1.226	2000	C+
L-T-V Inc.	1.394	1.085	1748	C+
Lukens Steel	1.537	1.001	2862	C+
National Airlines	3.049	.836	4006	C+
Northwest Airlines	.645	.792	4574	C+
Pan Am. Airways	.944	.751	14469	B
Raytheon Co.	1.018	.831	4676	C+
S C M Corp.	4.123	1.194	2694	C+
Texas Gulf Sulphur	1.119	.632	10016	C+
U.S. Smelting	1.479	1.179	2179	C+
White Consol.	.627	1.003	1341	C

Table C-6

Investment Characteristics Preceding
Stocks Selected for 1967

Company	1966 Turnover	1966 Volatility	1966 Shares Out. (000's)	1966 Rating
American Export	1.202	.800	1354	C+
American R & D	.722	.769	1535	NR
Calumet & Hecla	1.491	.838	2128	C
Carlisle Corp.	1.036	.685	1209	C+
Collins Radio	3.743	.779	2736	C+
Comm. Solvents	2.040	.948	3009	C+
Delta Air Lines	.698	.646	6375	B
Eastern Airlines	2.697	.797	4771	C+
E G & G Inc.	1.332	.876	1508	C+
Faberge (Rayette)	.802	.624	2767	B
Fairchild Camera	5.085	.765	2837	C+
Fansteel Metal	1.085	.721	1374	C+
General Instruments	2.791	.692	2745	C+
Gulf & Western	1.771	.810	7889	C+
Hecla Mining	.650	.810	2455	C+
KLM Airlines	3.369	.699	2500	C+
L-T-V Inc.	2.497	.713	2133	C+
Lukens Steel	.881	.730	2862	C+
Motorola	.746	.869	6103	B
National Airlines	.876	.606	4170	C+
Northwest Airlines	.601	.731	9150	C+
Occidental Pet.	.743	.756	10415	C+
Phil & Reading	.883	.729	2997	C+
Sanders Assoc.	1.257	.600	1872	C+
SCM Corp.	4.171	.717	4009	C+
Teledyne Inc.	1.706	.902	2543	C+
Texas Gulf Sulphur	1.098	.634	10034	C+
Trans World Airways	1.022	.649	8958	C+
U.S. Smelting	2.548	.796	2179	C+
Western Airlines	.996	.600	4301	C+
White Consol.	.630	.629	3171	C+

Table C-7

Investment Characteristics Preceding
Stocks Selected for 1968

Company	1967 Turnover	1967 Volatility	1967 Shares Out. (000's)	1967 Rating
Adams Millis	3.660	1.433	796	B
Ambac Ind.	1.046	1.117	1696	C+
Avco Corp.	1.104	.978	14075	B
Cadence Ind.	1.429	1.416	1144	C
City Investing	.869	.938	2074	C+
Colt Industries	1.142	1.102	3567	C+
Conrac Corp.	1.380	.947	1193	C+
Control Data	1.905	1.329	7730	C+
Diners Club	1.365	.857	1737	C+
Essex Int'l.	.934	.814	8036	C+
Faberge (Rayette)	.877	.906	2778	B
Fedders Corp.	1.587	1.167	2142	C+
Fuqua Ind.	1.350	.942	1098	C
General Hosts	.849	.902	1638	C+
Granby Mining	1.965	.962	474	C
Gulton Ind.	1.434	.935	2998	C+
Jim Walter	.800	1.012	2617	C+
King's Dept. Str.	.937	1.028	2114	C+
L-T-V Inc.	2.142	1.101	3934	C+
Loew's Corp.	.930	1.386	1907	C+
McDonald's Corp.	.851	1.114	2639	C+
Monarch Machine	.824	1.082	696	B
Oak Electro-netics	1.587	.889	1058	C+
Occidental Pet.	1.096	1.004	13056	B
Pan Am. Sulphur	2.177	1.006	4747	C
Republic Corp.	1.814	1.776	2569	C
Sanders Assoc.	1.351	.978	4448	C+
Seagrave	2.604	1.179	813	C
Scientific Data Sys.	1.435	1.129	3833	C+
Stokely Van Camp	1.187	1.026	2861	C+
Tandy Corp.	.802	1.184	1280	C
Teledyne Inc.	.869	1.150	6947	C+
United Nuclear	1.412	.964	4528	C
U.S. Industries	1.216	1.020	3422	C+
Ward Foods	1.497	1.154	1901	C

Table C-8

Investment Characteristics Preceding
Stocks Selected for 1969

Company	1968 Turnover	1968 Volatility	1968 Shares Out. (000's)	1968 Rating
AMK Inc.	1.922	.700	4006	C+
Avnet Inc.	1.316	.727	8659	C+
Bath Inc.	1.212	1.155	1046	C+
Bermec Corp.	2.579	1.344	4275	C
Berkey Photo	.757	.728	3824	C
Cadence Ind.	1.443	.767	1358	C
Certain-teed Pds.	1.005	.892	3532	C+
City Investing	.811	.733	9002	C+
Central Foundry	1.005	.943	731	C+
Duplan Corp.	.802	1.333	2064	C+
Evans Pds.	1.057	.905	3056	C+
Fansteel Inc.	1.176	.801	1704	C+
Financial Fed.	.778	.929	3320	NR
General Hosts	.886	.709	2450	C+
Granby Mining	1.385	.761	1444	C
Leesona Corp.	.781	.701	1756	C+
Loew's Corp.	3.148	1.188	4768	C+
MacAndrews & Forbes	1.212	1.222	973	B
MEI Inc.	.934	1.271	1138	C+
National General	2.113	.968	3512	C+
Natomas Inc.	.990	.835	3730	C
Penn Dixie	.940	.711	2763	B
Phillips Ind.	1.144	1.359	1988	C+
Rapid-American	1.196	.986	3056	B
Republic Corp.	1.443	.844	3775	C
Sangamo Electric	.907	.777	2580	C+
Seagrave Corp.	1.272	.826	995	C
Tandy Corp.	.902	.759	1924	C

Table C-9

Investment Characteristics Preceding
Stocks Selected for 1970

Company	1969 Turnover	1969 Volatility	1969 Shares Out. (000's)	1969 Rating
Allied Pds.	.822	.686	1800	C+
American R & D	1.173	.677	6140	NR
Cenco Instruments	.527	.672	3704	B
Collins Radio	.908	.713	2968	B
Computer Sciences	1.097	.643	12160	C
Copper Range	.880	.652	2224	C+
Dome Mines	.714	.705	1947	C+
Fairchild Camera	1.732	.564	4349	C+
General Am. Oil	.545	.777	5622	B
Great Western Unit.	.799	.862	2092	B
Handleman Co.	.673	.520	4412	B
International Ind.	.878	.595	5037	C+
Itek Corp.	1.900	.674	2297	C+
Kinney Nat'l. Soc.	.788	.733	5940	C+
Loew's Corp.	.774	.843	14376	C+
Midwest Oil	1.842	.572	2350	B
Natomas Inc.	5.705	1.171	3750	C
Pennzoil United	.503	.698	14442	B
Pittston Co.	.552	.515	4863	B
Ryder Systems	.696	.504	4787	C+
Sante Fe Int'l.	.502	.624	3277	C+
Studebaker-Worth	.658	.608	6324	B
Schaeffer F & M	.982	.541	1830	C+
Talley Ind.	1.025	.805	4060	C+
U.S. Smelting	.875	.654	2343	C+
Xtra Inc.	1.303	.796	2232	C+
Zapata Norness	.973	.723	4204	C+

APPENDIX D

PROFIT (LOSS) ON STRADDLES PURCHASED EACH PERIOD

Table D-1

Profit (Loss) On Straddles Purchased In 1962

Company	First Period	Second Period	Third Period	Fourth Period
ACF Ind.	$(1228)	$(1200)	$(601)	$ 837
Amphend-Borg	539	NP	NP	NP
Bliss F. W.	(308)	551	NP	NP
Certain-teed	1842	1814	NP	NP
Collins Radio	584	489	NP	NP
Comm. Solvents	565	714	NP	NP
Copeland Refrig.	1010	484	NP	NP
Delta Air Lines	(1060)	(395)	1656	859
Interstate D.S.	305	863	(346)	NP
Korvette E. J.	(607)	492	47	(344)
Leesona Corp.	1135	NP	NP	NP
Lockheed	(1052)	(1124)	(193)	(804)
Loew's Th.	770	1112	NP	NP
Magma Copper	(84)	(306)	162	528
Mergen. Lino.	247	NP	NP	NP
Mays J.W.	676	NP	NP	NP
McDonnell	(583)	(357)	917	(1106)
M-G-M Inc.	550	81	(613)	NP
Northrop	(271)	NP	NP	NP
Northwest Airlines	(295)	(653)	NP	811
Perkins-Elmer	1108	(44)	549	(440)
Revlon Inc.	1020	871	(688)	(233)
Standard Kollsman	521	373	NP	NP
Twentieth-Cent.	574	198	NP	NP
U M C	770	NP	NP	NP
Univ. Oil Pds.	975	667	(564)	328
Vendo	1472	325	NP	NP
Total	$ 9184	$ 4955	$ 326	$(220)

NP means a straddle was not purchased in that period.

Table D-2

Profit (Loss) On Straddles Purchased In 1963

Company	First Period	Second Period	Third Period	Fourth Period
American Enka	$ 30	$ (130)	$ 419	$ 2438
Beckman Inst.	NP	33	(1421)	(415)
Cenco Inst.	(341)	(303)	(635)	(1118)
Chrysler	3263	4875	776	(1341)
Collins & Aikman	(82)	1572	493	NP
Crown Cork	(700)	(593)	(419)	(621)
Delta Air Lines	(301)	268	1106	3309
Fairchild Camera	(413)	(634)	(863)	91
Fin. Federation	(1424)	(971)	(1052)	368
General Prec.	(444)	(641)	(227)	(450)
Litton Ind.	(751)	(24)	(1026)	(1182)
Magnavox	(293)	(772)	(900)	37
McDonnell	(1308)	(1046)	(1181)	502
M-G-M Inc.	(730)	(742)	(730)	(657)
Northwest Airlines	320	(342)	1210	3095
Perkins-Elmer	(871)	(549)	(458)	(489)
Texas Inst.	(207)	988	(806)	(620)
Univ. Oil Pds.	(645)	NP	(712)	(105)
Varian Assoc.	235	NP	NP	NP
Total	$(4661)	$ 989	$(6426)	$ 2842

NP means a straddle was not purchased in that period.

Table D-3

Profit (Loss) On Straddles Purchased in 1964

Company	First Period	Second8 Period	Third Period	Fourth Period
Aguirre (Central)	$ (88)	$ (237)	$ NP	$ NP
Amer. Crystal Sugar	208	(453)	(676)	NP
Beckman Inst.	325	(68)	320	(917)
Control Data	NP	(783)	(762)	(997)
Eastern G. & F.	(1427)	(973)	719	710
Electronic Assoc.	(626)	(424)	NP	NP
Fairchild Camera	474	NP	NP	NP
Haveg Ind.	117	718	NP	NP
High Voltage Eng.	191	NP	NP	NP
Holly Sugar	(97)	(86)	(624)	(356)
Interstate Dept. Str.	(366)	421	(1323)	(1088)
Leesona Corp.	804	(1075)	(1136)	(700)
Metromedia Inc.	(361)	(485)	(422)	(663)
Mueller Brass	(373)	34	(104)	436
Nat'l. Airlines	295	(629)	(3)	798
Nat'l. Casting	(405)	(680)	(747)	(157)
Northwest Airlines	2368	(987)	(902)	1046
Pan Am. Airlines	803	197	(54)	NP
Smith-Douglas	(435)	769	1122	NP
U.S. Smelting	998	855	NP	NP
Western Airlines	2117	NP	(299)	(782)
Youngstown S.D.	(668)	(835)	(821)	(865)
Total	$ 3854	$(4721)	$(5640)	$(3535)

NP means a straddles was not purchased in that period.

Table D-4

Profit (Loss) On Straddles Purchased In 1965

Company	First Period	Second Period	Third Period	Fourth Period
American Export	$ 979	$ NP	$ NP	$ 675
Arlans Dept. Str.	(944)	3386	NP	NP
Boeing Co.	(1489	2456	5108	NP
Bucyrus-Erie	(641)	20	1406	546
Cerro Corp.	(774)	(848)	78	756
Eastern Airlines	77	106	2153	366
Evans Pds.	(422)	(1024)	968	(17)
Fin. Federation	541	(132)	NP	NP
Fluor Corp.	(463)	(602)	1925	1145
General Cigars	180	198	(706)	NP
General Dynamics	(593)	(51)	884	292
Joy Mfg.	(319)	231	1192	(127)
Lukens Steel	(584)	283	7477	3687
McDermott J. R.	(868)	(252)	935	282
National Airlines	(707)	617	4810	6896
Northwest Airlines	390	(240)	2495	8217
Pan Am. Sulphur	180	198	NP	NP
Pitt Forging	(749)	(748)	(390)	133
Texas Gulf Sulphur	(974)	(1289)	2428	3052
United Artists	(57)	(975)	313	363
Vornado Inc.	885	464	1030	222
Western Airlines	(668)	(770)	336	919
Total	$(7020)	$ 1028	$32442	$27407

NP means a straddle was not purchased in that period.

Table D-5

Profit (Loss) On Straddles Purchased In 1966

Company	First Period	Second Period	Third Period	Fourth Period
Admiral Corp.	$ 1041	$ NP	$ 937	$ 3
Boeing Co.	NP	NP	(1225)	2018
Burndy Corp.	(164)	(1190)	NP	NP
Collins Radio	171	213	(847)	703
Congol.-Nair	581	643	22	NP
Cont. Airlines	735	(1249)	(1196)	1900
Control Data	(487)	NP	(273)	1439
Crowell-Collier	(698)	(369)	(655)	(619)
Delta Air Lines	2628	NP	NP	1147
Douglas Aircraft	(464)	3822	93	1097
Eastern Airlines	(321)	824	NP	1717
Fluor Corp.	(1455)	(399)	(664)	NP
General Dynamics	(998)	510	(905)	813
General Inst.	448	(833)	(1070)	(1072)
General Precision	130	(1334)	(318)	288
Grumman Aircraft	(1077)	(50)	(585)	228
Gulf & Western	(1999)	NP	(1992)	NP
Int'l. Resistence	(15)	335	(376)	(402)
KLM Airlines	2890	NP	NP	NP
L-T-V Inc.	1467	736	477	7350
Lukens Steel	(486)	864	121	NP
National Airlines	(235)	792	(1894)	247
Northwest Airlines	NP	NP	NP	998
Pan Am. Airways	1008	445	215	856
Raytheon Co.	(369)	(1073)	(379)	435
S C M Corp.	1375	(1274)	237	(625)
Texas Gulf Sulphur	(1090)	NP	NP	826
U.S. Smelting	(1357)	1472	(411)	725
White Consol.	1007	(721)	(842)	1633
Total	$ 2266	$ 2224	$11530	$21705

NP means a straddle was not purchased in that period.

Table D-6

Profit (Loss) On Straddles Purchased In 1967

Company	First Period	Second Period	Third Period	Fourth Period
American Export	$ NP	$ 225	$ 1193	$ (925)
American R & D	4960	3220	6272	NP
Calumet & Hecla	(716)	(250)	996	(626)
Carlisle Corp.	746	(567)	(1328)	(427)
Collins Radio	3637	93	NP	(1029)
Comm. Solvents	(46)	(483)	(146)	(717)
Eastern Airlines	1351	(1305)	(955)	1238
E G & G Inc.	3022	3383	(516)	
Faberge (Rayette)	1525	852	616	(617)
Fairchild Camera	NP	NP	(1393)	(931)
Fansteel Metal	1608	355	(1267)	977
General Instruments	1137	2169	(467)	493
Gulf & Western	1777	(959)	(1039)	(352)
Hecla Mining	(80)	(1095)	(879)	352
KLM Airlines	(1470)	NP	NP	419
L-T-V Inc.	5354	NP	NP	
Lukens Steel	(111)	(373)	(786)	(392)
Motorola Inc.	(494)	NP	NP	NP
National Airlines	(822)	(1516)	(1354)	1505
Occidental Pet.	882	2547	3923	24
Phil & Reading	1290	3619	1963	(2168)
Sanders Assoc.	1941	293	1735	(800)
S C M Corp.	(582)	1120	(890)	(29)
Teledyne Inc.	9091	NP	NP	NP
Trans World Airways	(699)	161	(114)	667
U.S. Smelting	788	(583)	(1190	(1146)
Western Airlines	(530)	(1113)	259	1243
White Consol.	114	193	899	319
Total	$33673	$ 7746	$ 5532	$(2922)

NP means a straddle was not purchased in that period.

Table D-7

Profit (Loss) On Straddles Purchased in 1968

Company	First Period	Second Period	Third Period	Fourth Period
Adams Millis	$ (528)	$ (323)	$ NP	$ NP
Ambac Inc.	(560)	(226)	(375)	(830)
Avco Corp.	293	(291)	(733)	(68)
Cadence Ind.	(260)	1129	(731)	1138
City Investing	NP	194	550	(1302)
Colt Industries	(226)	(500)	(939)	(1001)
Conrac Corp.	(433)	(669)	(1315)	(298)
Diners Club	(479)	(18)	(907)	1200
Essex Int'l.	202	(229)	(183)	(594)
Faberge (Rayette)	(1308)	(660)	(679)	(1109)
Fedders Corp.	948	2962	(989)	(985)
Fugua Ind.	(658)	(1353)	(484)	(554)
General Hosts	(221)	NP	109	(251)
Granby Mining	3	398	NP	NP
Gulton Ind.	(28)	(972)	(568)	(155)
Jim Walter	342	3040	1535	NP
King's Dept. Str.	712	4304	NP	NP
L-T-V Inc.	NP	NP	NP	1535
Loew's Th.	NP	NP	1585	
McDonald's Corp.	145	1611	(442)	(1180)
Monarch Machine	90	175	(1071)	(749)
Oak Electro-netics	(14)	NP	NP	NP
Occidental Pet.	NP	211	(1133)	(957)
Pan Am. Sulphur	(673)	(794)	(831)	(47)
Republic Corp.	(1518)	356	277	(1512)
Sanders Assoc.	(497)	(494)	(576)	(552)
Seagrave Corp.	67	2131	(441)	(1005)
Scientific Data Sys.	NP	NP	(2148)	331
Stokely Van Camp	(713)	(897)	352	(194)
Tandy Corp.	(399)	1800	1370	407
United Nuclear	(735)	(752)	(588)	(135)
U.S. Industries	875	194	(730)	(698)
Ward Foods	(989)	(282)	(679)	(347)
Total	$(6562)	$10045	$(10764)	$(9912)

NP means a straddle was not purchased in that period.

Table D-8

Profit (Loss) On Straddles Purchased In 1969

Comapny	First Period	Second Period	Third Period	Fourth Period
AMK Inc.	$ 1363	$ (314)	$ NP	$ NP
Avnet Inc.	830	NP	NP	NP
Bath Ind.	1306	(216)	(1058)	NP
Bermec Corp.	(1640)	NP	NP	NP
Berkey Photo	2069	NP	NP	NP
Cadence Ind.	2890	1780	NP	NP
Certain-teed Pds.	239	(59)	NP	NP
City Investing	215	NP	NP	NP
Central Foundary	NP	NP	NP	NP
Duplan Corp.	1500	387	NP	NP
Evans Pds.	(805)	343	(641)	(635)
Fansteel Inc.	795	NP	NP	NP
Financial Fed.	(377)	NP	NP	NP
General Hosts	480	NP	NP	NP
Granby Mining	(98)	(317)	NP	148
Leesona Corp.	11	1062	647	NP
Loew's Corp.	622	247	(209)	NP
MacAndrews & Forbes	868	NP	NP	NP
MEI Inc.	701	856	NP	NP
National General	346	605	257	NP
Natomas Inc.	7119	1158	NP	3535
Penn. Dixie	396	NP	NP	NP
Phillips Ind.	(1417)	(627)	(97)	NP
Rapid-American	902	380	NP	NP
Republic Corp.	1974	654	NP	NP
Sangamo Electric	597	510	NP	NP
Seagrave Corp.	446	1071	16	NP
Tandy Corp.	(1994)	NP	(696)	(1311)
Total	$19338	$ 7520	$(1781)	$ 1737

NP means a straddle was not purchased in that period.

Table D-9

Profit (Loss) On Straddles Purchased In 1970

Company	First Period	Second Period	Third Period	Fourth Period
Allied Products	$ 1195	$ NP	$ NP	$ NP
American R & D	1568	191	(1008)	(339)
Cenco Instruments	1487	(587)	NP	89
Collins Radio	1513	NP	NP	NP
Computer Sciences	1518	NP	NP	NP
Copper Range	737	2615	299	(223)
Dome Mines	(285)	(1357)	(1062)	(377)
Fairchild Camera	4698	3439	NP	NP
General Am. Oil	78	(278)	NP	(357)
Great Western Unit.	1334	NP	NP	NP
Handleman Co.	857	(31)	N)	44
International Ind.	2094	NP	NP	NP
Itek Corp.	872	1388	(473)	(163)
Kinney Natl'. Svc.	37	(161)	NP	NP
Loew's Corp.	818	(315)	NP	NP
Midwest Oil	(1725)	1015	1040	(1193)
Natomas Inc.	1925	1775	NP	(927)
Pennzoil United	970	NP	NP	NP
Pittston Co.	(1254)	489	NP	489
Ryder Systems	361	443	(54)	NP
Sante Fe Int'l.	591	NP	NP	NP
Studebaker-Worth.	(464)	(378)	985	75
Schaeffer F & M	(281)	1169	508	NP
Talley Ind.	1995	NP	NP	NP
U. S. Smelting	566	(307)	NP	(613)
X Tra Inc.	1288	NP	NP	NP
Zapata Norness	1686	NP	NP	NP
Total	$24213	$ 9119	$ 235	$(3495)

NP means a straddle was not purchased in that period.