

WATCH GUARD CAPITAL LLC INVESTMENT THEORY PRIMER

STEPHEN P. PALUGA

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I was born in 1983 and spent the first five years of my life living above a now-condemned bar as a jukebox playing Lynyrd Skynrd's "Free Bird" lulled me to sleep. Today, Zillow.com estimates the value of the next house I lived in until I left for college at \$12,340, which means it has appreciated over time. Needless to say, there was no college fund for me when I graduated Galion High School so I joined the Ohio Air National Guard which offered eight semesters of free tuition to any state university in exchange for a six-year commitment. None of this adds real value to this paper but it does explain how I found myself at Kent State University in a consumer behavior class working towards a master's in economics. Imagine my skepticism when my professor stated that individuals make rational monetary decisions and appropriately prepare for their financial future. However, the course of events described and eventual master's degree obtained gave me a unique perspective to question Consumer Behavior Economics then and Modern Portfolio Theory now, so I wouldn't change a thing.

In 1952, Harry Markowitz authored *Portfolio Selection*, which laid the foundation for Modern Portfolio Theory (MPT), a Nobel Prize winning theory on portfolio management and investment selection strategies. The theory was first introduced as a gospel set of economics during my studies at Kent, reiterated as the only acceptable way to manage life savings when I was becoming a CERTIFIED FINANCIAL PLANNER™, and finally as one I was forced to question after analyzing the 21-year gap between the introduction of MPT and the investment markets I specialized in after becoming a lead option and hedging strategist for one of the largest Registered Investment Advisories (RIA) in the country.

To be clear, I feel that Harry Markowitz is one of the most underrated contributors to the investing world and had my parents had a better understanding of his work, they would know that it would take a one-time payment of \$324 in 1983 to purchase that \$12,340 house in 2017 (assuming they had invested in a S&P 500® Index tracking fund). That being said, Markowitz wrote *Portfolio Selection* in 1952 when brokers used paper tickets to manually record stock purchases and sells, whereas in 2017 they are paying millions of dollars to shave 1 microsecond (1 millionth of one second) off trading lag times between servers. Technologies have changed and theories must be revisited. Specifically, the following assumptions of MPT are questioned in this paper:

- All fluctuations (variance) should be avoided;
- Static models are used for convenience; and
- Shorting (hedging) investments is prohibited.

Each page of this paper begins with a quote by Markowitz from *Portfolio Selection* in *italics* and his theory is then either accepted or refuted.

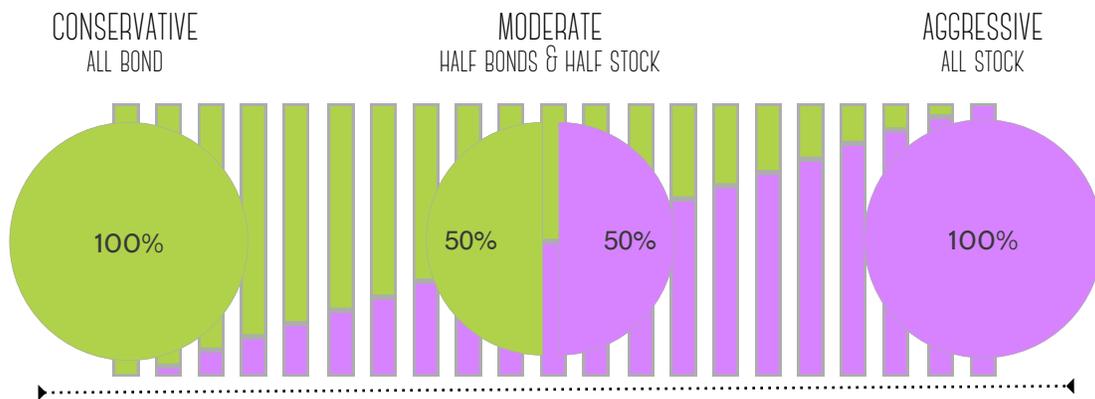
DISCLAIMERS

- Past performance does not guarantee future returns, investments may lose value and are generally not FDIC insured.
- The analysis presented does not consider investor taxes, management and investment fees, or trading commissions.
- Options, futures, and hedging may not be suitable for all investors, or they may be suitable only at certain times.
- Models presented are simplified versions of those Watch Guard Capital LLC uses in its strategies and are intended to explain complex concepts for educational purposes. Actual investor returns may have differed.

PORTFOLIO SELECTION

“The process of selecting a portfolio may be divided into two stages. The first stage starts with observation and experience and ends with beliefs about the future performances of available securities. The second stage starts with the relevant beliefs about future performances and ends with the choice of portfolio.”

-Harry Markowitz. Portfolio Selection, p. 77.



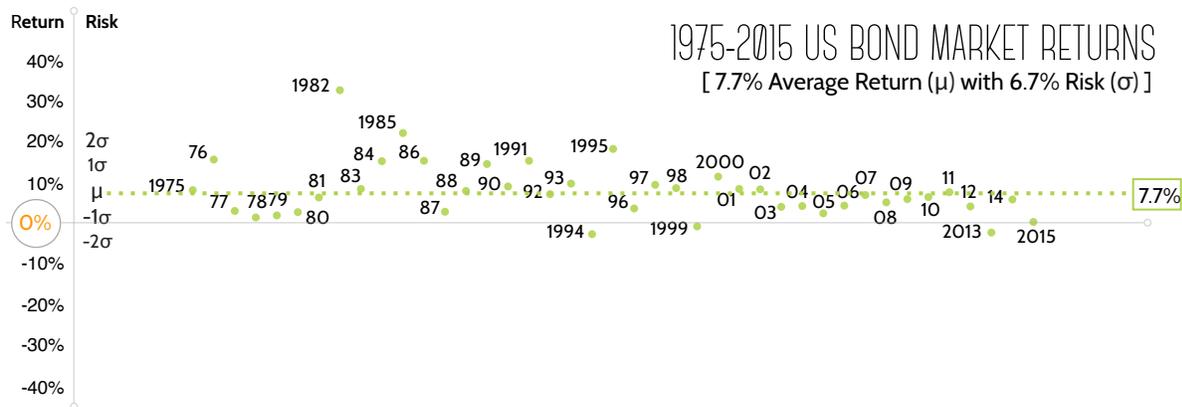
Investors should make the choice between selecting a conservative, moderate, or aggressive portfolio. Three possible portfolios represented above are a conservative all-bond portfolio, a balanced moderate half bond half stock portfolio, and an aggressive all stock portfolio. Although many potential investments could be selected from the conservative and aggressive universes, we will begin by considering portfolios comprised of a conservative US bond index (Bloomberg Barclay's US Aggregate Bond Index), an aggressive US large company stock index (S&P 500 Stock Index), or any combination of the two.

EXPECTED RETURNS

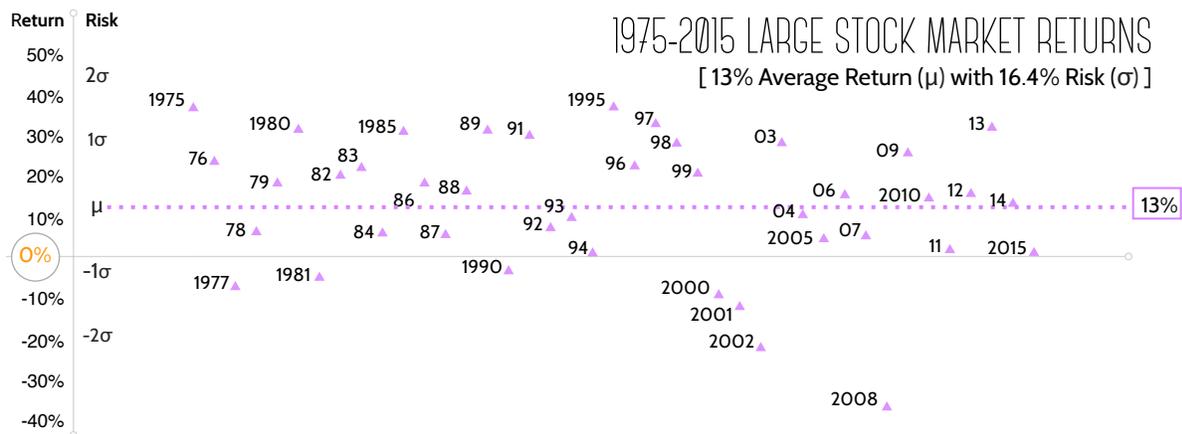
“The portfolio with maximum expected return is not necessarily the one with minimum variance. There is a rate at which the investor can gain expected return by taking on variance, or reduce variance by giving up expected return.”

-Harry Markowitz. Portfolio Selection, p. 79.

The 1975 to 2015 annual returns for the conservative (US Aggregate Bond Index) and aggressive (S&P 500 Stock Index) portfolios are displayed below. The aggressive portfolio had both higher expected returns and variance.



The conservative bond portfolio was relatively stable between 1975 and 2015 with reduced variance as indicated by the narrow range of returns. It had an average return of 7.7%, and a risk factor (standard deviation) of 6.7%. The worst and best years were -2.6% in 2013 and 32.6% in 1982. There were three years with negative returns.

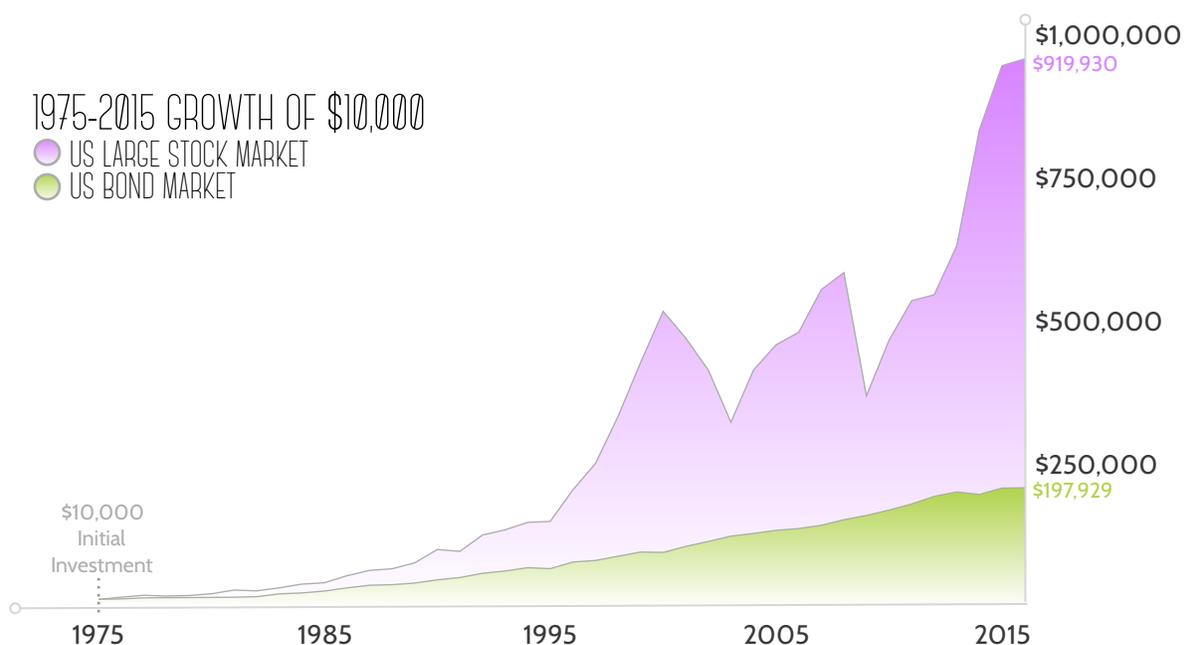


The aggressive large stock portfolio had a wider range of outcomes and more variance than the conservative portfolio between 1975 and 2015. It had an average return of 13.0% and a risk factor (standard deviation) of 16.4%. The worst and best years were -37.0% in 2008 and 37.5% in 1995. There were seven years with negative returns.

COMPOUND RETURNS

"...if the investor wished to maximize "anticipated" return from the portfolio he would place all his funds in that security with maximum anticipated returns."

-Harry Markowitz. Portfolio Selection, p. 79.



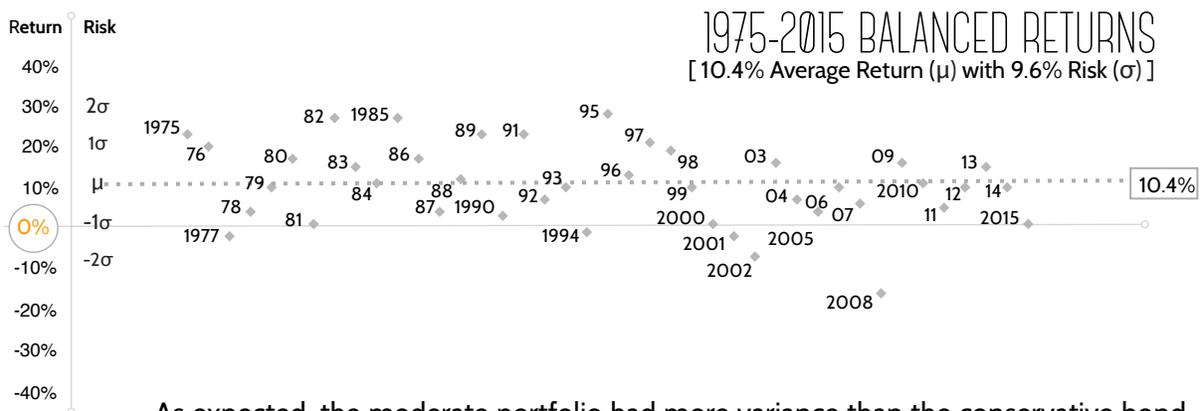
The graph demonstrates the power of compound returns and shows the growth of \$10,000 conservatively invested in either the bond market (green) or aggressively invested in the large stock market (purple) from 1975 to 2015. The stock market investment resulted in a final balance of almost five times more than the bond market even though the stock market had more than twice as many negative years. If an investor wanted to maximize anticipated returns and had a long time horizon, he or she would invest in stocks and would tolerate more return instability and variance.

DIVERSIFICATION

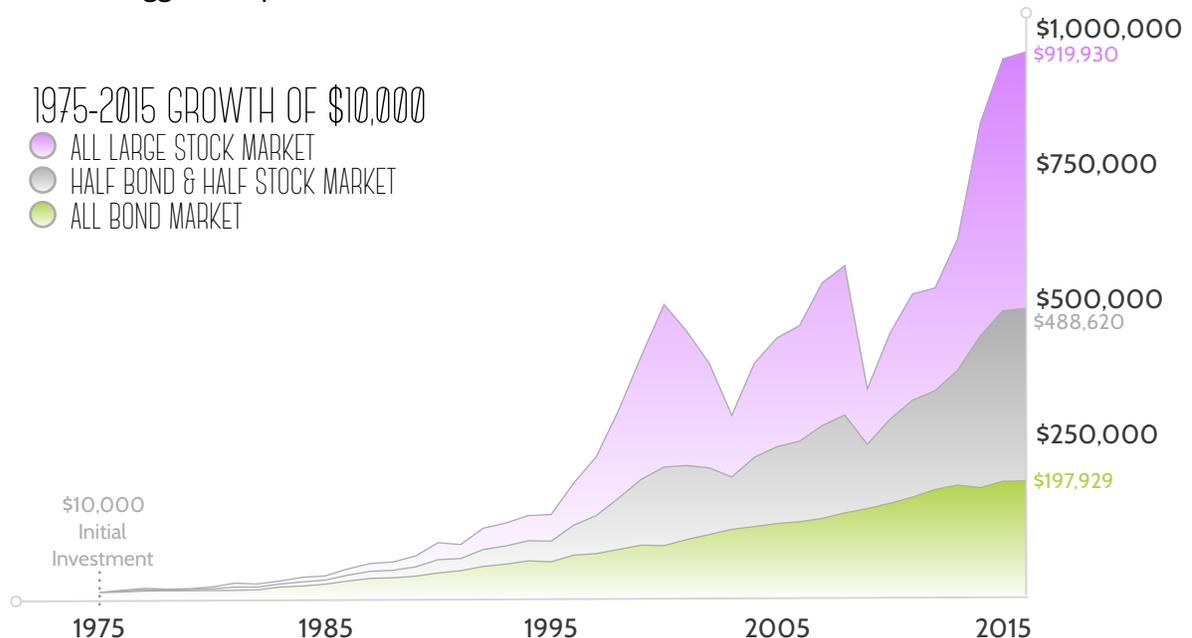
“Diversification is both observed and sensible; a rule of behavior which does not imply the superiority of diversification must be rejected both as a hypothesis and as a maxim.”

-Harry Markowitz. Portfolio Selection, p. 77.

We first considered an investor who selected the extreme portfolios, all bonds or all stocks. Now we will consider an investor who chose a balanced portfolio of half bonds and half stocks and rebalanced to this allocation on the 1st of every year.



As expected, the moderate portfolio had more variance than the conservative bond portfolio but less than the aggressive stock portfolio. It had an average return of 10.4% and a risk factor (standard deviation) of 9.6%. The worst and best years were -16.0% in 2008 and 27.8% in 1995. There were five years with negative returns. The final balance was more than twice the conservative portfolio and about half of the aggressive portfolio.

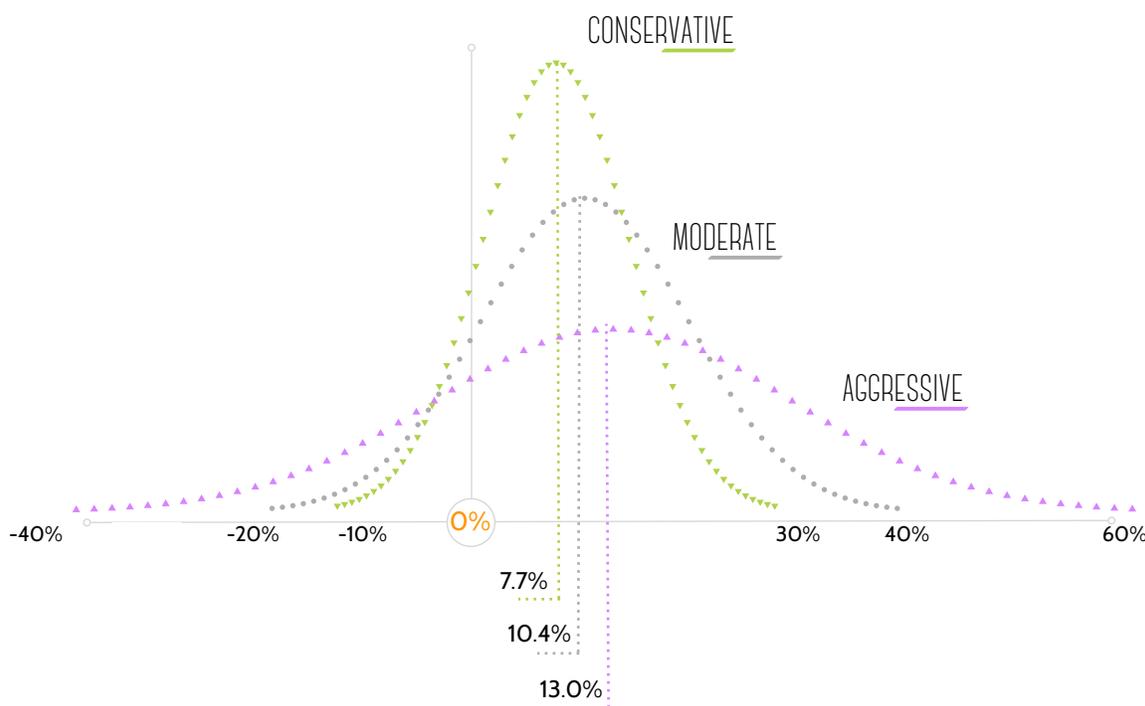


EXPECTED RETURNS AND VARIANCE

"The concepts "yield" and "risk" appear frequently in financial writings. Usually if the term "yield" were replaced by "expected yield" or "expected return," and "risk" by "variance of return," little change of apparent meaning would result. Variance is a well-known measure of dispersion about the expected."

-Harry Markowitz. Portfolio Selection, p. 89.

The expected portfolio returns were calculated by averaging the annual returns between 1975 to 2015 and are represented by the vertical lines. The taller and narrower the curve, the more stable and predictable the returns; the shorter and wider the curve, the more uncertain and unpredictable the returns.



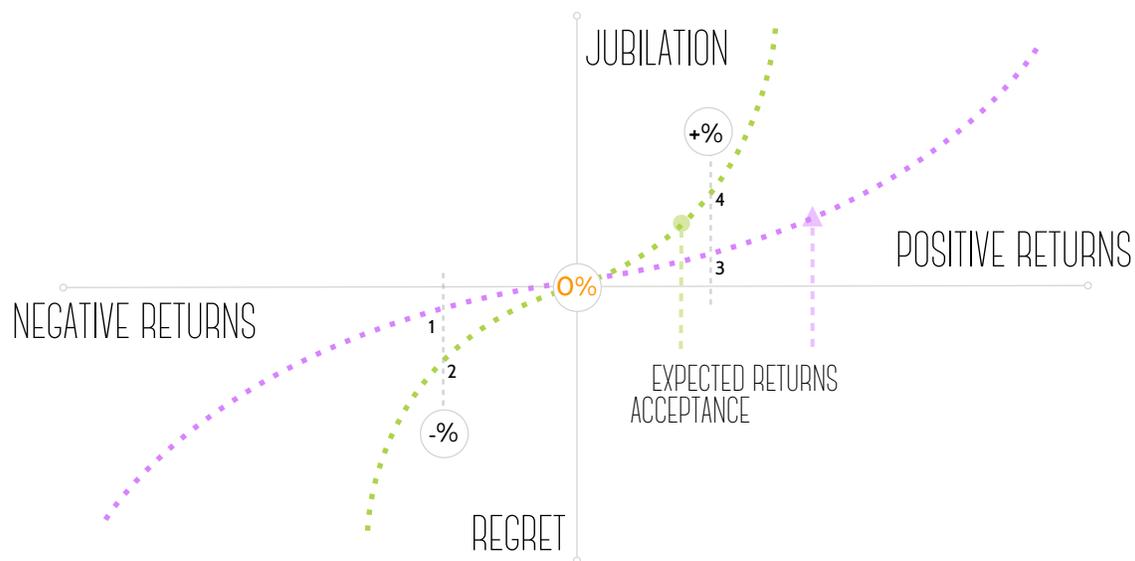
The aggressive stock portfolio has a higher expected return than both the conservative and moderate portfolios, but it requires the investor to take on more risk and accept a wider variance of possible outcomes. These outcomes include larger potential losses as indicated by the distance the potential outcome line extends to the left beyond the vertical 0% reference line into negative return territory.

EMOTIONAL RESPONSE TO VARIANCE

"We next consider the rule that the investor does (or should) consider expected return a desirable thing and variance of return an undesirable thing."

-Harry Markowitz. Portfolio Selection, p. 77.

Never in the history of investing was variance that resulted in a return greater than the expected return considered an undesirable thing. An investor does (or should) consider a negative return an undesirable thing, a positive return above 0% but less than the expected return a less than optimal but acceptable thing, and a return greater than what was expected a desirable thing. The following graph of two investors' emotional responses to different returns depicts a conservative investor (green) and an aggressive investor (purple).



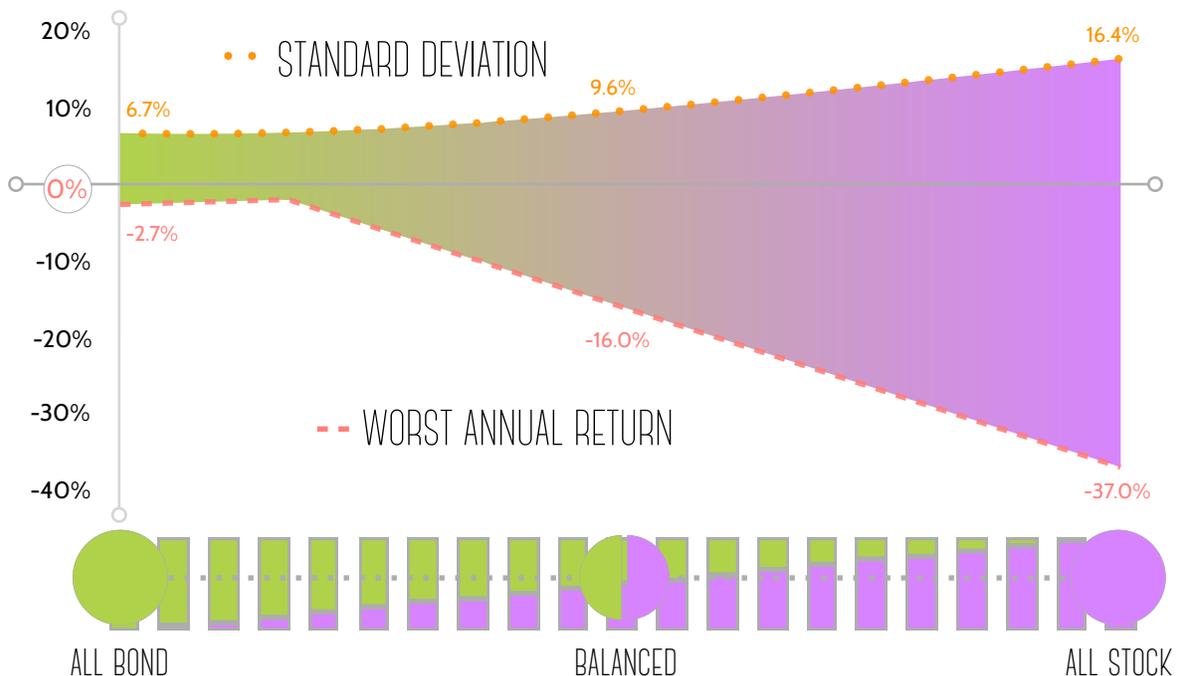
The aggressive investor has a higher tolerance for losses and experiences a lower level of regret (1) for a given negative return (-%) than the conservative investor (2). The aggressive investor requires a higher rate of return and experiences a lower level of jubilation (3) for a given positive return (+%) than the conservative investor (4). Only two emotional response curves are presented but there are as many emotional response curves as there are investors. The exact numbers are not important and are thus omitted. The concept that different investors will have different emotional responses to the same return is important and the basis for a discussion on risk tolerance.

RISK TOLERANCE

“V [Variance] is the average squared deviation of Y [the outcome] from its expected value [average return]. V [Variance] is a commonly used measure of dispersion. Other measures of dispersion, closely related to V [Variance] are the standard deviation, $\sigma = \sqrt{V}$ [standard deviation is equal to the square root of variance] and the co-efficient of variation, σ/E [standard deviation divided by the expected return].”

-Harry Markowitz. *Portfolio Selection*, p. 80.

Risk tolerance is an important concept in investing and attempts to quantify the degree of loss an investor can tolerate before experiencing investing regret and potentially abandoning his or her strategy at the worst time possible. As previously stated, investors are typically concerned with negative returns. Variance and standard deviation will always be positive numbers because any number squared will be positive, and the square root of a positive number will also be positive. Additionally, while standard deviation is a popular portfolio risk metric, most investors lack the statistical sophistication to realize that a small increase in standard deviation can lead to substantial increases in variance and potential losses. A difference of 9.7% in standard deviation between the all bond (6.7%) and all large company stock portfolio (16.4%) resulted in a worst annual return difference of -34.3%. As such, investors may be better served by accompanying statistical measures of risk with absolute measures of risk such as maximum historical drawdown or worst annual return as provided below.



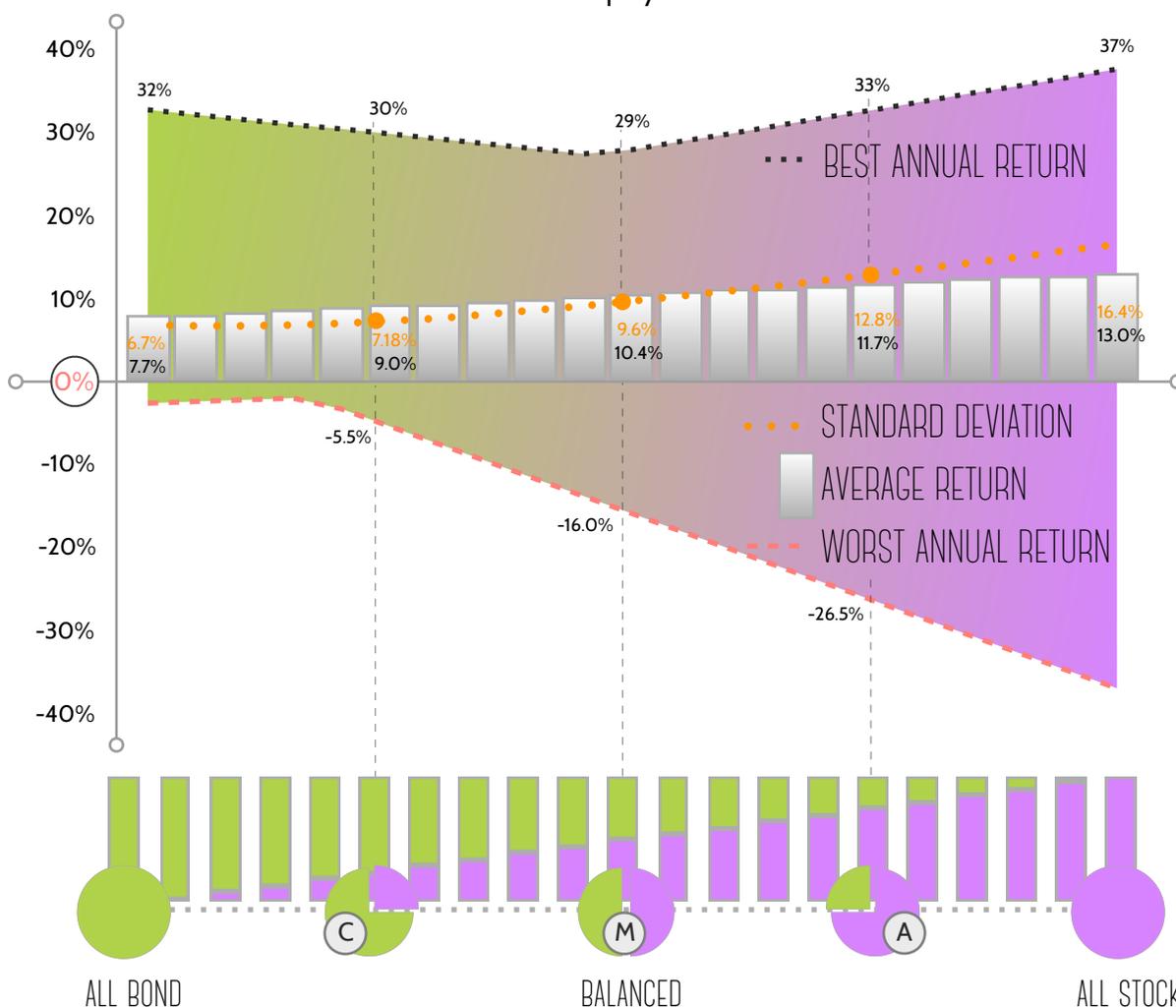
Theory accepted but incomplete, relies too heavily on statistical measures of risk. See Appendix A.

EFFICIENT PORTFOLIOS

"The investor, being informed of what (E [Expected Returns], V [Variance]) combinations were attainable, could state which he desired. We could then find the portfolio which gave this desired combination."

-Harry Markowitz. Portfolio Selection, p. 82.

The previous discussion was dedicated to informing the investor what risk and return combinations were attainable with a two investment portfolio. The risk (standard deviation), best, worst, and average returns of the possible combinations from 1975 to 2015 are displayed below.



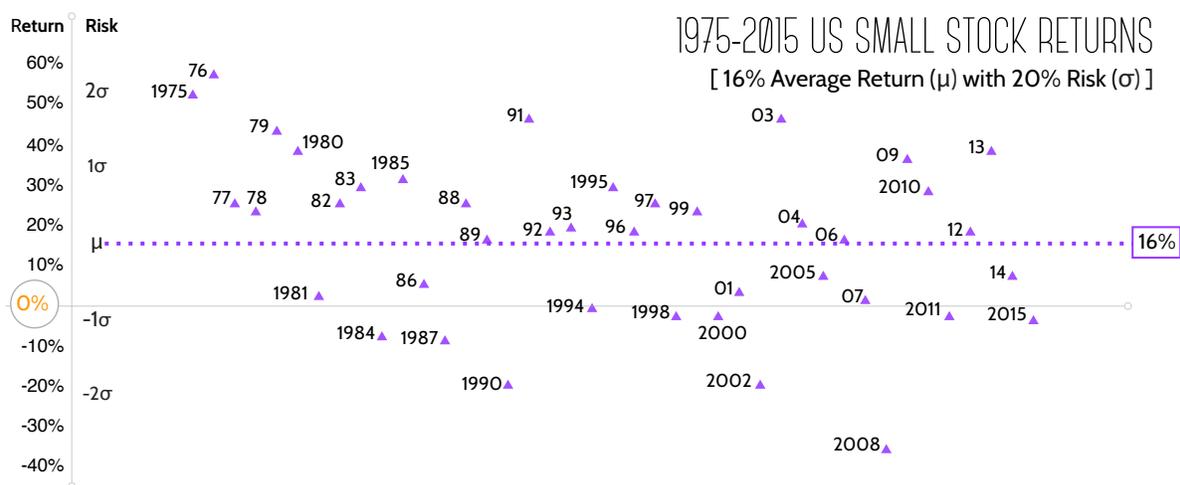
Using approximately -5%, -15%, and -25% as worst annual return caps, it is the author's opinion that the efficient conservative portfolio (C) is a combination of 75% conservative to 25% aggressive investments, the efficient moderate portfolio (M) is 50% conservative to 50% aggressive, and the efficient aggressive portfolio (A) is 75% aggressive to 25% conservative investments.

TACTICAL VARIANCE

“Suppose an investor diversifies between two portfolios (i.e., if he puts some of his money in one portfolio, the rest of his money in the other. An example of diversifying among portfolios is the buying of the shares of two different investment companies). If the two original portfolios have equal variance then typically the variance of the resulting (compound) portfolio will be less than the variance of either original portfolio.”

-Harry Markowitz. *Portfolio Selection*, p. 89.

As previously stated, variance is not necessarily undesirable and should only be avoided or reduced when it results in negative returns. The conservative bond investment was used to reduce variance; specifically, the severity of potential negative outcomes. This reduction was at the cost of expected or average returns. The US small company stock market (Russell 2000 Index) will now be introduced as a more aggressive investment with greater variance and average returns than the US large company stock index to recapture lost expected returns.



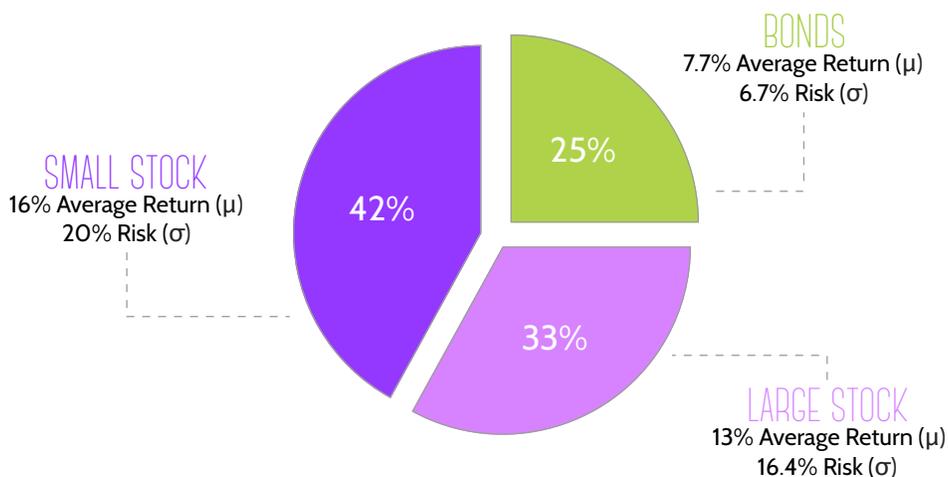
The aggressive small stock portfolio had a wider range of outcomes and more variance than the aggressive large stock portfolio. The small stock market had an average return of 16.2% versus the large stock market at 13.0% and a risk factor (standard deviation) of 20.4% versus 16.4%. The worst and best years for the small stock portfolio were -36.0% in 2008 and 57.0% in 1976. There were ten years with negative returns.

EXPECTED RETURNS

“The expected value of a weighted sum is the weighted sum of the expected values. I.e., $E(R) = a_1E(R_1) + a_2E(R_2) + \dots + a_nE(R_n)$. The variance of a weighted sum is not as simple. To express it we must define “covariance” [a measure of the degree of joint variability and directional relationship between investments].”

-Harry Markowitz. Portfolio Selection, p. 80.

The 1975 to 2015 expected (average) values for the US investment indexes were 13.0% for large stock, 16.2% for small stock, and 7.7% for bonds. The investor gave up 0.053% of expected return for every 1% bond allocation ($[7.7 - 13.0\%] * 1\% = -0.053\%$) and gained 0.032% of expected return for every 1% small stock allocation ($[16.2 - 13.0] * 1\% = 0.032\%$) when compared to the large stock market. Thus, a portfolio required roughly 1.66% ($0.053/0.032 = 1.656$) of small stock per 1% of bonds to maintain an expected portfolio return of 13.0%. A portfolio's expected return increases with additional small stock allocations but not necessarily the portfolio's risk (variance) which is dependent on the covariance of the underlying investments. Using the 25% bond allocation target in the aggressive portfolio for risk reduction purposes, the portfolio requires approximately 42% small stock allocation ($25\% * 1.66 = 41.5\%$) to recapture the lost expected return. The remaining 33% is allocated to large stock.



$$\text{Expected(Return)} = a_1E(R_1) + a_2E(R_2) + a_3E(R_3)$$

$$E(R) = (\text{Wt. Large} * R_L) + (\text{Wt. Small} * R_S) + (\text{Wt. Bond} * R_B)$$

$$E(R) = 33\% (13.0\%) + 42\% (16.2\%) + 25\% (7.7\%)$$

$$E(R) = 4.3\% + 6.8\% + 1.9\%$$

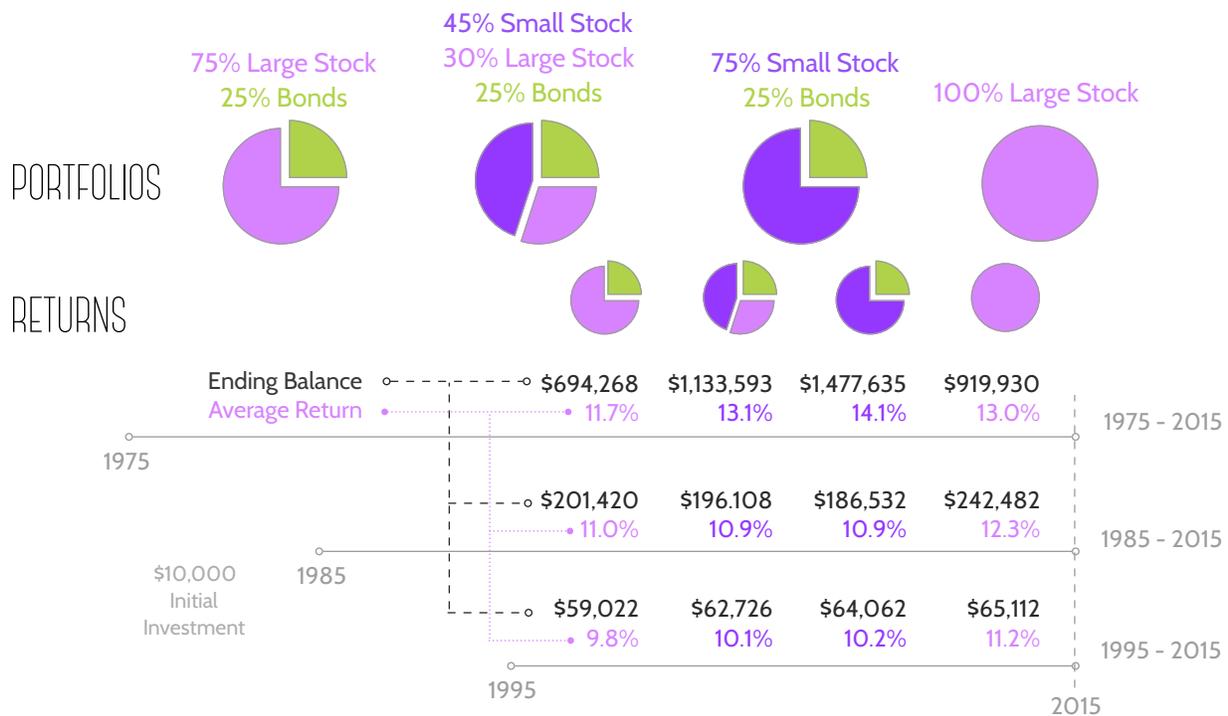
$$E(R) = 13.0\%$$

AVERAGE VS. COMPOUND RETURNS

“In a general presentation we must recognize that the probability distribution of yields of the various securities is a function of time.”

-Harry Markowitz. Portfolio Selection, p. 79.

The previous calculations used 40 year average returns to optimize portfolio allocations, but averages do not capture the complete investor experience unless the rate of return was constant. Consider an investment that produces +200% in year one and -100% in year two. An initial investment of \$100 would be \$300 at the end of year one and \$0 at the end of year two but would still report a respectable 50% “average” over two years $([200\% + (-100\%)]/2=50\%)$. Therefore, it is important to look at the “distribution of yields as a function of time,” or the compound rate of return to see if a respectable average was contingent on a certain investing period. The compound and average returns for four aggressive portfolios over three separate time periods are displayed below.



The calculated ending balances demonstrate the impact time has on a portfolio. An additional ten years of time horizon yielded three to four times larger portfolios. Additionally, while portfolio two (45% small stock, 30% large stock, and 25% bonds) had roughly the same expected return as portfolio four (100% large stock) over 40 years, the actual returns were significantly more. However, this was not the case from 1985 to 2015 or 1995 to 2015. 1975 to 1985 was favorable to small stocks and portfolios with increased small stock exposure vastly outperformed those without. 1985 to 1998 was favorable to large stocks so small stock exposure caused underperformance.

Theory accepted but incomplete, averages can be misleading. See Appendix D.

STATIC VS. DYNAMIC PORTFOLIOS

"It will be convenient at this point to consider a static model."

-Harry Markowitz. Portfolio Selection, p. 78.

One underlying assumption of Modern Portfolio Theory (MPT) is that an investor's allocation model is static or constant. The assumption is "convenient" for backtesting risk characteristics such as variance and standard deviation, estimating future returns, and for providing an investor with a simple and non-emotional investing strategy. Dynamic or shifting portfolios are more complex, their return expectations are harder to calculate, and they may encourage an investor to attempt to predict the future or even abandon the efficiency of investment allocations and rebalancing guidelines altogether. One way to combat these potential risks is to predefine the signals that would invoke tactical shifts. The investor would predefine his or her normal strategic portfolio, the non-emotional quantitative signals or triggers, and the tactical portfolios that would be shifted into and out of. Thus, the strategy could be perfectly tailored to the investor's risk tolerance and goals.

STATIC PORTFOLIO EXAMPLE

Moderate Portfolio
50% Bond, 50% Stock
Static, does not shift

50% Bond
30% Small Stock
20% Large Stock



DYNAMIC PORTFOLIO EXAMPLES

Conservative Portfolio
75% Bond, 25% Stock
Dynamic, one shift,
maximum 50% stock

75% Bond
15% Small Stock
10% Large Stock



+

50% Bond
30% Small Stock
20% Large Stock



-

75% Bond
15% Small Stock
10% Large Stock



Moderate Portfolio
50% Bond, 50% Stock
Dynamic, multiple shifts,
maximum 100% stock

50% Bond
30% Small Stock
20% Large Stock



+



+

60% Small Stock
40% Large Stock



-



50% Bond
30% Small Stock
20% Large Stock



Aggressive Portfolio
25% Bond, 75% Stock
Dynamic, one shift,
maximum 100% stock

25% Bond
45% Small Stock
30% Large Stock



+



+

60% Small Stock
40% Large Stock



-



25% Bond
45% Small Stock
30% Large Stock



Signals: + Increase Stock %

- Decrease Stock %

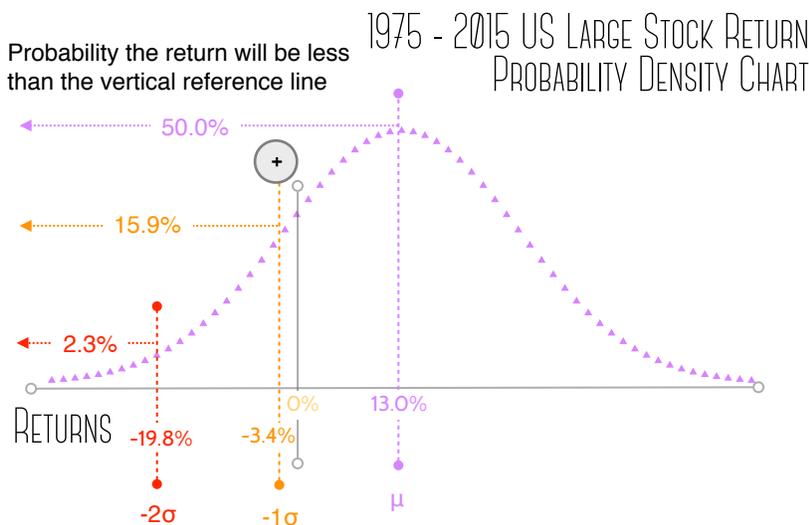
Theory strongly rejected. See next pages.

NON-EMOTIONAL QUANTITATIVE TACTICAL SHIFT SIGNALS

"In our presentation we try to avoid complicated mathematical statements and proofs. As a consequence a price is paid in terms of rigor and generality."

-Harry Markowitz. Portfolio Selection, p. 87.

There is an infinite number of signals sets an investor could use to structure tactical shifts. A price is paid in terms of rigor and generality as only two sets of signals are demonstrated here which are based on standard deviation and full calendar year returns, and are implemented or removed on January 1st after one or two years. The US large stock market is used as the signaling market because most investors are familiar with it and use it as a benchmark for performance comparisons. As previously stated, US large stocks averaged 13.0% between 1975 to 2015 and had a standard deviation of 16.4%. A tactical shift occurs if the return of the large stock market is below -3.4% (-1σ) for the previous calendar year. A return below -19.8% (-2σ) could be used as a shift signal for a more conservative investor. All tactical shifts are removed after one or two successive positive years. Based on this set of parameters, there would have been six potential tactical shifts over the 40 year period.



While this is an acceptable signal set to take advantage of positive returns that typically follow selloffs, it is not the set the author would recommend. This set was presented to avoid complicated mathematical statements utilizing high-water mark referencing, non-standardized shifting periods, and the incorporation of other economic variables that would be prudent to consider.

Shift	Year	Large	Small	Bond
	1975	36.95%	52.45%	8.08%
	1976	23.68%	57.04%	15.60%
	1977	-7.97%	25.11%	3.00%
+	1978	5.90%	23.22%	1.40%
-1	1979	18.00%	42.77%	1.90%
-2	1980	31.90%	38.28%	2.70%
	1981	-5.20%	1.77%	6.30%
+	1982	20.90%	24.61%	32.60%
-1	1983	21.30%	28.80%	8.40%
-2	1984	6.21%	-7.51%	15.15%
	1985	31.23%	30.80%	22.11%
	1986	18.06%	5.46%	15.26%
	1987	4.71%	-9.01%	2.76%
	1988	16.22%	24.61%	7.89%
	1989	31.36%	15.93%	14.53%
	1990	-3.32%	-19.68%	8.96%
	1991	30.22%	45.76%	15.25%
	1992	7.42%	17.93%	7.14%
	1993	9.89%	18.70%	9.68%
	1994	1.18%	-0.51%	-2.66%
	1995	37.45%	28.74%	18.18%
	1996	22.88%	18.12%	3.58%
	1997	33.19%	24.59%	9.44%
	1998	28.62%	-2.61%	8.58%
	1999	21.07%	23.13%	-0.76%
	2000	-9.06%	-2.67%	11.39%
+	2001	-12.02%	3.10%	8.43%
+	2002	-22.15%	-20.02%	8.26%
+	2003	28.50%	45.63%	3.97%
-1	2004	10.74%	19.90%	4.24%
-2	2005	4.77%	7.36%	2.40%
	2006	15.64%	15.64%	4.27%
	2007	5.39%	1.16%	6.92%
	2008	-37.02%	-36.07%	5.05%
+	2009	26.49%	36.12%	5.93%
-1	2010	14.91%	27.72%	6.42%
-2	2011	1.97%	-2.80%	7.56%
	2012	15.82%	18.04%	4.05%
	2013	32.18%	37.62%	-2.26%
	2014	13.51%	7.37%	5.76%
	2015	1.25%	-3.78%	0.30%

NOTE: The 1990 Large Stock Market missed the -1σ (-3.4%) shift signal by -0.08%.

Theory accepted, impossible to model all scenarios but non-emotional quantitative tactical shift signals are not included in MPT.

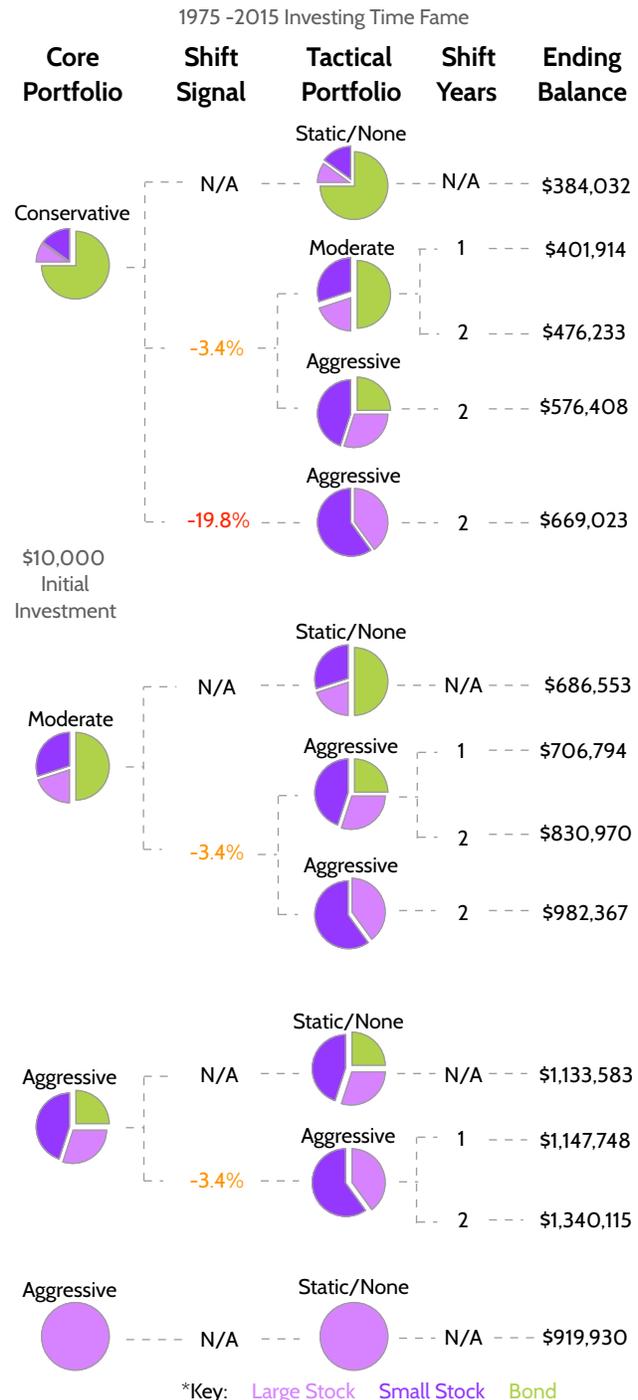
SOCIALLY RESPONSIBLE DYNAMIC SHIFTING

"Various reasons recommend the use of the expected return-variance of return rule, both as a hypothesis to explain well-established investment behavior and as a maxim to guide one's own action. The rule serves better, we will see, as an explanation of, and guide to, "investment" as distinguished from 'speculative' behavior."

-Harry Markowitz. Portfolio Selection, p. 87.

An investor establishes all the key components of an investment plan necessary to avoid "speculative behavior" once selecting a core portfolio allocation and a shift signal set based on acceptable risk tolerance, a tactical portfolio to shift into, and the time frame that the shift will remain in place. The graphic to the right demonstrates the impact tactical shifts have on initial investments of \$10,000 in conservative, moderate, and aggressive portfolios between 1975 to 2015 compared to static allocations. The underlying assumptions are that both annual rebalancing and tactical shifts are initiated or removed on January 1st and that shifts remain in place until the required number of positive return years are sequentially experienced.

Tactical shifts have a strong positive influence on ending balances for all portfolio strategies, and the longer or more aggressive the shift, the larger the expected impact. Conservative investors are able to capture moderate-like returns, moderate investors are able to capture aggressive-like returns, and aggressive investors are able to increase expected returns if they are willing to increase their stock exposure after known selloffs. Additional positive externalities of tactical shifts are increased cash infusions to distressed markets promoting investment and labor market stability, and a reduction in wasted life-hours as investors infuse contingency planning into their investing strategies. Thus, investors acting in their own best interests to minimize personal stress and maximize personal returns by deploying tactical shifts are also investing in a socially responsible manner.



NOTE: Additional pages will cover hedging and income strategies that may not currently be necessary for all investors.

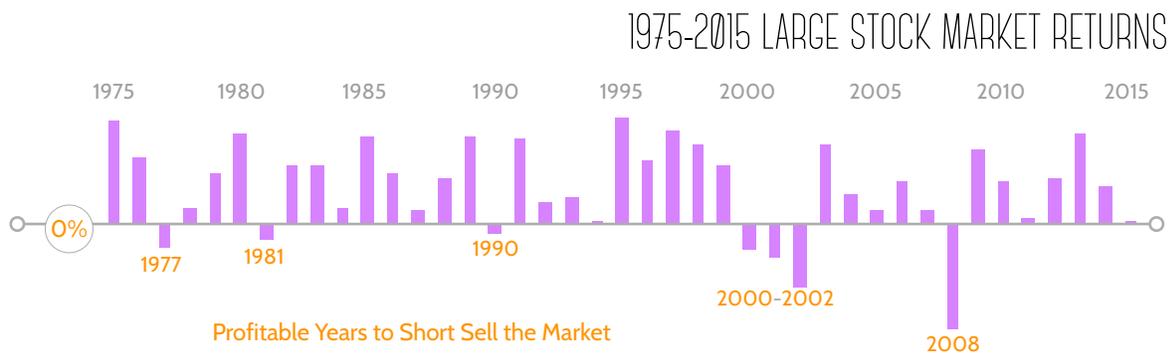
Theory accepted, ruled-based investing is superior to speculation but dynamic shifting not included in MPT. See Appendix E.

SHORT SELLING

“The X_i [investment weights] are not random variables, but are fixed by the investor. Since the X_i are percentages we have $\sum X_i = 1$ [the sum of the investment weights = 100%]. In our analysis we will exclude negative values of the X_i (i.e., short sales); therefore $X_i \geq 0$ for all i [investments weights must be positive for all investments].”

-Harry Markowitz. *Portfolio Selection*, p. 81.

Successful short selling occurs when an investor anticipates a market decline, borrows an investment at a given price, sells it, and later repurchases it at a lower price for a profit. The strategy is considered aggressive because it is counter to the long-term positive return assumptions of the stock market. There were seven full calendar years between 1975 and 2015 that short selling the US large stock market would have been profitable (negative return years) and 33 years that it would have resulted in losses (positive return years).



Excluding short sells is appropriate given the strategy's risk, general non-profitability, and potentially detrimental impact on labor market stability if adopted by the aggregate investing community. However, excluding negative weights in a portfolio is inappropriate given their ability to hedge portfolios, exchange risk, and temper investor emotions. Specific consideration should be given to the potential benefits of structuring negative weights with options because they were not considered in Markowitz's *Portfolio Selection* in 1952 due to the 21-year gap between his publication and the establishment of the Chicago Board Options Exchange in 1973.

OPTIONS

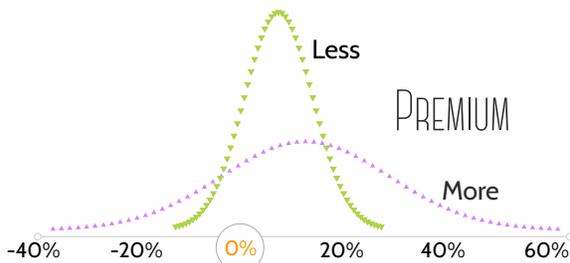
"The returns from securities are too intercorrelated. Diversification cannot eliminate all variance."

-Harry Markowitz. Portfolio Selection, p. 79.

If an investor's goal is to diversify and reduce risk (variance), he or she will select a portfolio of uncorrelated securities. Correlation coefficients measure the degree that securities move in relation to each other and range from +1 to -1. Perfectly positive correlated securities (+1) move in tandem and are poor diversifiers while perfectly negative correlated securities (-1) move exactly opposite of each other and offer a great deal of diversification. Options are contracts that give one investor (option buyer) the right to buy (call) or sell (put) an investment at a given price (strike) for a specified amount of time (expiration date) to another investor (option seller) who accepts the obligation (risk) in exchange for compensation (premium). Certain option strategies reduce risk by providing a high-degree of negative correlation when paired with their underlying investment while other strategies are "naked," aggressive, and speculative in nature. The premium or compensation exchanged between investors will depend on the underlying investment, length of time, risk (volatility), and the strike price.



The further out the expiration date, the more time or days left for the underlying investment price to change and the more premium on a contract.

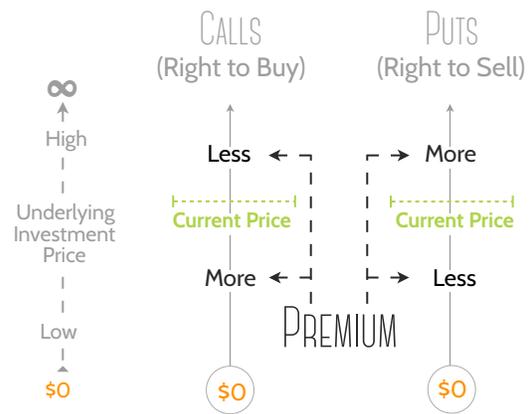


VOLATILITY

The more volatile the investment, the more potential for gains or losses and the more premium on a contract.

CALL OPTION

The lower the potential buy price (strike), the more valuable the call option and the more premium on a call contract.



PUT OPTION

The higher the potential sell price (strike), the more valuable the put option and the more premium on a put contract.

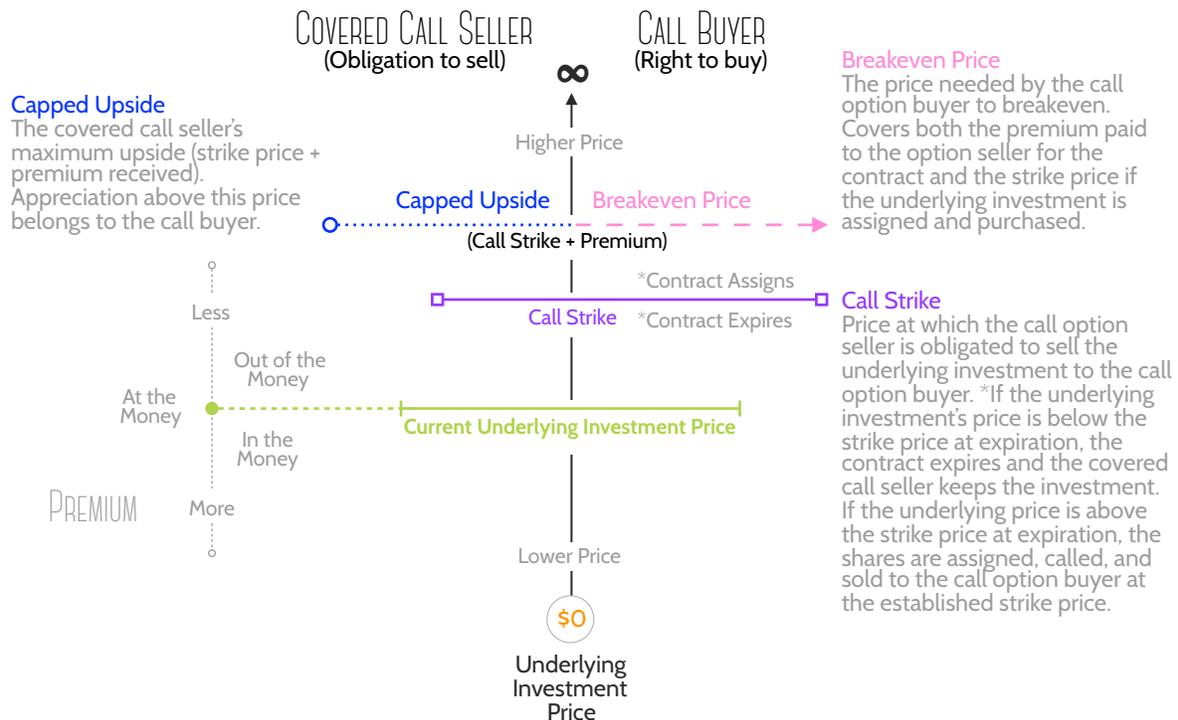
Theory accepted, not all variance can be eliminated but additional diversification can be gained with options. Not included in MPT.

INCREASE YIELD AND REDUCE RISK WITH CALL OPTIONS

“Perhaps-for a great variety of investing institutions which consider yield to be a good thing; risk, a bad thing; gambling, to be avoided-E [expected return], V [variance] efficiency is reasonable as a working hypothesis and a working maxim.”

-Harry Markowitz. Portfolio Selection, p. 91.

Perhaps, for a great variety of investors who consider positive returns a good thing, risk (standard deviation) a bad thing, and/or portfolio income a necessary thing, the shorting of covered calls is a strategy that should be considered. A covered call is shorted when an investor sells the right to purchase an investment she or he owns at an agreed upon strike price, for a specific amount of time, in exchange for market-determined premiums to an option buyer who is speculating that the investment will appreciate enough in price to cover his or her strike price and initial expended premiums. If the market price of the underlying investment is below the agreed upon strike price at the expiration date, the call seller keeps 100% of the exchanged premiums and original shares while the call buyer loses 100% of his or her gambled premiums. If the market price of the underlying investment is above the strike price, the shares are transferred to the option buyer at the agreed upon strike price, or the option seller must compensate the option buyer for the difference to cancel the contract prior to expiration. Thus, the strategy is beneficial to the option seller in down, flat, and slightly up markets but will have an associated opportunity cost in up markets as the option seller “caps” his or her return in exchange for the hedging that the short option provides.



Theory accepted, risk to return investing approach is superior than speculation but can be enhanced with options. Not included in MPT.

REASONABLE RISK ESTIMATES AND PUT OPTIONS

“To use the E-V rule in the selection of securities we must have procedures for finding reasonable μ_{ij} [returns] and σ_{ij} [risk].”

-Harry Markowitz. Portfolio Selection, p. 91

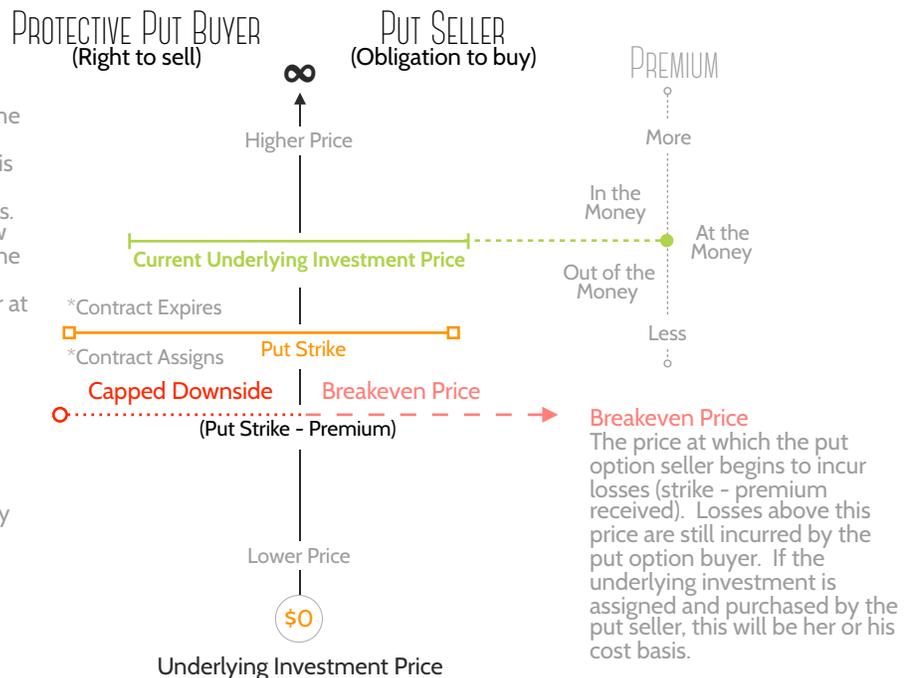
The purchase of a protective put may be appropriate if an investor is able to form a reasonable negative return expectation (i.e., the magnitude of a negative return and the approximate length of time). An investor purchases a put option when he or she believes an investment will decline in value and wishes to insure against the potential losses. The strategy is expensive if employed over long periods of time but very effective over short periods to insure investments or temper against the possibility of emotionally charged speculation. The protective put buyer pays the put seller a market-determined premium based on the perceived risk of the underlying investment, the length of time the contract is valid, and the strike price that the investment will be exchanged at if assigned and transacted.

Put Strike

Price at which the put option seller is obligated to buy the underlying investment from the put option buyer. *If the underlying investment's price is above the strike price at expiration, the contract expires. If the underlying price is below the strike price at expiration, the shares are assigned and purchased by the option seller at the established strike price.

Capped Downside

The put option buyer's maximum downside (strike price - premium paid). Losses below this price are covered by the option seller.



The put buyer has the right to sell the shares at an established strike price but not necessarily the obligation. He or she could sell the contract back to the options market at a gain or loss depending on its current market value if not wanting to transact the underlying investment. The put seller has the obligation to buy the investment at an established strike price but can remove this obligation by buying the contract back at a gain or loss depending on its current market value. For the buyer, a protective put is an effective way to hedge an investment and for the seller, shorting puts can be both an effective income strategy and a mechanism to acquire the underlying investment at or below the strike price.

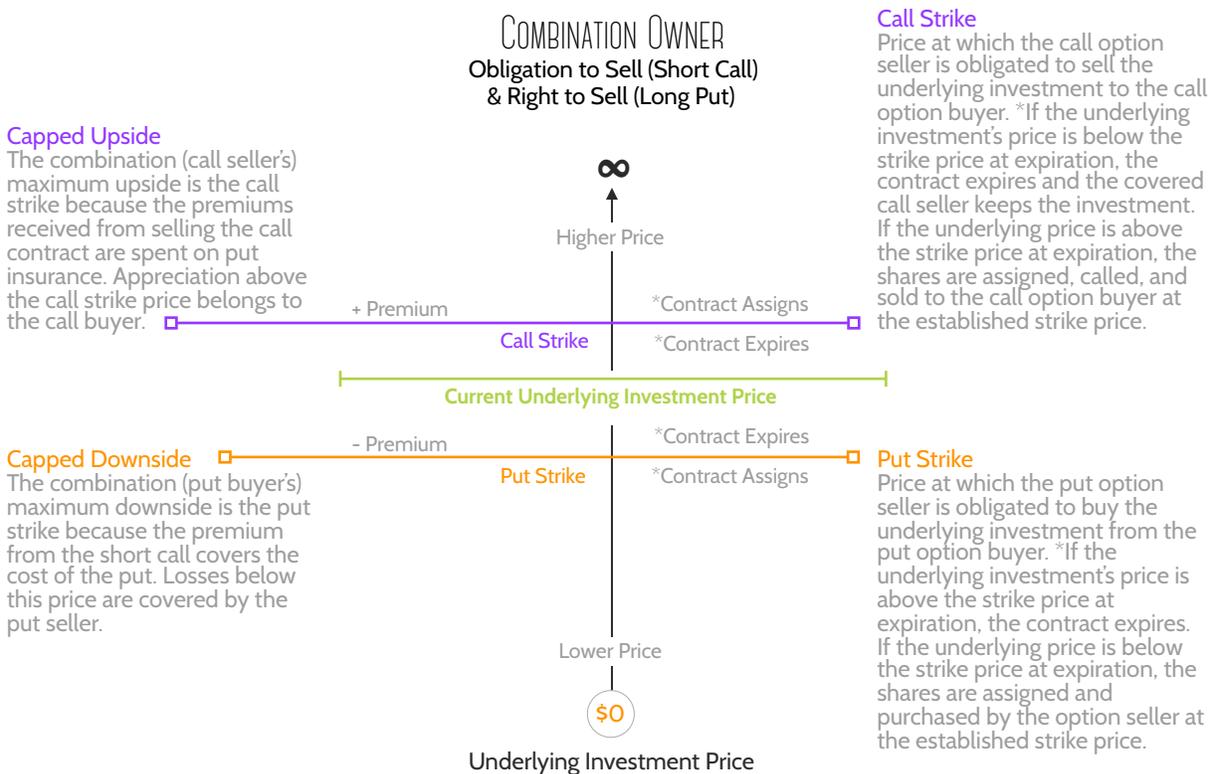
Theory accepted, investors must be able to quantify their expectations to properly use protective puts. Not included in MPT.

COMBINING CALLS AND PUTS

“The adequacy of diversification is not thought by investors to depend solely on the number of different securities held.”

-Harry Markowitz. Portfolio Selection, p. 89

If the goal of diversification is risk reduction, both in variance and absolute negative returns, investors should not depend solely on the number of different securities held and should consider the benefits of structuring a portfolio with securities that have liquid option markets to allow for various strategies in the future if and when they are needed. As previously discussed, shorting the market is typically a poor strategy over long periods, but can be profitable over short periods if the investor is correct on his or her timing. One way to reduce the cost of shorting the market is to do a combination trade which occurs when an investor sells a call option for premium and uses the premium to purchase a protective put contract. The call contract caps the investor’s upside and the put contract caps the investor’s downside. If the market price of the underlying investment is between the established strike prices at expiration, both contracts expire and the investor is free to formulate a new expectation. If the price of the underlying investment declines below the put strike, the call will expire providing slight hedging and the put contract will protect the investor from losses below the established strike price.

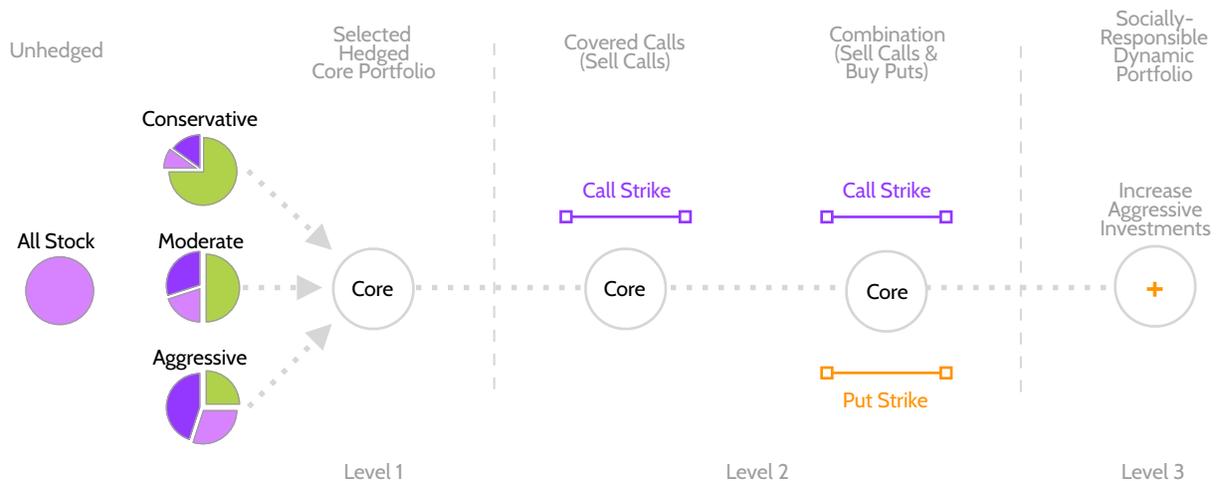


Theory accepted, but utilizing multiple options contracts and strategies may yield additional diversification. Not included in MPT.

HEDGING CONTINUUM

“We assume that the investor does (and should) act as if he had probability beliefs concerning [returns]. In general we would expect that the investor could tell us, for any two events (A and B), whether he personally considered A more likely than B, B more likely than A, or both equally likely. If the investor were consistent in his opinions on such matters, he would possess a system of probability beliefs.”

-Harry Markowitz. Portfolio Selection, p. 81.



If an investor was able to establish a system of probability beliefs and define his or her return expectations, or at least able to define his or her expected reaction to a range of hypothetical returns, the necessary information needed to form a range of portfolio hedging strategies would be available. “Level 1” hedging requires an investor to choose the core-hedged portfolio most aligned with his or her risk tolerance to utilize during normal market operating conditions. “Level 2” hedging is optional and may or may not be utilized by all investors. If portfolios were constructed with investments with viable option markets, an investor concerned with flat to slightly negative return markets could deploy a covered call strategy on all the investments in the portfolio or a targeted strategy on those investments causing concern. If an investor had even greater concern with the potential of negative investment returns, he or she could deploy a combination strategy (sell covered calls and purchase protective puts) and place two layers of option hedging on all investments in the portfolio, or on those investments causing additional concern. “Level 3” hedging would require the investor to establish a contingency plan consisting of a set of trigger signals and tactical portfolios to be used during “Socially-Responsible Dynamic Portfolio” shift years allowing the investor to take advantage of depressed markets after known selloffs by increasing the aggressive investment allocation in portfolios.

CONCLUSION

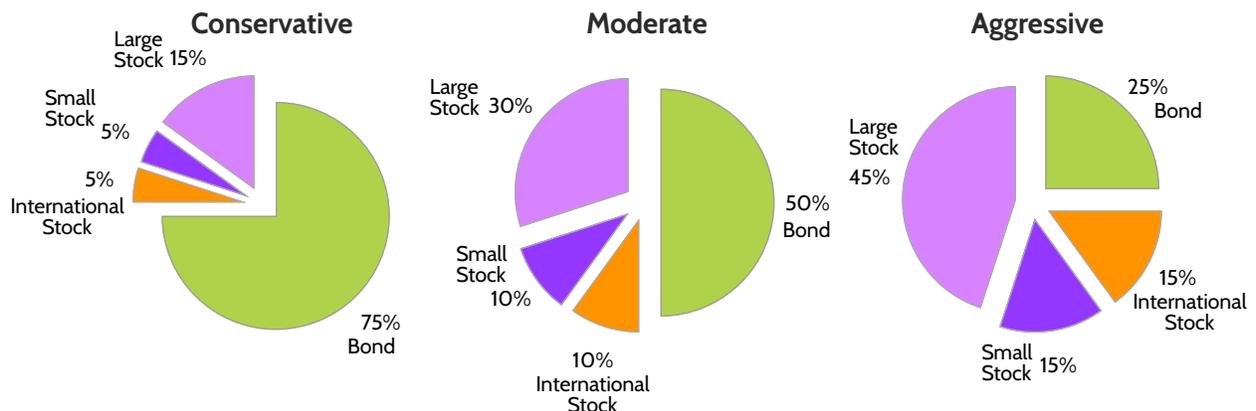
"I believe that what is needed is essentially a 'probabilistic' reformulation of security analysis. I will not pursue this subject here, for this is 'another story.' It is a story of which I have read only the first page of the first chapter."

-Harry Markowitz. Portfolio Selection, p. 91.

I believe that what is needed is a reformulation of security analysis, portfolio management strategies, professional competency and ethical standards, and the manner in which financial literacy is disseminated. As retirement plans increasingly shift from defined-benefit pension systems to defined-contribution 401(k) and Individual Retirement Account systems, the population is due increased quality in both financial education and advice. In an effort to decrease the likelihood of my theories being inappropriately used to facilitate unethical advice and the selection of investments containing conflicts of interests, I present the following three affirmations:

1. The single most important component to amassing wealth is time. I would rather have an extra decade in a diversified stock index fund than a shorter time horizon with most "professional" stock analyst.
2. Reducing downside capture in negative return years is as important as beating "the stock market" in positive return years if one fully understands the benefits of dynamic shifting. That being said, there are too many strategies currently reducing variance at the expense of expected returns.
3. Constructing portfolios with investments possessing liquid options markets increases the ability of future hedging if necessary and decreases the likelihood of conflict of interests if receiving investment advice.

In the spirit of brevity, this paper did not address currency hedging, interest rate risks, low-volatility hedging, option contract selection, section 1256 contracts, investor benchmarking expectations, wash rules and tax-loss harvesting, and many other components that also need to be taken into consideration when optimizing an investing strategy. Had it, it would have explained why the following three portfolios are the basis for Watch Guard Capital LLC's core portfolios. Thank you for reading page one of the first chapter of an economist's plan to fix the inefficiencies in our financial system.



APPENDIX A

Portfolio Metrics

Large Stock Allocation	Bond Allocation	Standard Deviation	Average Return	Worst Year	Best Year	Large Stock Allocation	Bond Allocation	Standard Deviation	Average Return	Worst Year	Best Year
0%	100%	6.69%	7.75%	-2.7%	32.6%	50%	50%	9.56%	10.37%	-16.0%	27.8%
1%	99%	6.66%	7.80%	-2.6%	32.5%	51%	49%	9.67%	10.42%	-16.4%	28.0%
2%	98%	6.64%	7.86%	-2.6%	32.4%	52%	48%	9.79%	10.48%	-16.8%	28.2%
3%	97%	6.62%	7.91%	-2.5%	32.2%	53%	47%	9.91%	10.53%	-17.2%	28.4%
4%	96%	6.60%	7.96%	-2.5%	32.1%	54%	46%	10.04%	10.58%	-17.7%	28.6%
5%	95%	6.59%	8.01%	-2.5%	32.0%	55%	45%	10.16%	10.63%	-18.1%	28.8%
6%	94%	6.58%	8.06%	-2.4%	31.9%	56%	44%	10.28%	10.69%	-18.5%	29.0%
7%	93%	6.58%	8.12%	-2.4%	31.8%	57%	43%	10.41%	10.74%	-18.9%	29.2%
8%	92%	6.58%	8.17%	-2.4%	31.7%	58%	42%	10.53%	10.79%	-19.4%	29.4%
9%	91%	6.59%	8.22%	-2.3%	31.5%	59%	41%	10.66%	10.84%	-19.8%	29.5%
10%	90%	6.60%	8.27%	-2.3%	31.4%	60%	40%	10.79%	10.90%	-20.2%	29.7%
11%	89%	6.61%	8.33%	-2.2%	31.3%	61%	39%	10.92%	10.95%	-20.6%	29.9%
12%	88%	6.63%	8.38%	-2.2%	31.2%	62%	38%	11.05%	11.00%	-21.0%	30.1%
13%	87%	6.65%	8.43%	-2.2%	31.1%	63%	37%	11.18%	11.05%	-21.5%	30.3%
14%	86%	6.67%	8.48%	-2.1%	31.0%	64%	36%	11.31%	11.11%	-21.9%	30.5%
15%	85%	6.70%	8.54%	-2.1%	30.8%	65%	35%	11.44%	11.16%	-22.3%	30.7%
16%	84%	6.73%	8.59%	-2.0%	30.7%	66%	34%	11.58%	11.21%	-22.7%	30.9%
17%	83%	6.77%	8.64%	-2.1%	30.6%	67%	33%	11.71%	11.26%	-23.1%	31.1%
18%	82%	6.81%	8.69%	-2.5%	30.5%	68%	32%	11.84%	11.32%	-23.6%	31.3%
19%	81%	6.85%	8.75%	-2.9%	30.4%	69%	31%	11.98%	11.37%	-24.0%	31.5%
20%	80%	6.90%	8.80%	-3.4%	30.3%	70%	30%	12.12%	11.42%	-24.4%	31.7%
21%	79%	6.95%	8.85%	-3.8%	30.1%	71%	29%	12.25%	11.47%	-24.8%	31.9%
22%	78%	7.00%	8.90%	-4.2%	30.0%	72%	28%	12.39%	11.53%	-25.2%	32.1%
23%	77%	7.06%	8.96%	-4.6%	29.9%	73%	27%	12.53%	11.58%	-25.7%	32.2%
24%	76%	7.12%	9.01%	-5.0%	29.8%	74%	26%	12.67%	11.63%	-26.1%	32.4%
25%	75%	7.18%	9.06%	-5.5%	29.7%	75%	25%	12.80%	11.68%	-26.5%	32.6%
26%	74%	7.25%	9.11%	-5.9%	29.6%	76%	24%	12.94%	11.74%	-26.9%	32.8%
27%	73%	7.32%	9.17%	-6.3%	29.4%	77%	23%	13.08%	11.79%	-27.3%	33.0%
28%	72%	7.39%	9.22%	-6.7%	29.3%	78%	22%	13.22%	11.84%	-27.8%	33.2%
29%	71%	7.46%	9.27%	-7.2%	29.2%	79%	21%	13.36%	11.89%	-28.2%	33.4%
30%	70%	7.54%	9.32%	-7.6%	29.1%	80%	20%	13.51%	11.95%	-28.6%	33.6%
31%	69%	7.62%	9.38%	-8.0%	29.0%	81%	19%	13.65%	12.00%	-29.0%	33.8%
32%	68%	7.71%	9.43%	-8.4%	28.9%	82%	18%	13.79%	12.05%	-29.4%	34.0%
33%	67%	7.79%	9.48%	-8.8%	28.7%	83%	17%	13.93%	12.10%	-29.9%	34.2%
34%	66%	7.88%	9.53%	-9.3%	28.6%	84%	16%	14.08%	12.16%	-30.3%	34.4%
35%	65%	7.97%	9.59%	-9.7%	28.5%	85%	15%	14.22%	12.21%	-30.7%	34.6%
36%	64%	8.06%	9.64%	-10.1%	28.4%	86%	14%	14.36%	12.26%	-31.1%	34.8%
37%	63%	8.16%	9.69%	-10.5%	28.3%	87%	13%	14.51%	12.31%	-31.6%	34.9%
38%	62%	8.25%	9.74%	-10.9%	28.2%	88%	12%	14.65%	12.37%	-32.0%	35.1%
39%	61%	8.35%	9.80%	-11.4%	28.0%	89%	11%	14.80%	12.42%	-32.4%	35.3%
40%	60%	8.45%	9.85%	-11.8%	27.9%	90%	10%	14.94%	12.47%	-32.8%	35.5%
41%	59%	8.56%	9.90%	-12.2%	27.8%	91%	9%	15.09%	12.52%	-33.2%	35.7%
42%	58%	8.66%	9.95%	-12.6%	27.7%	92%	8%	15.24%	12.57%	-33.7%	35.9%
43%	57%	8.77%	10.01%	-13.0%	27.6%	93%	7%	15.38%	12.63%	-34.1%	36.1%
44%	56%	8.88%	10.06%	-13.5%	27.5%	94%	6%	15.53%	12.68%	-34.5%	36.3%
45%	55%	8.99%	10.11%	-13.9%	27.3%	95%	5%	15.68%	12.73%	-34.9%	36.5%
46%	54%	9.10%	10.16%	-14.3%	27.2%	96%	4%	15.82%	12.78%	-35.3%	36.7%
47%	53%	9.21%	10.21%	-14.7%	27.2%	97%	3%	15.97%	12.84%	-35.8%	36.9%
48%	52%	9.32%	10.27%	-15.1%	27.4%	98%	2%	16.12%	12.89%	-36.2%	37.1%
49%	51%	9.44%	10.32%	-15.6%	27.6%	99%	1%	16.27%	12.94%	-36.6%	37.3%
50%	50%	See Next Table, Row 1				100%	0%	16.42%	12.99%	-37.0%	37.5%

* Rebalanced Jan 1st, calculations completed with annual returns, "Large Stock" equal to S&P 500 and "Bond" to Bloomberg Barclay's US Aggregate Bond Index like-returns (see Appendix B).

APPENDIX B

Annual Returns and Growth of \$10,000 Invested in the Bonds, Stocks, and a 50/50 Balanced Portfolio

Year	Total Bond Market Returns (Barclays Agg.)	Growth of \$10,000	50% Total Bond, 50% Large Stock Portfolio Returns	Growth of \$10,000	Large Stock Market Returns (S&P 500 Index)	Growth of \$10,000
1975	8.08%	\$10,808	22.52%	\$12,252	36.95%	\$13,695
1976	15.60%	\$12,494	19.64%	\$14,658	23.68%	\$16,938
1977	3.00%	\$12,869	-2.49%	\$14,293	-7.97%	\$15,588
1978	1.40%	\$13,049	3.65%	\$14,815	5.90%	\$16,508
1979	1.90%	\$13,297	9.95%	\$16,289	18.00%	\$19,479
1980	2.70%	\$13,656	17.30%	\$19,107	31.90%	\$25,693
1981	6.30%	\$14,516	0.55%	\$19,212	-5.20%	\$24,357
1982	32.60%	\$19,249	26.75%	\$24,351	20.90%	\$29,447
1983	8.40%	\$20,866	14.85%	\$27,968	21.30%	\$35,720
1984	15.15%	\$24,027	10.68%	\$30,955	6.21%	\$37,938
1985	22.11%	\$29,339	26.67%	\$39,210	31.23%	\$49,786
1986	15.26%	\$33,816	16.66%	\$45,743	18.06%	\$58,777
1987	2.76%	\$34,749	3.74%	\$47,453	4.71%	\$61,546
1988	7.89%	\$37,491	12.06%	\$53,176	16.22%	\$71,529
1989	14.53%	\$42,939	22.95%	\$65,380	31.36%	\$93,960
1990	8.96%	\$46,786	2.82%	\$67,224	-3.32%	\$90,840
1991	15.25%	\$53,921	22.74%	\$82,511	30.22%	\$118,292
1992	7.14%	\$57,771	7.28%	\$88,517	7.42%	\$127,070
1993	9.68%	\$63,363	9.79%	\$97,183	9.89%	\$139,637
1994	-2.66%	\$61,677	-0.74%	\$96,464	1.18%	\$141,285
1995	18.18%	\$72,890	27.82%	\$123,300	37.45%	\$194,196
1996	3.58%	\$75,500	13.23%	\$139,613	22.88%	\$238,628
1997	9.44%	\$82,627	21.32%	\$169,379	33.19%	\$317,828
1998	8.58%	\$89,716	18.60%	\$200,883	28.62%	\$408,791
1999	-0.76%	\$89,035	10.16%	\$221,293	21.07%	\$494,923
2000	11.39%	\$99,176	1.17%	\$223,882	-9.06%	\$450,083
2001	8.43%	\$107,536	-1.80%	\$219,852	-12.02%	\$395,983
2002	8.26%	\$116,419	-6.95%	\$204,572	-22.15%	\$308,273
2003	3.97%	\$121,040	16.24%	\$237,795	28.50%	\$396,130
2004	4.24%	\$126,172	7.49%	\$255,606	10.74%	\$438,675
2005	2.40%	\$129,201	3.59%	\$264,782	4.77%	\$459,600
2006	4.27%	\$134,717	9.96%	\$291,154	15.64%	\$531,481
2007	6.92%	\$144,040	6.16%	\$309,089	5.39%	\$560,128
2008	5.05%	\$151,314	-15.99%	\$259,666	-37.02%	\$352,769
2009	5.93%	\$160,287	16.21%	\$301,758	26.49%	\$446,217
2010	6.42%	\$170,577	10.67%	\$333,955	14.91%	\$512,748
2011	7.56%	\$183,473	4.77%	\$349,885	1.97%	\$522,849
2012	4.05%	\$190,904	9.94%	\$384,664	15.82%	\$605,564
2013	-2.26%	\$186,589	14.96%	\$442,209	32.18%	\$800,434
2014	5.76%	\$197,337	9.64%	\$484,838	13.51%	\$908,573
2015	0.30%	\$197,929	0.78%	\$488,620	1.25%	\$919,930
Ending Value	All Bonds	\$197,929	Balanced 50/50	\$488,620	All Large Stock	\$919,930
Average Returns		7.75%		10.37%		12.99%
Standard Deviation		6.69%		9.56%		16.42%

^ Rebalancing occurs on Jan 1st

Data Sources:

www.portfoliovisualizer.com

Bonds: 1975-1986 Bloomberg Barclays US Aggregate Bond Index
1987-2015 Vanguard Total Bond Index Fund (VBMFX)

Stocks: 1975-1976 Professor Kenneth French's Research Data
1977-2015 Vanguard 500 Index Fund (VFIX)

APPENDIX C

Small Stock Market Returns

Year	Small Stock Market Returns (Russell 2000)	Growth of \$10,000
1975	52.45%	\$15,245
1976	57.04%	\$23,941
1977	25.11%	\$29,952
1978	23.22%	\$36,907
1979	42.77%	\$52,692
1980	38.28%	\$72,863
1981	1.77%	\$74,153
1982	24.61%	\$92,402
1983	28.80%	\$119,013
1984	-7.51%	\$110,075
1985	30.80%	\$143,979
1986	5.46%	\$151,840
1987	-9.01%	\$138,159
1988	24.61%	\$172,160
1989	15.93%	\$199,585
1990	-19.68%	\$160,307
1991	45.76%	\$233,663
1992	17.93%	\$275,559
1993	18.70%	\$327,089
1994	-0.51%	\$325,421
1995	28.74%	\$418,946
1996	18.12%	\$494,860
1997	24.59%	\$616,546
1998	-2.61%	\$600,454
1999	23.13%	\$739,339
2000	-2.67%	\$719,598
2001	3.10%	\$741,906
2002	-20.02%	\$593,376
2003	45.63%	\$864,134
2004	19.90%	\$1,036,096
2005	7.36%	\$1,112,353
2006	15.64%	\$1,286,325
2007	1.16%	\$1,301,247
2008	-36.07%	\$831,887
2009	36.12%	\$1,132,365
2010	27.72%	\$1,446,256
2011	-2.80%	\$1,405,761
2012	18.04%	\$1,659,360
2013	37.62%	\$2,283,611
2014	7.37%	\$2,451,913
2015	-3.78%	\$2,359,231
Ending Value	All Small Stock	\$2,359,231
Average Returns		16.17%
Standard Deviation		20.37%

Data Sources:

www.portfoliovisualizer.com

Stocks: 1975-1989 Professor Kenneth French's Research Data

1990-2015 Vanguard Small Cap Index Fund (NAESX)

APPENDIX D

Backtesting the Growth of \$10,000 Invested in Multiple Aggressive Portfolios over 20, 30, and 40 Years

Year	Portfolio Returns	Growth of \$10,000 (1975-2015)	Growth of \$10,000 (1985-2015)	Growth of \$10,000 (1995-2015)	Portfolio Returns	Growth of \$10,000 (1975-2015)	Growth of \$10,000 (1985-2015)	Growth of \$10,000 (1995-2015)
1975	29.73%	\$12,973			36.71%	\$13,671		
1976	21.66%	\$15,783			36.67%	\$18,684		
1977	-5.23%	\$14,958			9.66%	\$20,489		
1978	4.78%	\$15,672			12.57%	\$23,064		
1979	13.98%	\$17,863			25.12%	\$28,858		
1980	24.60%	\$22,257			27.47%	\$36,785		
1981	-2.33%	\$21,739			0.81%	\$37,084		
1982	23.83%	\$26,919			25.49%	\$46,538		
1983	18.08%	\$31,784			21.45%	\$56,521		
1984	8.45%	\$34,469			2.27%	\$57,804		
1985	28.95%	\$44,447	\$12,895		28.76%	\$74,427	\$12,876	
1986	17.36%	\$52,163	\$15,134		11.69%	\$83,127	\$14,381	
1987	4.22%	\$54,366	\$15,773		-1.95%	\$81,505	\$14,100	
1988	14.14%	\$62,052	\$18,002		17.91%	\$96,105	\$16,626	
1989	27.15%	\$78,900	\$22,891		20.21%	\$115,527	\$19,986	
1990	-0.25%	\$78,703	\$22,833		-7.61%	\$106,733	\$18,465	
1991	26.48%	\$99,542	\$28,879		33.47%	\$142,457	\$24,645	
1992	7.35%	\$106,858	\$31,002		12.08%	\$159,666	\$27,622	
1993	9.84%	\$117,370	\$34,051		13.80%	\$181,703	\$31,434	
1994	0.22%	\$117,629	\$34,126		-0.54%	\$180,720	\$31,264	
1995	32.63%	\$156,014	\$45,263	\$13,263	28.71%	\$232,611	\$40,241	\$12,871
1996	18.06%	\$184,182	\$53,435	\$15,658	15.91%	\$269,626	\$46,645	\$14,920
1997	27.25%	\$234,376	\$67,997	\$19,925	23.38%	\$332,671	\$57,551	\$18,408
1998	23.61%	\$289,712	\$84,051	\$24,629	9.56%	\$364,463	\$63,051	\$20,167
1999	15.61%	\$334,944	\$97,174	\$28,475	16.54%	\$424,744	\$73,479	\$23,503
2000	-3.95%	\$321,722	\$93,338	\$27,351	-1.07%	\$420,190	\$72,692	\$23,251
2001	-6.91%	\$299,499	\$86,890	\$25,461	-0.10%	\$419,755	\$72,616	\$23,227
2002	-14.55%	\$255,929	\$74,250	\$21,757	-13.59%	\$362,715	\$62,749	\$20,070
2003	22.37%	\$313,174	\$90,858	\$26,624	30.08%	\$471,805	\$81,621	\$26,107
2004	9.12%	\$341,720	\$99,140	\$29,051	13.24%	\$534,258	\$92,425	\$29,563
2005	4.18%	\$355,996	\$103,281	\$30,264	5.34%	\$562,803	\$97,363	\$31,142
2006	12.80%	\$401,554	\$116,499	\$34,137	12.80%	\$634,828	\$109,823	\$35,128
2007	5.77%	\$424,734	\$123,223	\$36,108	3.87%	\$659,389	\$114,072	\$36,487
2008	-26.50%	\$312,169	\$90,566	\$26,539	-26.08%	\$487,454	\$84,328	\$26,973
2009	21.35%	\$378,817	\$109,902	\$32,204	25.68%	\$612,649	\$105,986	\$33,900
2010	12.79%	\$427,258	\$123,956	\$36,323	18.55%	\$726,307	\$125,649	\$40,190
2011	3.37%	\$441,646	\$128,130	\$37,546	1.22%	\$735,176	\$127,183	\$40,680
2012	12.88%	\$498,519	\$144,630	\$42,381	13.88%	\$837,192	\$144,832	\$46,325
2013	23.57%	\$616,020	\$178,719	\$52,370	26.02%	\$1,055,013	\$182,514	\$58,378
2014	11.57%	\$687,309	\$199,401	\$58,430	8.81%	\$1,147,954	\$198,593	\$63,521
2015	1.01%	\$694,268	\$201,420	\$59,022	-1.25%	\$1,133,593	\$196,108	\$62,726
Ending Value	75% Large Stock, 25% Bond	\$694,268	\$201,420	\$59,022	30% Large Stock, 25% Bond, 45% Small Stock	\$1,133,593	\$196,108	\$62,726
Average Returns		11.68%	11.02%	9.81%		13.11%	10.95%	10.07%
Standard Deviation		12.80%	13.18%	14.10%		13.71%	13.43%	13.74%

* Rebalanced Jan 1st, "Large Stock" equal to S&P 500, "Small Stock" to Russell 2000, and "Bond" to Bloomberg Barclay's US Aggregate Bond Index like-returns (see Appendix A)

Backtesting the Growth of \$10,000 Invested in Multiple Aggressive Portfolios over 20, 30, and 40 Years

Year	Portfolio Returns	Growth of \$10,000 (1975-2015)	Growth of \$10,000 (1985-2015)	Growth of \$10,000 (1995-2015)	Portfolio Returns	Growth of \$10,000 (1975-2015)	Growth of \$10,000 (1985-2015)	Growth of \$10,000 (1995-2015)
1975	41.36%	\$14,136			36.95%	\$13,695		
1976	46.68%	\$20,734			23.68%	\$16,938		
1977	19.58%	\$24,795			-7.97%	\$15,588		
1978	17.77%	\$29,199			5.90%	\$16,508		
1979	32.55%	\$38,705			18.00%	\$19,479		
1980	29.39%	\$50,078			31.90%	\$25,693		
1981	2.90%	\$51,531			-5.20%	\$24,357		
1982	26.61%	\$65,243			20.90%	\$29,447		
1983	23.70%	\$80,705			21.30%	\$35,720		
1984	-1.85%	\$79,216			6.21%	\$37,938		
1985	28.63%	\$101,894	\$12,863		31.23%	\$49,786	\$13,123	
1986	7.91%	\$109,953	\$13,880		18.06%	\$58,777	\$15,493	
1987	-6.07%	\$103,282	\$13,038		4.71%	\$61,546	\$16,223	
1988	20.43%	\$124,382	\$15,702		16.22%	\$71,529	\$18,854	
1989	15.58%	\$143,761	\$18,148		31.36%	\$93,960	\$24,767	
1990	-12.52%	\$125,762	\$15,876		-3.32%	\$90,840	\$23,944	
1991	38.13%	\$173,719	\$21,930		30.22%	\$118,292	\$31,180	
1992	15.23%	\$200,180	\$25,270		7.42%	\$127,070	\$33,494	
1993	16.45%	\$233,100	\$29,426		9.89%	\$139,637	\$36,807	
1994	-1.05%	\$230,658	\$29,118		1.18%	\$141,285	\$37,241	
1995	26.10%	\$290,860	\$36,717	\$12,610	37.45%	\$194,196	\$51,188	\$13,745
1996	14.49%	\$332,991	\$42,036	\$14,437	22.88%	\$238,628	\$62,899	\$16,890
1997	20.80%	\$402,262	\$50,780	\$17,440	33.19%	\$317,828	\$83,776	\$22,496
1998	0.19%	\$403,016	\$50,876	\$17,472	28.62%	\$408,791	\$107,752	\$28,934
1999	17.16%	\$472,163	\$59,605	\$20,470	21.07%	\$494,923	\$130,456	\$35,030
2000	0.85%	\$476,153	\$60,108	\$20,643	-9.06%	\$450,083	\$118,636	\$31,856
2001	4.43%	\$497,259	\$62,772	\$21,558	-12.02%	\$395,983	\$104,376	\$28,027
2002	-12.95%	\$432,864	\$54,643	\$18,766	-22.15%	\$308,273	\$81,257	\$21,819
2003	35.22%	\$585,296	\$73,886	\$25,375	28.50%	\$396,130	\$104,415	\$28,038
2004	15.99%	\$678,856	\$85,697	\$29,431	10.74%	\$438,675	\$115,629	\$31,049
2005	6.12%	\$720,402	\$90,941	\$31,232	4.77%	\$459,600	\$121,145	\$32,530
2006	12.80%	\$812,596	\$102,580	\$35,229	15.64%	\$531,481	\$140,092	\$37,618
2007	2.60%	\$833,723	\$105,247	\$36,145	5.39%	\$560,128	\$147,643	\$39,645
2008	-25.79%	\$618,706	\$78,104	\$26,823	-37.02%	\$352,769	\$92,986	\$24,969
2009	28.57%	\$795,486	\$100,420	\$34,488	26.49%	\$446,217	\$117,617	\$31,583
2010	22.40%	\$973,635	\$122,909	\$42,211	14.91%	\$512,748	\$135,154	\$36,292
2011	-0.21%	\$971,590	\$122,651	\$42,122	1.97%	\$522,849	\$137,817	\$37,007
2012	14.54%	\$1,112,883	\$140,487	\$48,248	15.82%	\$605,564	\$159,619	\$42,861
2013	27.65%	\$1,420,596	\$179,332	\$61,589	32.18%	\$800,434	\$210,985	\$56,654
2014	6.97%	\$1,519,576	\$191,827	\$65,880	13.51%	\$908,573	\$239,489	\$64,308
2015	-2.76%	\$1,477,635	\$186,532	\$64,062	1.25%	\$919,930	\$242,482	\$65,112
Ending Value	75% Small Stock, 25% Bond	\$1,477,635	\$186,532	\$64,062	100% Large Cap	\$919,930	\$242,482	\$65,112
Average Returns		14.06%	10.90%	10.25%		12.99%	12.29%	11.15%
Standard Deviation		15.54%	14.52%	14.34%		16.42%	17.00%	18.76%

APPENDIX E

Annual Returns and Growth of \$10,000 Invested in the Core Conservative, Moderate, and Aggressive Portfolios

Year	15% Small Stock, 10% Large Stock, 75% Bond	Growth of \$10,000	30% Small Stock, 20% Large Stock, 50% Bond	Growth of \$10,000	45% Small Stock, 30% Large Stock, 25% Bond	Growth of \$10,000
1975	17.62%	\$11,762	27.17%	\$12,717	36.71%	\$13,671
1976	22.62%	\$14,423	29.65%	\$16,487	36.67%	\$18,684
1977	5.22%	\$15,175	7.44%	\$17,713	9.66%	\$20,489
1978	5.12%	\$15,952	8.85%	\$19,280	12.57%	\$23,064
1979	9.64%	\$17,490	17.38%	\$22,631	25.12%	\$28,858
1980	10.96%	\$19,407	19.21%	\$26,979	27.47%	\$36,785
1981	4.47%	\$20,275	2.64%	\$27,692	0.81%	\$37,084
1982	30.23%	\$26,404	27.86%	\$35,408	25.49%	\$46,538
1983	12.75%	\$29,770	17.10%	\$41,463	21.45%	\$56,521
1984	10.86%	\$33,003	6.56%	\$44,184	2.27%	\$57,804
1985	24.33%	\$41,033	26.54%	\$55,911	28.76%	\$74,427
1986	14.07%	\$46,806	12.88%	\$63,112	11.69%	\$83,127
1987	1.19%	\$47,363	-0.38%	\$62,872	-1.95%	\$81,505
1988	11.23%	\$52,682	14.57%	\$72,034	17.91%	\$96,105
1989	16.42%	\$61,332	18.32%	\$85,227	20.21%	\$115,527
1990	3.44%	\$63,442	-2.09%	\$83,448	-7.61%	\$106,733
1991	21.32%	\$76,968	27.40%	\$106,310	33.47%	\$142,457
1992	8.79%	\$83,734	10.43%	\$117,401	12.08%	\$159,666
1993	11.05%	\$92,986	12.43%	\$131,992	13.80%	\$181,703
1994	-1.95%	\$91,173	-1.25%	\$130,346	-0.54%	\$180,720
1995	21.69%	\$110,948	25.20%	\$163,196	28.71%	\$232,611
1996	7.69%	\$119,480	11.80%	\$182,456	15.91%	\$269,626
1997	14.09%	\$136,315	18.74%	\$216,639	23.38%	\$332,671
1998	8.91%	\$148,461	9.23%	\$236,637	9.56%	\$364,463
1999	5.01%	\$155,899	10.77%	\$262,130	16.54%	\$424,744
2000	7.24%	\$167,186	3.08%	\$270,209	-1.07%	\$420,190
2001	5.59%	\$176,531	2.74%	\$277,615	-0.10%	\$419,755
2002	0.98%	\$178,261	-6.31%	\$260,109	-13.59%	\$362,715
2003	12.67%	\$200,847	21.37%	\$315,704	30.08%	\$471,805
2004	7.24%	\$215,389	10.24%	\$348,026	13.24%	\$534,258
2005	3.38%	\$222,669	4.36%	\$363,207	5.34%	\$562,803
2006	7.11%	\$238,500	9.96%	\$399,365	12.80%	\$634,828
2007	5.90%	\$252,572	4.89%	\$418,877	3.87%	\$659,389
2008	-5.33%	\$239,110	-15.70%	\$353,114	-26.08%	\$487,454
2009	12.51%	\$269,022	19.10%	\$420,555	25.68%	\$612,649
2010	10.46%	\$297,162	14.51%	\$481,569	18.55%	\$726,307
2011	5.45%	\$313,358	3.33%	\$497,625	1.22%	\$735,176
2012	7.33%	\$336,327	10.60%	\$550,378	13.88%	\$837,192
2013	7.17%	\$360,441	16.59%	\$641,696	26.02%	\$1,055,013
2014	6.78%	\$384,879	7.79%	\$691,704	8.81%	\$1,147,954
2015	-0.22%	\$384,032	-0.73%	\$686,627	-1.25%	\$1,133,593
Ending Value	Conservative	\$384,032	Moderate	\$686,627	Aggressive	\$1,133,593
Average Returns		9.54%		11.32%		13.11%
Standard Deviation		7.21%		9.99%		13.71%

* Rebalanced Jan 1st, "Large Stock" equal to S&P 500, "Small Stock" to Russell 2000, and "Bond" to Bloomberg Barclay's US Aggregate Bond Index-like returns (see Appendix A)

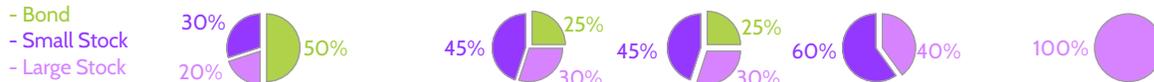
Annual Returns of Core Conservative Portfolio & Growth of \$10,000 with Moderate and Aggressive Tactical Shifts



Year	Core Conservative Portfolio Returns	Growth of \$10,000 (1975-2015)	Core + 1 Year Tactical Shift to Moderate (-3.4% [-1σ] Shift Signal)	Core + 2 Year Tactical Shift to Moderate (-3.4% [-1σ] Shift Signal)	Core + 2 Year Tactical Shift to Aggressive (-3.4% [-1σ] Shift Signal)	Core + 2 Year Tactical Shift to Aggressive (-19.8% [-2σ] Shift Signal)	Shift Signal & Shift Year	Large Stock Returns (Shift Signal Reference)
1975	17.62%	\$11,762	17.62%	17.62%	17.62%	17.62%		36.95%
1976	22.62%	\$14,423	22.62%	22.62%	22.62%	22.62%		23.68%
1977	5.22%	\$15,176	5.22%	5.22%	5.22%	5.22%	-1σ	-7.97%
1978	5.12%	\$15,954	+ 8.85%	+ 8.85%	+ 12.57%	5.12%	+	5.90%
1979	9.64%	\$17,492	- 9.64%	17.38%	25.12%	9.64%	+	18.00%
1980	10.96%	\$19,408	10.96%	- 10.96%	- 10.96%	10.96%		31.90%
1981	4.47%	\$20,276	4.47%	4.47%	4.47%	4.47%	-1σ	-5.20%
1982	30.23%	\$26,406	+ 27.86%	+ 27.86%	+ 25.49%	30.23%	+	20.90%
1983	12.75%	\$29,772	- 12.75%	17.1%	21.45%	12.75%	+	21.30%
1984	10.86%	\$33,005	10.86%	- 10.86%	- 10.86%	10.86%		6.21%
1985	24.33%	\$41,033	24.33%	24.33%	24.33%	24.33%		31.23%
1986	14.07%	\$46,807	14.07%	14.07%	14.07%	14.07%		18.06%
1987	1.19%	\$47,363	1.19%	1.19%	1.19%	1.19%		4.71%
1988	11.23%	\$52,683	11.23%	11.23%	11.23%	11.23%		16.22%
1989	16.42%	\$61,335	16.42%	16.42%	16.42%	16.42%		31.36%
1990	3.44%	\$63,442	3.44%	3.44%	3.44%	3.44%		-3.32%
1991	21.32%	\$76,970	21.32%	21.32%	21.32%	21.32%		30.22%
1992	8.79%	\$83,733	8.79%	8.79%	8.79%	8.79%		7.42%
1993	11.05%	\$92,989	11.05%	11.05%	11.05%	11.05%		9.89%
1994	-1.95%	\$91,173	-1.95%	-1.95%	-1.95%	-1.95%		1.18%
1995	21.69%	\$110,949	21.69%	21.69%	21.69%	21.69%		37.45%
1996	7.69%	\$119,482	7.69%	7.69%	7.69%	7.69%		22.88%
1997	14.09%	\$136,314	14.09%	14.09%	14.09%	14.09%		33.19%
1998	8.91%	\$148,453	8.91%	8.91%	8.91%	8.91%		28.62%
1999	5.01%	\$155,886	5.01%	5.01%	5.01%	5.01%		21.07%
2000	7.24%	\$167,166	7.24%	7.24%	7.24%	7.24%	-1σ	-9.06%
2001	5.59%	\$176,503	+ 2.74%	+ 2.74%	+ -0.10%	5.59%	+ -1σ	-12.02%
2002	0.98%	\$178,227	-6.31%	-6.31%	-13.59%	0.98%	+ -2σ	-22.15%
2003	12.67%	\$200,812	21.37%	21.37%	30.08%	+ 38.78%	+	28.50%
2004	7.24%	\$215,349	- 7.24%	10.24%	13.24%	16.24%	+	10.74%
2005	3.38%	\$222,630	3.38%	- 3.38%	- 3.38%	- 3.38%		4.77%
2006	7.11%	\$238,464	7.11%	7.11%	7.11%	7.11%		15.64%
2007	5.90%	\$252,541	5.90%	5.9%	5.90%	5.90%		5.39%
2008	-5.33%	\$239,093	-5.33%	-5.33%	-5.33%	-5.33%	-2σ	-37.02%
2009	12.51%	\$269,014	+ 19.10%	+ 19.1%	+ 25.68%	+ 32.27%	+	26.49%
2010	10.46%	\$297,164	- 10.46%	14.51%	18.55%	22.6%	+	14.91%
2011	5.45%	\$313,351	5.45%	- 5.45%	- 5.45%	- 5.45%		1.97%
2012	7.33%	\$336,305	7.33%	7.33%	7.33%	7.33%		15.82%
2013	7.17%	\$360,405	7.17%	7.17%	7.17%	7.17%		32.18%
2014	6.78%	\$384,828	6.78%	6.78%	6.78%	6.78%		13.51%
2015	-0.22%	\$383,993	-0.22%	-0.22%	-0.22%	-0.22%		1.25%
Ending Value	\$383,993	\$401,914	\$476,233	\$576,408	\$669,023	\$919,930		
Average Returns	9.54%	9.70%	10.16%	10.79%	11.17%	12.99%		
Standard Deviation	7.21%	7.72%	7.89%	9.31%	9.35%	16.42%		

* Portfolio rebalanced and tactical shifts implemented and removed on Jan 1st, "Large Stock" equal to S&P 500, "Small Stock" to Russell 2000, and "Bond" to Bloomberg Barclay's US Aggregate Bond Index-like returns (see Appendix A)

Annual Returns of Core Moderate Portfolio & Growth of \$10,000 Invested with Multiple Aggressive Tactical Shifts



Year	Core Moderate Portfolio Returns	Growth of \$10,000 (1975-2015)	Core + 1 Year Tactical Shift to Aggressive (-3.4% [-1σ] Shift Signal)	Core + 2 Year Tactical Shift to Aggressive (-3.4% [-1σ] Shift Signal)	Core + 2 Year Tactical Shift to Full Aggressive (-3.4% [-1σ] Shift Signal)	Shift Signal & Shift Year	Large Stock Returns (Shift Signal Reference)
1975	27.17%	\$12,717	27.17%	27.17%	27.17%		36.95%
1976	29.65%	\$16,487	29.65%	29.65%	29.65%		23.68%
1977	7.44%	\$17,713	7.44%	7.44%	7.44%	-1σ	-7.97%
1978	8.85%	\$19,280	+ 12.57%	+ 12.57%	+ 16.29%	+	5.90%
1979	17.38%	\$22,631	- 17.38%	25.12%	32.86%	+	18.00%
1980	19.21%	\$26,979	19.21%	- 19.21%	- 19.21%		31.90%
1981	2.64%	\$27,692	2.64%	2.64%	2.64%	-1σ	-5.20%
1982	27.86%	\$35,408	+ 25.49%	+ 25.49%	+ 23.13%	+	20.90%
1983	17.10%	\$41,463	- 17.10%	21.45%	25.80%	+	21.30%
1984	6.56%	\$44,184	6.56%	- 6.56%	- 6.56%		6.21%
1985	26.54%	\$55,911	26.54%	26.54%	26.54%		31.23%
1986	12.88%	\$63,112	12.88%	12.88%	12.88%		18.06%
1987	-0.38%	\$62,872	-0.38%	-0.38%	-0.38%		4.71%
1988	14.57%	\$72,034	14.57%	14.57%	14.57%		16.22%
1989	18.32%	\$85,227	18.32%	18.32%	18.32%		31.36%
1990	-2.09%	\$83,448	-2.09%	-2.09%	-2.09%		-3.32%
1991	27.40%	\$106,310	27.40%	27.40%	27.40%		30.22%
1992	10.43%	\$117,401	10.43%	10.43%	10.43%		7.42%
1993	12.43%	\$131,992	12.43%	12.43%	12.43%		9.89%
1994	-1.25%	\$130,346	-1.25%	-1.25%	-1.25%		1.18%
1995	25.20%	\$163,196	25.20%	25.20%	25.20%		37.45%
1996	11.80%	\$182,456	11.80%	11.80%	11.80%		22.88%
1997	18.74%	\$216,639	18.74%	18.74%	18.74%		33.19%
1998	9.23%	\$236,637	9.23%	9.23%	9.23%		28.62%
1999	10.77%	\$262,130	10.77%	10.77%	10.77%		21.07%
2000	3.08%	\$270,209	3.08%	3.08%	3.08%	-1σ	-9.06%
2001	2.74%	\$277,615	+ -0.10%	+ -0.10%	+ -2.95%	+ -1σ	-12.02%
2002	-6.31%	\$260,109	-13.59%	-13.59%	-20.87%	+ -2σ	-22.15%
2003	21.37%	\$315,704	30.08%	30.08%	38.78%	+	28.50%
2004	10.24%	\$348,026	- 10.24%	13.24%	16.24%	+	10.74%
2005	4.36%	\$363,207	4.36%	- 4.36%	- 4.36%		4.77%
2006	9.96%	\$399,365	9.96%	9.96%	9.96%		15.64%
2007	4.89%	\$418,877	4.89%	4.89%	4.89%		5.39%
2008	-15.70%	\$353,114	-15.70%	-15.70%	-15.70%	-2σ	-37.02%
2009	19.10%	\$420,555	+ 25.68%	+ 25.68%	+ 32.27%	+	26.49%
2010	14.51%	\$481,569	- 14.51%	18.55%	22.60%	+	14.91%
2011	3.33%	\$497,625	3.33%	- 3.33%	- 3.33%		1.97%
2012	10.60%	\$550,378	10.60%	10.60%	10.60%		15.82%
2013	16.59%	\$641,696	16.59%	16.59%	16.59%		32.18%
2014	7.79%	\$691,704	7.79%	7.79%	7.79%		13.51%
2015	-0.73%	\$686,627	-0.73%	-0.73%	-0.73%		1.25%
Ending Value	\$686,627		\$706,794	\$830,970	\$982,367		\$919,930
Average Returns	11.32%		11.48%	11.95%	12.58%		12.99%
Standard Deviation	9.99%		10.79%	11.07%	12.63%		16.42%

* Portfolio rebalanced and tactical shifts implemented and removed on Jan 1st, "Large Stock" equal to S&P 500, "Small Stock" to Russell 2000, and "Bond" to Bloomberg Barclay's US Aggregate Bond Index-like returns (see Appendix A)

Annual Returns of Core Aggressive Portfolio & Growth of \$10,000 Invested with Multiple Full Aggressive Tactical Shifts

- Bond
- Small Stock
- Large Stock



Year	Core Aggressive Portfolio Returns	Growth of \$10,000 (1975-2015)	Core + 1 Year Tactical Shift to Full Aggressive [-3.4% [-1σ] Shift Signal)	Core + 2 Year Tactical Shift to Full Aggressive [-3.4% [-1σ] Shift Signal)	Shift Signal & Shift Year	Large Stock Returns (Shift Signal Reference)
1975	36.71%	\$13,671	36.71%	36.71%		36.95%
1976	36.67%	\$18,684	36.67%	36.67%		23.68%
1977	9.66%	\$20,489	9.66%	9.66%	-1σ	-7.97%
1978	12.57%	\$23,065	+ 16.29%	+ 16.29%	+	5.90%
1979	25.12%	\$28,858	- 25.12%	32.86%	+	18.00%
1980	27.47%	\$36,786	27.47%	- 27.47%		31.90%
1981	0.81%	\$37,084	0.81%	0.81%	-1σ	-5.20%
1982	25.49%	\$46,536	+ 23.13%	+ 23.13%	+	20.90%
1983	21.45%	\$56,518	- 21.45%	25.80%	+	21.30%
1984	2.27%	\$57,801	2.27%	- 2.27%		6.21%
1985	28.76%	\$74,425	28.76%	28.76%		31.23%
1986	11.69%	\$83,125	11.69%	11.69%		18.06%
1987	-1.95%	\$81,504	-1.95%	-1.95%		4.71%
1988	17.91%	\$96,102	17.91%	17.91%		16.22%
1989	20.21%	\$115,524	20.21%	20.21%		31.36%
1990	-7.61%	\$106,732	-7.61%	-7.61%		-3.32%
1991	33.47%	\$142,456	33.47%	33.47%		30.22%
1992	12.08%	\$159,665	12.08%	12.08%		7.42%
1993	13.80%	\$181,698	13.80%	13.80%		9.89%
1994	-0.54%	\$180,717	-0.54%	-0.54%		1.18%
1995	28.71%	\$232,601	28.71%	28.71%		37.45%
1996	15.91%	\$269,608	15.91%	15.91%		22.88%
1997	23.38%	\$332,642	23.38%	23.38%		33.19%
1998	9.56%	\$364,443	9.56%	9.56%		28.62%
1999	16.54%	\$424,721	16.54%	16.54%		21.07%
2000	-1.07%	\$420,177	-1.07%	-1.07%	-1σ	-9.06%
2001	-0.10%	\$419,757	+ -2.95%	+ -2.95%	+ -1σ	-12.02%
2002	-13.59%	\$362,712	-20.87%	-20.87%	+ -2σ	-22.15%
2003	30.08%	\$471,816	38.78%	38.78%	+	28.50%
2004	13.24%	\$534,284	- 13.24%	16.24%	+	10.74%
2005	5.34%	\$562,815	5.34%	- 5.34%		4.77%
2006	12.80%	\$634,855	12.80%	12.80%		15.64%
2007	3.87%	\$659,424	3.87%	3.87%		5.39%
2008	-26.08%	\$487,446	-26.08%	-26.08%	-2σ	-37.02%
2009	25.68%	\$612,622	+ 32.27%	+ 32.27%	+	26.49%
2010	18.55%	\$726,264	- 18.55%	22.60%	+	14.91%
2011	1.22%	\$735,124	1.22%	- 1.22%		1.97%
2012	13.88%	\$837,159	13.88%	13.88%		15.82%
2013	26.02%	\$1,054,988	26.02%	26.02%		32.18%
2014	8.81%	\$1,147,933	8.81%	8.81%		13.51%
2015	-1.25%	\$1,133,583	-1.25%	-1.25%		1.25%
Ending Value	\$1,133,583		\$1,147,748	\$1,340,115		\$919,930
Average Returns	13.11%		13.27%	13.74%		12.99%
Standard Deviation	13.71%		14.62%	14.95%		16.42%

* Portfolio rebalanced and tactical shifts implemented and removed on Jan 1st, "Large Stock" equal to S&P 500, "Small Stock" to Russell 2000, and "Bond" to Bloomberg Barclay's US Aggregate Bond Index-like returns (see Appendix A)

APPENDIX F

Disclaimers

Author's Intent

Investments are increasingly moving in tandem diminishing the value of diversification with standard investing strategies and asset classes such as stocks and bonds. As a result, many professional managers add "alternative" assets to their models to reduce variance, but most investors are only interested in reducing variance that results in negative or below-average returns. Additionally, "alternative" assets commonly have the unintended consequences of reducing average returns and increasing portfolio expenses and may be detrimental to investors' long-term financial well-being. This paper is intended to review the established but potentially dated concepts presented in Modern Portfolio Theory, consider the infusion of contingency planning with the use options, and explain new concepts created by Stephen Paluga including Non-Emotional Trigger Signals and Socially Responsible Dynamic Shifting.

General Information

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The opinions and information provided by third-parties is not guaranteed. WGC makes all attempts to provide accurate, complete, and reliable information. Historical returns for asset classes and

indexes are not 100% reliable as authoritative sources often differ on exact returns. Portfolio performance metrics and calculations were rounded to the hundredths position.

Investment Risks

All investments involve various degrees of risk, most with the potential of principal loss. Past performance does not guarantee future results and hypothetical performance and simulated models are not necessarily indicative of future returns as markets and investor behaviors change over time. All investments and indexes referenced in this paper are not bank guaranteed or Federal Deposit Insurance Corporation (FDIC) insured.

Equities are always subject to market risk. No amount of diversification will eliminate systematic market risk and portfolio volatility. Investors should consider their personal time horizons and risk profiles before allocating to equity investments.

The value of fixed income securities will generally change inversely with a change in interest rates. Longer-term fixed income securities are more sensitive to interest rate changes than shorter-term fixed income securities. Fixed income securities are subject to various risks such as credit and inflation.

Certain options strategies carry a higher level of risk and are not suitable for all investors. Other strategies reduce risk if properly used, and are suitable but not all the time. Investors should read the options disclosure document "Characteristics and Risks of Standardized Options" before trading an option as it explains the characteristics and risks of exchange traded options.

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