Why More Investors Should Be Using Tactical Allocation as Their Core Investment Strategy

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Summary. With the exceptions of near-term saving goals and tax intensive environments, tactical strategies are well suited to the core investment portfolio. Not as a sliver but as a major portfolio commitment.

Backtests using investable securities over the past fifty years show that tactical strategies would have nearly doubled returns net of inflation as compared to return of the traditional 60:40 portfolio. Volatilities would have been similar; drawdowns would have been reduced and there would have been large increases in the probabilities of achieving financial goals. For example, the 4% rule for spending in retirement would have become the 6% rule.

Some tactical strategies do not require market timing.

Tactical strategies which are suitable for the core portfolio are not difficult to implement. For those without the time or inclination, comparable tactical strategies are available in separately managed accounts.

Relative strength shows that individual tactical strategies do not consistently outperform over time and that the investment horizon must extend for a decade for the outperformance to become pronounced. Inconsistent performance implies that the investor who extrapolates from only a decade or two of historical backtesting does so with considerable risk.

Introduction. Brown created a "proof-of concept" tactical asset allocation model containing 27 assets spanning 102 years[1]. Each month, the model invested in the 8 assets with the highest 11-month total return, the usual academic definition of momentum. There was no market timing.

Brown concluded that the tactical model was more likely to achieve a minimum return, 4.25% net of inflation in his example, than static models constructed from the same asset classes. He observed that the outperformance of the tactical model improved if the investment horizon was a decade or longer.

Brown examined the inflation-adjusted yields of the 10-year Treasury note since 1842 and concluded that interest rates have been cyclical, varying between about minus 3% and about 8% with a time cycle measured in

[1] Rob Brown, "Winner Repeat, Losers Repeat," *J. Investing*, August 2022.

decades. Brown concluded that it is likely that interest rates will rise from their mid-2022 lows for at least the next decade.

Brown's tactical model provided positive returns during months when interest rates were rising rapidly. Equities and bonds produced negative returns during these same months.

Brown asks the provocative question, "If you are not using tactical allocation, why not?"

The present study was undertaken to test Brown observations with real portfolios. The emphasis is on tactical strategies with volatilities comparable to that of the 60:40 portfolio; that is on strategies which could replace the 60:40 portfolio as the core of an investor's portfolio.

Part I illustrates and compares tactical strategies which enhance the static performance of portfolios of US large cap stocks (S&P 500 composite), foreign developed market stocks (MSCI-EAFE), real estate (USNAREIT), US Treasury bills and intermediate term US government bonds[2] over a fifty-year interval.

Part II illustrates additional strategies over the past 23 years. These strategies add additional assets to the allocation universe.

Return (CAGR), standard deviation of the monthly returns (mSD) and maximum drawdown (maxDD) are calculated from the inflation-adjusted monthly equity curve. The Sharpe ratio and Ulcer Performance Index (UPI) are calculated from the nominal monthly equity curve[3].

Most results in this report are without income tax and are thus only applicable to IRAs and qualified pension accounts.

This study is reflective of the past. Future performance will be different, but no one knows whether the differences will be material. Tactical strategies have the potential advantage of being able to adapt to different environments.

Tactical strategies do not provide consistent outperformance over time, which may be why a decade or more is needed for the strategy to outperform. The investor who extrapolates from a decade or two of historical results does so with considerable risk.

Part I.

Using a Static Allocation to Bonds to Enhance the Core Portfolio. The core portfolio is often dominated by US equities[4], represented here by LrgCapUS. The equities are typically diluted with bonds to reduce volatility. Bonds are

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[2] The fabrication of the historical price histories is described in "Curated Data" at www.liingane.com/qi.

[3] For the definitions of these performance statistics and of the allocation and timing algorithms used herein, see "Definitions of Timing and Allocation Algorithms" at www.lingane,com/qi.

[4] For example, "How Individual Investors Use Mutual funds and ETFs," AAII Journal, August 1922.

often represented in this report by IGBond, intermediate term government bonds.

Table 1. Historical Performance of Large Cap US Stocks, Intermediate Term US Government Bonds and Static Allocations to Stocks and Bonds. CAGR, mSD and maxDD are adjusted for inflation.

1973 – Sep 2022 (~ 50 years)	CAGR	mSD	Sharpe	maxDD	UPI
LrgCapUS	5.9	4.5	0.43	54 2/2009	0.43
IGBond	2.1	1.5	0.39	32[5] 8/1981	0.77
Static Stock-Bond Allocations					
80:20	5.4	3.6	0.46	45 9/1974	0.50
60:40	4.7	2.8	0.50	38 9/1974	0.66
40:60	3.9	2.1	0.54	30 9/1974	1.03

Source: 50-year TAA.xlsb.

Adding a static allocation of bonds to the stock portfolio reduces volatility and drawdown, but adding bonds also reduces the return. Sharpe ratios and UPIs are unimpressive.

The goal of the tactical strategies is to reduce volatility and drawdown while increasing return, Sharpe ratio and UPI.

Market Timing to Enhance the Core Portfolio

Three tactical approaches will be illustrated. The first is "market timing." This strategy invests the portfolio in stocks or in bonds in response to the recommendations of an algorithm.

Timing has a poor reputation because of the risk of "whipsaw". (Whipsaw describes the situation when the signal to exit equities for bonds occurs at a lower price that the signal to exit bond for equities, resulting in a loss.) The risk of whipsaw is real, though less likely during major bear markets.

There are many market timing algorithms; two are illustrated here. There is no implied suggestion that the illustrated timing algorithms are the "best."

The Antonacci "absolute momentum" algorithm chooses between stocks and bonds based on the relative 12-month returns of LrgCapUS equities and Tbills[6].

It can be psychologically challenging to buy or sell a million dollars of securities based on the recommendation of an algorithm that, has often been inaccurate.

[5] Bonds lost one third of their inflation-adjusted value from 1973 to Aug 1981. The largest drawdown in nominal terms was 13% in September 2022; we won't know whether this is the maximum nominal drawdown until the bond markets stabilize.

[6] Gary Antonacci, Dual Momentum Investing, McGraw Hill, 2015.

Algorithmic errors are reduced by basing decisions of several algorithms, such as the 3-component Composite algorithm illustrated here. A composite algorithm improves accuracy by basing its recommendation on different factors. This Composite market timer uses price changes, price times volume changes and initial unemployment claims.

The three algorithms forming this Composite were developed by Don Maurer, by Lingane, Maurer and John Nicholas, and by Al Zmyslowski.

A composite timer has the advantage that portfolio changes are usually more gradual than with an all or nothing algorithm such as Dual Momentum. This composite algorithm recommends equity allocations of zero, one third, two thirds and one hundred percent, for example.

I tuned the enhanced StormGuard algorithm to the post-1950 era whereas Scott Juds tuned the original StormGuard standard algorithm to the 1989 to 2010 era. StormGuard Armor is not illustrated since not enough if known of the details of its construction to independently reproduce its results.

Table 2. Effect of Market Timing and Volatility Control on Binary Portfolios of Large Cap US Stocks and Bonds. CAGR, mSD and maxDD are adjusted for inflation.

1973 – Sep 2022 (~ 50 years)	CAGR	mSD	Sharpe	maxDD	UPI
LrgCapUS	5.9	4.5	0.43	54 2/2009	0.43
Static 60:40 Allocation	4.7	2.8	0.50	38 9/1974	0.66
Timing Strategies LtgCapUS vs IGBond					
Absolute Momentum	7.2	3.6	0.61	32 3/1980	0.95
Composite	7.5	3.3	0.67	34 8/1974	1.15
Enhanced StormGuard Std	7.6	3.5	0.64	30 8/1974	1.06
Nicholas	7.6	3.6	0.63	34 9/1974	1.00
Volatility Control[7] LrgCapUS vs IGBOND					
001SPVolSPX	2.7	1.4	0.51	31 9/1981	1.25
002SPVolSPX	3.3	1.6	0.57	31 9/1981	1.45
003SPVolSPX	3.8	1.8	0.59	31 9/1981	1.36
004SPVolSPX	4.3	2.1	0.58	31 9/1981	1.18
005SPVolSPX	4.7	2.5	0.55	35 9/1974	0.96
006SPVolSPX	5.1	2.8	0.53	38 9/1974	0.82
008SPVolSPX	5.6	3.4	0.50	44 9/1974	0.64

[7] The Standard & Poors' Dynamic Rebalancing Risk Control Indicator determines the equity allocation as the standard deviation goal divided by the square root of the exponential moving average of the standard deviation of a risk index. If the standard deviation goal is 0.6% per day, approximately 8% annually, and the risk index is SPX, the indicator is identified as 006SPVolSPX.

Volatility Control LrgCapUS vs RiskFree					
001SPVolSPX	1.1	0.5	0.50	16 3/1980	1.67
002SPVolSPX	1.8	1.0	0.48	19 3/1980	1.18
003SPVolSPX	2.5	1.4	0.48	23 3/1980	0.87
004SPVolSPX	3.2	1.9	0.47	28 9/1974	0.72
005SPVolSPX	3.7	2.3	0.46	32 9/1974	0.62
006SPVolSPX	4.2	2.7	0.45	36 9/1974	0.57

Source: 50-year TAA_working copy.xlsb.

The timing strategies reduce volatility and drawdown as compared to LrgCap US stocks and increase the return above that of the LrgCap US stocks and the static 60:40 portfolio.

Momentum Strategies to Enhance the Core Portfolio. The second tactical approach shifts the portfolio between stocks and bonds in response to the trend or "momentum" of the recent price histories of stocks and bonds. The historical evidence is that assets which have been appreciating the most rapidly are likely to continue outperforming for an additional period and assets which have been underperforming are likely to continue to underperform for an additional period[8].

"Description of Timing and Allocation Algorithms" at www.lingane.com/qi describes many trend algorithms and that list is doubtless incomplete. Table 3 was developed using the FundX algorithm.

FundX Investment Management has used an algorithm called "SCORE" since the 1970s to rank funds by their momentum potential. The FundX SCORE is the sum of the 1-, 3-, 6- and 12-month total returns, plus additional items.

This algorithm has spawned several timers and allocation strategies within the Computerized Investing group, each with different weighting of the 1-, 3-, 6-, 9- and 12-month returns. Ren Curry was responsible for much of this work.

I am showcasing the FundX algorithm because it gives good results with many asset universes.

[8] These algorithms are better than guessing, but not much better. The probability of the funds with the highest trends providing the highest returns in the following month is about 55%. The accuracy of a timing algorithm in predicting whether to invest in the equity or fixed income markets is about 70%. See Table 9 in "Three Momentum Algorithms" at www.lingane.com/qi.

Table 3. Effect of Momentum Allocation. CAGR, mSD and maxDD are adjusted for inflation.

1973 – Sep 2022 (~ 50 years)	CAGR	mSD	Sharpe	maxDD	UPI
LrgCapUS	5.9	4.5	0.43	54 2/2009	0.43
Static 60:40 Allocation	4.7	2.8	0.50	38 9/1974	0.66
Composite Timing	7.5	3.3	0.67	34 8/1974	1.15
FundX Momentum					
"Active 60:40." Top1 of LrgCapUS & IGBond	6.5	3.3	0.58	29 9/2022	1.03
Top1 of 5. LrgCapUS, foreign, USREIT & IGBond (2)	9.5	3.9	0.72	30 9/1981	1.49
Top2 of 5. LrgCapUS, foreign, USREIT & IGBond (2)	8.5	3.1	0.78	30 9/2022	1.52
Top2 of 7. LrgCapUS, foreign, USREIT, IGBond (2) & Tbills (2)	8.5	3.0	0.81	21 9/1980	1.52
Top2 of 9. LrgCapUS, Foreign, USREIT, IGBond (2), Tbills (2) & LngBnd (2)	7.7	3.2	0.70	24 9/1990	1.21

Source: 50-year TAA.xlsb

The "active 60:40" portfolio, which allocates between LrgCapUS and IGBond, provides a better return and drawdown and a slightly poorer volatility than the static 60:40 portfolio.

The Top1 of 5 strategy chooses the fund with the highest FundX trend from among LrgCapUS, Foreign (developed markets exclusive of the US and Canada), USREIT, IGBond and IGBond.

There are two instances of IGBond so that the portfolio can be invested entirely in bonds in the Top2 of 5 strategy.

Comment. It might be better to use Top1 of 4 rather than Top2 of 5 strategy.

The Top2 of 7 strategy adds two instances of Tbills to the investment options. The Top2 of 7 strategy provides better statistics than Composite timing and much better statistics than the static 60:40 portfolio.

The Top2 of 9 strategy adds two instances of long-term Treasury bond funds to the investment universe; see also Table 12.

Drawdowns for the active 60:40 and Top2 of 5 strategies increased 2 – 3 points between the end of August 2022 and the end of September. The implication is that the drawdowns for these strategies may increase from the values quoted here once the current bear market recovers.

Combining Momentum and Timing Strategies. The third tactical approach combines momentum and timing. Momentum is used to determine the equity allocation and timing is used to determine whether the portfolio should be in equities or IGBond.

Two strategies are illustrated:

- Antonacci's Dual Momentum, which uses total return over 12 months to choose between US and foreign stocks and Absolute Momentum timing to choose between stocks and bonds.
- The SIMPLE strategy evolved from the Dual Momentum strategy in 2017. It uses FundX to choose the Top2 from among LrgCapUS, Foreign and USREIT stocks and Composite timing to choose between stocks and IGBond.

Table 4. Combined Momentum Allocation and Timing. CAGR, mSD and maxDD are adjusted for inflation.

1973 – Sep 2022 (~ 50 years)	CAGR	mSD	Sharpe	maxDD	UPI
LrgCapUS	5.9	4.5	0.43	54 2/2009	0.43
Static 60:40 Allocation	4.7	2.8	0.50	38 9/1974	0.66
Composite Timing	7.5	3.3	0.67	34 8/1974	1.15
FundX Momentum					
"Active 60:40." Top1 of LrgCapUS & IGBond	6.5	3.3	0.58	29 9/2022	1.03
Top1 of 5. LrgCapUS, Foreign, USREIT & IGBond (2)	9.5	3.9	0.72	30 9/1981	1.49
Top2 of 5. LrgCapUS, Foreign, USREIT & IGBond (2)	8.5	3.1	0.78	30 9/2022	1.52
Top2 of 7. LrgCapUS, Foreign, USREIT, IGBond (2) & Tbills (2)	8.5	3.0	0.81	21 3/1980	1.52
Top2 of 9. LrgCapUS, Foreign, USREIT, IGBond (2), Tbills (2) & LngBnd (2)	7.7	3.2	0.70	24 9/1990	1.21
Momentum and Timing					
Dual Momentum (Top1 of LrgCapUS & Foreign plus Absolute Momentum Timing)	9.9	3.7	0.79	22 11/2000	1.45
Simple (Top2 of LrgCapUS, Foreign & USREIT plus Composite Timing)	8.4	3.1	0.78	36 9/1975	1.22

Source: 50-year TAA.xlsb

Effect of Delayed Portfolio Changes. Life happens. It is not always possible to make portfolio changes on the last day of the month. To obtain a qualitative indication of the effect of execution delays, two of the momentum strategies were simulated assuming a one-month delay in execution. That is, the allocations in January reflect recommendations as of the prior November whereas allocations in January for the strategies in Table 3 were as of the prior December.

Table 5. Momentum Allocation With a One-Month Delay. The first rows of statistics for the momentum strategies are with no delays; the second rows are with one-month delays. CAGR, mSD and maxDD are adjusted for inflation.

1973 – Sep 2022 (~ 50 years)	CAGR	mSD	Sharpe	maxDD	UPI
LrgCapUS	5.9	4.5	0.43	54 2/2009	0.43
Static 60:40 Allocation	4.7	2.8	0.50	38 9/1974	0.66
FundX Momentum					
"Active 60:40." Top1 of LrgCapUS & IGBond	6.5	3.3	0.58	29 9/2022	1.03
	5.8	3.4	0.51	31 8/1988	0.97
Top2 of 7. LrgCapUS, foreign, USREIT, IGBond (2) & Tbills (2)	8.5	3.0	0.81	21 3/1980	1.52
	7.6	3.2	0.70	26 9/1990	1.00

Source: 50-year TAA 1-month delay.xlsb

Delay degrades performance. For example, the return with the active 60:40 strategy is reduced from 6.5% to 5.8% if execution is delayed by one month.

If delays were only occasional and on the order of a week rather than a month, the performance hit is likely significantly smaller. (This cannot be simulated because there are no weekly or daily data back to the 1970s.)

Even with delay, the momentum strategies provide better returns and drawdowns than the static 60:40 portfolio.

Effect of Commodities. Commodities provided a modest benefit in Brown's strategy over the past 102 years. This was demonstrated by removing palladium and the World Bank Agricultural Index from the investment options. Comparative simulations using FundX/Top6 as the allocation algorithm show that the presence of palladium and the World Bank Agricultural Index slightly increase inflation adjusted CAGR and slightly decrease maximum drawdown.

Table 6a. What four assets does Brown define as commodities?

Feb 1920 – Oct 2021	CAGR	mSD	maxDD
With Commodities	11.3	3.4	38
Without Commodities	11.0	3.4	40

As shown in Table 4B, commodities were not helpful with the Top2 of 7 strategy over the past 23 years. The World Bank Agricultural Index did provide a small benefit to CAGR and mSD but worsened maxDD. There is no fund which tracks World Bank Agricultural Index.

Table 6b. SIMPLERM (Top2 of 7, no timing). The small numerals at the end of the descriptions are run identifiers.

2000 – Sep 2022 (~ 23 years)	CAGR	mSD	Sharpe	maxDD	UPI
PCRIX (Bloomberg Commodity Index, history since 2003) 79	6.6	3.2	0.74	18 10/2016	1.05
World Bank Agricultural Index (history since 1960) 80	8.0	2.9	0.93	19 2/2020	1.43
Without Commodities 78	7.7	3.0	0.90	17 9/2022	1.51

Source: Output_10052022 with adjustment.xlsx.

Adding commodities and gold, represented by FSAGX, significantly impaired performance relative to the Top2 of 7 strategy.

Probability of Achieving Investment Goals. This section illustrates how tactical strategies affect the probability of achieving three investment goals.

- The probability of achieving a minimum CAGR.
- The growth of a monthly investment over time.
- The risk of prematurely running out of money in retirement.

Table 7 illustrates the probability of achieving a return of at least 4.25%, net of inflation, for different investment horizons and tactical strategies. For a three-year investment horizon, the probability of achieving a 4.25% minimum return is higher with the tactical strategies, as compared to the static 60:40 portfolio, but not very much higher. As the investment horizon increases, the probability of achieving a 4.25% return increases for the tactical strategies while the probability for the 60:40 portfolio is little changed.

These results qualitatively agree with Brown's Exhibit 9.

Table 7. Probability of Achieving an Inflation-Adjusted Return of at least 4.25%. A probability of 1.00 should be interpreted as a very high probability but not as a guarantee.

1973 – Aug 2022	3 years	6 years	9 years	12 years	15 years
Static 60:40	0.65	0.62	0.70	0.80	0.75
Static 40:60	0.57	0.59	0.62	0.65	0.63
Active LrgCapUS or IGBond	0.73	0.82	0.96	1.00	1.00
Composite Timing	0.76	0.90	0.97	0.98	1.00
006SPVolSPX	0.78	0.83	0.87	0.97	1.00
008SPVolSPX	0.77	0.84	0.89	0.97	1.00
Top2 of 5	0.79	0.91	0.98	1.00	1.00
Top2 of 7	0.76	0.83	0.96	1.00	1.00
Dual Momentum	0.73	0.90	0.95	0.98	0.99
SIMPLE	0.80	0.89	0.97	1.00	1.00

Source: 50year TAA.xlsb, workbook Frequency.

Table 8 illustrates the growth of a monthly investment over time for different time horizons and investment strategies. The values shown are the median future values from simulations in which the monthly inflation-adjusted returns are drawn at random with replacement from a normal distribution.

Table 8. Median Future Value, $, On Investing $1 Monthly. The parameters of the normal distribution, the average monthly return and standard deviation of monthly returns, are computed from the monthly inflation-adjusted returns of each strategy.

1973 – Aug 2022	Return	StdDev	20 years	30 years	40 years
Static 60:40	0.00436	0.0277	397	787	1459
Static 40:60	0.00355	0.0204	366	692	1189
Active 60:40	0.00586	0.0328	503	1149	2362
Composite Timing	0.00668	0.0330	543	1344	3035
006SPVolSPX	0.00662	0.0256	567	1384	3122
008SPVolSPX	0.00742	0.0310	622	1661	3951
Top2 of 5	0.00740	0.0314	628	1609	3858
Top2 of 7	0.00728	0.0299	619	1610	3763
Dual Momentum	0.00861	0.0365	727	2110	5632
SIMPLE	0.00729	0.0309	607	1547	3733

Source: HistoricalSimulation.sln

Tables 9 illustrate the risk of running out of money for different initial withdrawal rates and investment strategies. For a 4% initial withdrawal rate, with the amount of subsequent withdrawals adjusted for inflation, there is a 5% risk of running out of money within 30 years if the portfolio is invested in the static 60:40 portfolio. A 5% risk may be acceptable. This is an illustration of the 4% rule for retirement spending[9].

The tactical strategies have lower risks of penury (running out of money before death), but the reduction in risk has little practical impact at a 4% initial withdrawal rate.

As the initial withdrawal rate increases, the risk of penury increases. At a 6% initial withdrawal rate, the risk of penury is 44% for the static 60:40 strategy. Note that the risks with some tactical strategies are still in the single digits.

The conclusion is that 4% is about the highest sustainable initial withdrawal rate for the static 60:40 strategy while higher sustainable withdrawal rates are possible with certain tactical strategies.

[9] Conserving Client Portfolios During Retirement, William P. Bengen FPA Press, 2006.

Table 9a. Risk of Penury Within 20 Years as a Function of the Initial Withdrawal Rate and the Investment Strategy. The withdrawal amount is adjusted annually for inflation.

1973 – Aug 2022	Return	StdDev	4%	5%	6%	7%
Static 60:40	0.00436	0.0277	0.3%	3%	12%	33%
Static 40:60	0.00355	0.0204	~ 0%	1%	11%	39%
Active 60:40	0.00586	0.0328	0.4%	2%	7%	19%
Composite Timing	0.00668	0.0330	~ 0%	0.6%	4%	11%
006SPVolSPX	0.00662	0.0256	~ 0%	0.2%	0.6%	5%
008SPVolSPX	0.00742	0.0310	~ 0%	0.1%	1%	7%
Top2 of 5	0.00740	0.0314	~ 0%	0.2%	1%	5%
Top2 of 7	0.00728	0.0299	~ 0%	0.3%	1%	5%
Dual Momentum	0.00861	0.0365	~ 0%	0.1%	0.6%	4%
SIMPLE	0.00729	0.0309	0.1%	0.3%	1%	7%

Source: HistoricalSimulation.sln

Table 9b. Risk of Penury Within 30 Years as a Function of the Initial Withdrawal Rate and of the Investment Strategy. The withdrawal amount is adjusted annually for inflation.

1973 – Aug 2022	Return	StdDev	4%	5%	6%	7%
Static 60:40	0.00436	0.0277	5%	20%	44%	67%
Static 40:60	0.00355	0.0204	4%	24%	60%	Not tested
Active 60:40	0.00586	0.0328	2%	8%	23%	40%
Composite Timing	0.00668	0.0330	0.7%	4%	12%	27%
006SPVolSPX	0.00662	0.0256	0.0%	1%	6%	19%
008SPVolSPX	0.00742	0.0310	0.1%	2%	7%	19%
Top2 of 5	0.00740	0.0314	0.1%	1%	6%	16%
Top2 of 7	0.00728	0.0299	0.1%	2%	6%	17%
Dual Momentum	0.00861	0.0365	0.1%	0.5%	4%	11%
SIMPLE	0.00729	0.0309	0.2%	2%	7%	20%

Source: HistoricalSimulation.sln

Table 9c. Risk of Penury Within 40 Years as a Function of the Initial Withdrawal Rate and of the Investment Strategy. The withdrawal amount is adjusted annually for inflation.

1973 – Aug 2022	Return	StdDev	4%	5%	6%	7%
Static 60:40	0.00436	0.0277	13%	36%	60%	Not tested
Static 40:60	0.00355	0.0204	15%	50%	Not tested	Not tested
Active 60:40	0.00586	0.0328	4%	15%	32%	54%
Composite Timing	0.00668	0.0330	2%	7%	18%	37%
006SPVolSPX	0.00662	0.0256	0.3%	2%	12%	31%
008SPVolSPX	0.00742	0.0310	0.4%	3%	11%	26%
Top2 of 5	0.00740	0.0314	0.2%	3%	9%	22%
Top2 of 7	0.00728	0.0299	0.4%	3%	10%	24%
Dual Momentum	0.00861	0.0365	0.1%	1%	6%	14%
SIMPLE	0.00729	0.0309	0.6%	3%	12%	27%

Source: HistoricalSimulation.sln

The limitations of the results shown in Tables 7 are, first, that investment returns are only approximately random. And second, that the means and standard deviations are representative of the past fifty years. While we know that future returns will be different, we do not know how different they will be.

Tactical strategies have been superior to the static 60:40 buy and hold strategy in terms of the probability of achieving three investment goals: minimum return, growth of savings and the risk of penury and/or the sustainable withdrawal rate.

Volatility is Not Risk. In the academic literature and in many investment discussions, risk is defined as standard deviation. The Sharpe ratio, for example, which is the average return divided by the standard deviation the returns, if often thought of as the return per unit of risk.

Risk is properly considered as the probability of failing critical investment goals. Table 10 compares the static 60:40 and 40:60 portfolios to the top2 of 7 tactical strategy in terms of standard deviation and the probabilities of achieving three investment goals.

The tactical strategy is the most volatile and exhibits the lowest risks of failing to meet the investment goals. If an investor is unhappy with the "risk" of the 40:60 portfolio, they should move to the tactical strategy rather than to the less volatile 60:40 portfolio.

Table 10. Volatility and Risk.

1973 - Aug 2022	Static 60:40	Static 40:60	Tactical Top2 of 7
mSD (volatility)	2.8%	2.0%	3.0%
maxDD	38%	30%	21%
Minimum 4.25% CAGR at 9 years	70%	62%	96%
Retirement Savings at 30 years	787	692	1610
Risk of Penury at 30 years for a 4% initial withdrawal rate	5%	4%	0.1%

Tactical Returns When Interest Rates Are Rising. Brown's tactical model provided positive returns during months when interest rates were rising. Equities and bonds produced negative returns during these same months.

Table 11 shows the results for the same analysis during months when rising interest rates were rising during the past fifty years. Months were ranked by the month over month yield change (1 + current yield / 1 + prior yield) and strategy returns were averaged for the top tenth (about 60 months), top fifth (about 120 months) and top third (about 200 months) of the months.

Table 11. Average Strategy Returns During Months with Rising Interest Rates

1973 – Aug 2022	Top Tenth	Top Fifth	Top Third
Static 60:40	- 2.0%	- 1.4%	- 1.0%
Active 60:40	- 0.9%	- 0.5%	- 0.3%
Composite Timing	- 2.6%	- 1.6%	- 1.1%
Top2 of 5	- 3.4%	- 2.3%	- 1.4%
Top2 of 7	0.2%	0.3%	0.3%
Dual Momentum	- 2.8%	- 1.4%	- 0.8%
SIMPLE	- 3.1%	- 2.0%	- 1.3%

The static 60:40 strategy and the tactical strategies generally lost ground during time of rising interest rates. The exception is the Top2 of 7 strategy. This strategy could invest entirely in Tbills when equities and longer duration fixed income securities were declining.

Relative Strength. The Fidelity Diversified International Fund. Return statistics reflect the difference between the starting and ending portfolio values and say nothing about what happened in between[10]. The tortoise won the race with the hare but suppose that the hare had won? Most investors would prefer tortoise-like investment returns even if more volatile strategies occasionally provide better long-term returns.

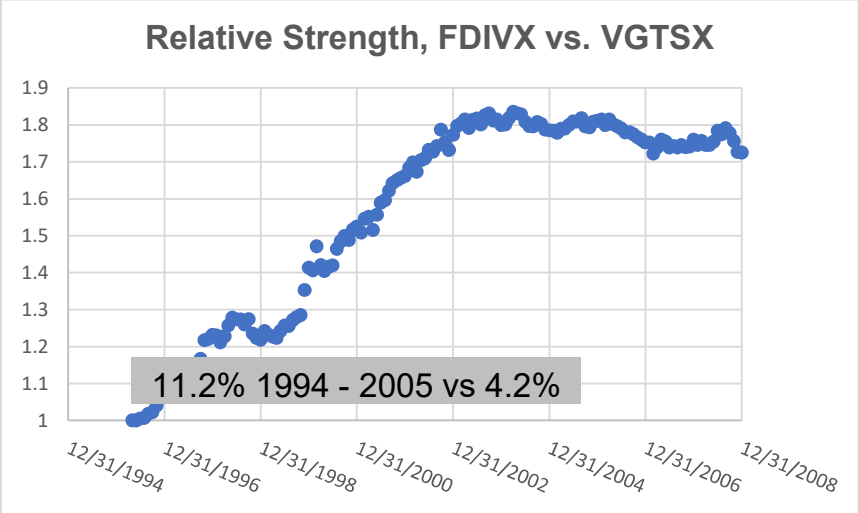
A plot of relative strength over time is an excellent way to determine whether a strategy is a tortoise, gaining a bit every year, or a hare, generating occasional large gains.

Relative strength is the ratio of the value of one strategy divided by the value of another strategy at the same point in time. The relative performance of the strategies is revealed by plotting relative strength over time.

If relative strength rises over time, the strategy in the numerator is outperforming the strategy in the denominator. If relative strength falls, the strategy in the denominator is outperforming the strategy in the numerator.

Figure 1 shows the relative strength of the Fidelity Diversified International fund (FDIVX) versus the Vanguard Total International Index fund (VGTSX). The relative strength is rising in the early part of the chart. The cumulative returns over the nine years from mid-1994 through mid-2005 were eleven versus four percent, favoring Fidelity. The shaded bar in the figure delineates the nine years at issue.

Figure 1. Relative Strength of Two International Funds.



Source: fdivx vs vgtsx.xlsx

By virtue of the outstanding performance, investors flooded into the fund. Fidelity was forced to close the fund to new investors in mid-2005.

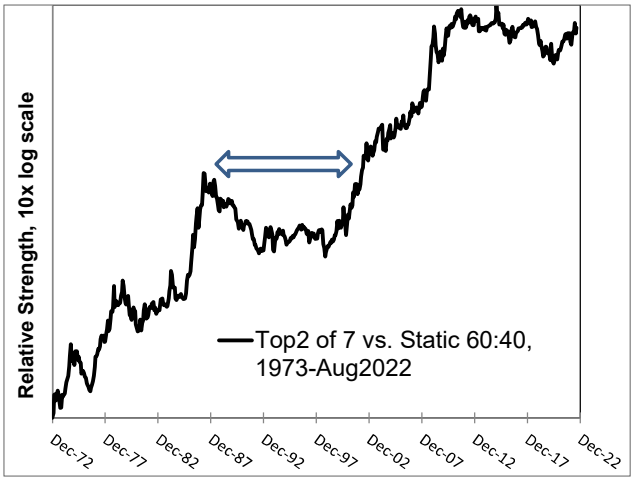
[10] mSD, Sharpe ratio, maximum drawdown and UPI do provide some indication of what happened in between.

Relative strength shows that the outperformance of the Fidelity fund disappeared about two years prior to its closure. Had investors consulted relative strength, they would have known that there was no current evidence of outperformance in mid-2005.

Relative strength continued to decline slowly for the next decade. The decline rate is about equal to the higher expense ratio of the Fidelity fund.

Relative Strength of a Tactical Strategy. Figure 2 shows the relative strength of the Top2 of 7 tactical strategy versus the static 60:40 strategy.

Figure 2. Relative Strength of the Top2 of 7 Tactical Strategy. The vertical scale is logarithmic with a ten-fold dynamic range.



Source: 50 year TAA.xlsx

The tactical strategy is acting like the hare, leaping ahead, then falling asleep. Relative performance begins a long decline in 1988 and it takes a full 14 years for the tactical strategy to return to parity with the static 60:40 portfolio. Relative strength has been falling for the past decade.

Tactical strategies seldom deliver consistent year after year performance, which is probably why tactical strategies need a decade or more to evidence their outperformance.

Relative Strength. The SIMPLE and Dual Momentum strategies. Figure 3 illustrates the relative strength of the SIMPLE strategy versus the Dual Momentum strategy. The long-term statistics in Table 4 and the probabilities in Tables 7 through 9 suggest that Dual Momentum is the better strategy. However, relative strength shows that Dual Momentum only outperformed during the first thirty years and that SIMPLE has outperformed for the most recent twenty years.

Two observations.

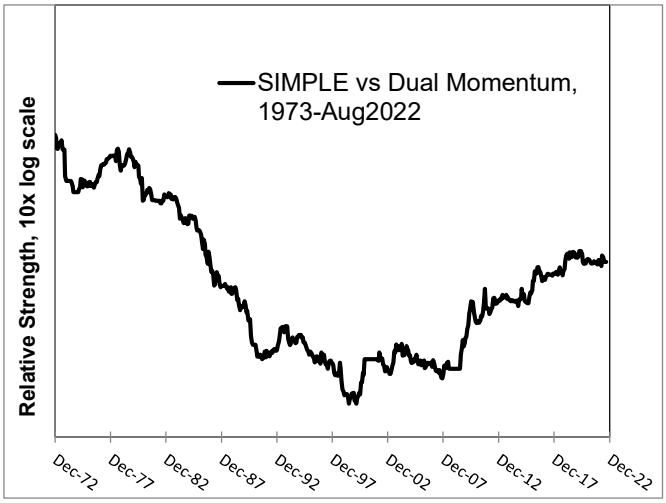
- The relative performances of tactical strategies vary over time. I have yet to discover the tactical strategy which consistently outperforms. It is

possible that a composite of different tactical strategies may provide more consistent performance than a single tactical strategy.

The next stage of tactical innovation may be composite strategies in which the relative weights of the strategies change dynamically with market conditions.

- One comes to different opinions about the "best" strategy by focusing on the first three decades or the latter two decades. Analyses which focus on the past two decades risk future surprises.

Figure 3. Relative Strength of the SIMPLE Strategy versus the Dual Momentum Strategy. The vertical scale is logarithmic with a ten-fold dynamic range.



Source: 50 year TAA.xlsx

Conclusions, Part I. I am partial to the Top2 of 7 strategy for the following reasons.

- It can be tested over fifty years.
- It has better performance statistics than the 60:40 portfolio and better probabilities of achieving the three financial goals.
- It does not require timing, which is prone to whipsaw and adds complexity.
- It is the only tactical strategy tested which provides a positive return in months when interest rates are rising.

Table 12. Variants of the SIMPLE Strategy over the past 23 years.

The Top2 of 8 strategy, adds PCRIX, a fund tracking the Bloomberg commodity index, to the Top2 of 7 strategy.

The Top2 of 9 strategy allocates among LrgCapUS, Foreign, USREIT, RiskFree, Short, IGBond, BNDe, TLTe and VGLTe. See also Table 3.

The Top2 of 14 strategy allocates among LrgCapUS, foreign, USREITs, RiskFree, Short, Core, IGBond, BNDe, VGLTe, TLTe, BNDXe, BankLoan, HiYield and Mortgage.

The Top2 of 16 strategy, adds PCRIX, a fund tracking the Bloomberg commodity index, and DBCOM, a fund tracking the Deutshe Bank commodity index to the Top2 of 14 strategy.

It was not possible to test the Top2 of 14 and Top2 of 16 strategies from 1973. CAGR, mSD and maxDD are inflation-adjusted.

2003 – Sep 2022 (~ 20 years)	CAGR	mSD	Sharpe	maxDD	UPI
Equal Weighting					
SIMPLE 77	8.3	3.1	0.93	23 9/2022	1.79
SIMPLERM (Top2 of 7) 78	7.7	3.0	0.90	17 9/2022	1.51
SIMPLERM (Top2 of 8) 79	6.6	3.2	0.74	18 10/2016	1.05
SIMPLERM (Top2 of 9) 97	8.9	3.1	0.96	20 4/2016	1.63
SIMPLERM (Top2 of 14) 93	8.7	3.0	0.97	19 1/2016	1.61
SIMPLERM (Top2 of 16) 99	7.1	3.6	0.71	21 10/2008	0.95
Inverse 60-day SD Weighting					
SIMPLE 94	8.3	3.0	0.93	23 9/2022	1.77
SIMPLERM (Top2 of 7) 95	6.6	2.8	0.83	19 11/2016	1.17
SIMPLERM (Top2 of 9) 98	8.1	3.0	0.92	20 4/2016	1.46
SIMPLERM (Top2 of 14) 96	7.8	2.9	0.92	19 4/2016	1.49

Source: Output_10052022 with adjustment.xlsx. The small numbers identify the run number in the source file.

The Top2 of 9 and Top2 of 14 strategies provide a larger CAGR than the Top2 of 7 strategy. The Top2 of 9 strategy is favored since it involves fewer assets.

The Top2 of 9 and Top2 of 14 strategies provide similar statistics as the SIMPLE strategy. They are favored over the SIMPLE strategy since SIMPLE involves market timing whereas they do not.

The Top2 of 8 and Top2 of 16 strategies are inferior. These strategies involve commodities.

Inverse volatility weighting reduces mSD marginally, but generally degrades the other characteristics. Inverse volatility weighting is not attractive with these portfolios.

The inverse volatility weighting may employ 120-day standard deviations. The code was written years ago, and I have yet to look into its innards.

Part II. Application of Tactical Allocation to Other Portfolios

Optimizing the Bond Portfolio Over Time. Interest rates were generally declining during the past thirty-eight years. This meant that long bond portfolios benefited from both coupon income and capital gains and that a tactical strategy which moved between equites and bonds performed better with long bonds as the defensive alternative.

Interest rates are now rising and may rise of a decade or two. Tactical strategies are likely to perform better in the near term with Tbills or short bonds as the defensive alternative.

A variety of defensive securities could be added to the investment universe and the allocation algorithm could be tasked with choosing the defensive securities with the highest momentum. This approach worked with the universes discussed in Part I, but it is less successful with other universes.

Another approach is to optimize the defensive securities separately. This is the approach espoused by Julex Capital in their Julex Opportunistic Yrs 0-5 tactical asset allocation strategy.

The Julex strategy uses a proprietary algorithm to allocate among five types of income funds at each month-end.

1. Treasuries, represented by GOVT[11].
2. Mortgages, represented by SPMB[12].
3. Cash, represented by SHV[13].
4. US High Yield, represented by JNK[14].
5. Bank Loans, represented by BKLN[15].

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[11] iShares GOVT (0.05% expenses, $17B AUM, inception Feb 2012) is a bond fund which holds a variety of Treasury securities with maturities ranging from 1 – 30 years and a current duration of 6.8 years.

[12] SPDR SPMB (0.06% expenses, $4B AUM, inception Jan 2009) holds mortgage-backed securities and uses the BBG-S index as its benchmark. BBG-S has history from 1997.

[13] iShares SHV (0.05% expenses, $14B AUM, inception Jan 2007) is a short-term Treasury fund with a current duration of about five months.

[14] SPDR JNK (0.40% expenses, $10B AUM, inception Dec 2007) tracks the Bloomberg Barclays High Yield Very Liquid Index (VLI). This index is designed to track a more liquid component of the USD-denominated, high yield, fixed-rate corporate bond market. The index was created in January 2002 and there is simulated history from January 1, 1994.

[15] Invesco BKLN (0.65% expenses, $7B AUM, inception Mar 2011) tracks the S&P/LSTA Leveraged Loan 100 TR Index, a market-value-weighted index of senior loans issued by banks to corporations. The index went live October 20, 2008; S&P graciously provided the author hypothetical simulated history from 2002.

BKLN offers higher yield with less interest rate risk but significantly higher credit risk. The index tracks the 100 largest bank loan facilities floating-rate, high-yield senior debt issued by banks to companies. Bank loans offer relative safety from interest rate risk because the coupons are reset periodically, but they do take significant credit risk. In fact, the bulk of BKLN's portfolio is below investment grade and debt

Surrogates. It is necessary to extend the short ETF histories to develop the hypothetical equity curve over a longer interval. Julex used the following surrogates. Julex has adjusted Index returns for estimated expenses.

Treasuries. GOVT. Julex did not specify a surrogate.

Mortgages. SPMB. Julex did not specify a surrogate. SPMB seeks to track the Bloomberg Barclays U.S. MBS Index.

Cash. SHV. Three-month T-bills before 2/28/2007.

US High Yield. JNK. Barclays US High Yield index before 1/31/2008.

Bank Loans. BKLN. S&P/LSTA Bank Loan Index, presumably the S&P/LSTA Leveraged Loan 100 TR Index, before 4/29/2011.

This study uses the FundX momentum algorithm to select the three highest trending of the same five income funds at month-end. The starting date of December 31, 2002 is determined by the initiation date of the S&P/LSTA Bank Loan index plus a year to initialize the momentum algorithm.

Core (Treasuries). The Bloomberg Government/Credit Total Return index[16] (FastTrack ticker BBG-G) was used as the measure of core fixed income performance. GOVT has underperformed this index by 90 bpts annually whereas VBILX[17] (and BIV, its ETF share class) has provided a slightly higher return than the index.

VBILX was used for backtesting; the history is long enough that no prefacing is required. Substitute BIV for trading purposes.

Mortgages. SPMB, VMBS[18] and VFIIX[19] are all correlated with the Bloomberg Barclays U.S. MBS Index (FastTrack ticker BBG-S). VFIIX was preferred over the index for backtesting because of its longer history and because VFIIX includes expenses while the index does not.

VMBS was prefaced by VFIIX for backtesting. Use VMBS for trading.

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from firms in bankruptcy is not ruled out either. While the floating rate feature greatly reduces sensitivity to changes in interest rates, it doesn't eliminate it. A spike in interest rates makes it harder for issuers to service their debt, potentially raising default risk. The index is rebalanced and reconstituted semi-annually. – etf.com, Oct. 15, 2021.

[16] The Bloomberg US Government/Credit Bond Index is a broad-based flagship benchmark that measures the non-securitized component of the US Aggregate Index. The index includes investment grade, US dollar-denominated, fixed-rate treasuries, government-related and corporate securities. – Bloomberg.com

[17] Vanguard VBILX (0.07% expenses, $40B AUM, inception Nov 2001). The current duration is 6.6 years. This fund tracks the investment return of the Bloomberg U.S. 5–10 Year Government/Credit Float Adjusted Index, which is investment-grade bonds (US government, corporate and international dollar-denominated) with a dollar-weighted average maturity of 5 to 10 years.

[18] Vanguard VMBS (0.05% expenses, $16B AUM, inception Nov 2009), an exchange traded fund.

[19] Vanguard VFIIX (0.2% expenses, inception Jun 1980), a GNMA fund.

Cash. SHV, the Julex choice for cash, has a current duration of five months, which suggests that a 6-month Treasury bill may be a better match than the 3-month bill. The 6-month bill was less volatile than the 3-month during 2009-2015.

For backtesting, SHV was prefaced by DGS6MO, the constant maturity 6-month Treasury yield. DGS6MO is available from FRED or from FastTrack (ticker: US6M-). There was no adjustment for expenses. Use SHV for trading purposes.

US High Yield. VWEAX[20] was used for backtesting since it has a longer history than HYG or JNK. VWEAX has provided more CAGR and less volatility over the common history of the three funds since 2013.

4/30/2013 – 9/30/2021	VWEAX	JNK	HYG
Expenses	0.13%	0.40%	0.48%
CAGR	5.15%	4.20%	4.24%
dSD*SQRT(252)	5.02%	8.01%	8.07%

VWEAX has a $50,000 minimum initial purchase and a 30-day trading limitation. VWEHX, its sibling, has a minimum initial purchase of $3,000. There were two instances during backtesting when VWEAX was sold and repurchased a month later but only one of these would have run afoul of Vanguard's 30-day rule.

It may be necessary to use JNK or HYG as the trading vehicle if the minimum initial purchase of VWEAX/VWEHX is unaffordable, if the 30-day rule is an issue or if VWEAX/VWEHX is not available on a particular trading platform.

Bank Loans. SRLN is preferred to BKLN because it is actively managed[21].

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[20] Vanguard VWEAX (0.13% expenses, inception Nov 2001).

[21] SPDR SRLN (0.70% expenses, $8B AUM, inception Apr 2013) provides actively managed exposure to noninvestment-grade, floating-rate senior secured debt of US and non-US corporations that resets in 3 months or less.

Morningstar's Neal Kosciulex commented Feb. 12, 2021 "Considering the [senior loan] market's lack of liquidity and abundant credit risk,[the senior loan market] lends itself well to active management."

SRLN's actively managed approach to the senior loan ETF space has been well received by investors. The fund has amassed a strong asset base since launch. SRLN aims to outperform the indexes underlying two competing ETFs, SNLN and BKLN, citing two possible means. First, it tries to anticipate which credits will be added and dropped from the indexes, buying and selling accordingly. Second, it isn't constrained to US firms. By design, SRLN allocates overwhelmingly to floating rate, below-investment-grade loans per issuer State Street Global Advisors. SRLN trades well with small spreads, though larger investors looking to trade blocks will have to work harder with market makers for good executions as the underlying senior loan market is generally less liquid. It charges a reasonable fee for the active management space, and with no underlying index, tracking isn't a concern. – etf.com, Oct. 15, 2021.

For backtesting, SRLN was prefaced by BKLN which was prefaced by the S&P/LSTA index (ticker SPBDLL). Some interpolation was necessary before 2007 when this was a weekly index. Use SRLN for trading.

The results of backtests are shown in Table 13. The To2 or Top3 of 5 strategies provide the best results. The tactical fixed income portfolio is slightly superior to the PIMCO PTTRX fund and much superior to the Vanguard BND/VBMFX fund.

Table 13. FundX allocates among BankLoan, HiYield, Mortgage, Core and Short fixed income securities. The performance of two bond mutual funds is shown for comparison.

CAGR, mSD and maxDD are inflation-adjusted.

2003 – Sep 2022 (~ 20 years)	CAGR	mSD	Sharpe	maxDD	UPI
FundX, Top2 of 5 0	4.2	1.18	1.16	5.5 9/2008	4.6
FundX, Top3 of 5 1	3.4	1.04	1.31	5.0 10/2008	4.9
FundX, Top4 of 5 2	3.0	1.03	1.16	10.4 10/2008	2.7
Static PTTRX 42	3.2	1.35	1.06	6.8 9/2008	2.6
Static BNDe 43	2.2	1.20	0.60	17.0 10/2018	2.1

Source: Output 10052022 with adjustment. The small numbers identify the runs in the source file.

This study should be extended to include long bonds.

Vanguard LifeStrategy funds invest in US and foreign stocks and in US and foreign bonds. The difference among the funds is the equity to fixed income ratio.

Vanguard publishes how these funds are constructed. The strategy has evolved over time. Most recently, the funds have maintained fixed allocations within the equity and fixed income sectors.

The extended histories of USMarket, xUSMarket, BNDe and BNDXe, which are used in this analysis, are described in Appendix A.

Table 14. Simulated Performance of the Moderate LifeStrategy fund. VSMGX currently holds about 36% total US stock market, 24% total international stock market, 27% total US bond market and 13% total international bond market, rebalanced periodically.

The moderate LifeStrategy performance is simulated as 60% USMarket and xUSMarket, rebalanced monthly to a 60:40 ratio, plus 40% BNDe and BNDXe, rebalanced monthly to a 70:30 ratio.

Composite Timing chooses USMarket and xUSMarket, rebalanced monthly to a 60:40 ratio or BNDe and BNDXe, rebalanced monthly to a 70:30 ratio.

Volatility Control reduces the equity allocation using the 006SPVolSPX indicator; the balance of the portfolio is BNDe plus BNDXe in a 70:30 ratio.

FundX choses among US Market, xUSMarket, BNDe or BNDXe.

Dual Momentum chooses between USMarket plus xUSMarket or BNDe plus BNDXe and, if equities are chosen, between USMarket or xUSMarket.

CAGR, mSD and maxDD are inflation-adjusted.

2003 – Sep 2022 (~ 20 years)	CAGR	mSD	Sharpe	maxDD	UPI
60% USMarket and 40% xUSMarket. No timing [50]	2.4	4.6	0.30	55 2/2009	0.23
Moderate LifeStrategy [47]	2.3	2.9	0.39	36 2/2009	0.41
Tactical Strategies					
Composite Timing [48]	6.2	3.0	0.74	23 9/2022	1.26
Volatility Control [49]	3.3	2.6	0.54	26 9/2022	0.69
FundX Top1 [56]	5.4	3.1	0.65	26 9/2022	0.94
FundX Top2 [57]	4.5	2.7	0.65	29 9/2022	0.87
Dual Momentum [84]	5.7	3.6	0.60	24 9/2022	0.83
SIMPLERM (Top2 of 7) [78]	7.7	3.0	0.90	17 9/2022	1.51

Source: Output_10052022 with adjustment.xlsx. The small numbers identify the run number in the source file.

The moderate LifeStrategy strategy reduces the volatility and maximum drawdown as compared to the 60:40 (equity only) portfolio of US and foreign stocks with little effect on the return.

The tactical strategies reduce the maximum drawdown further, provide substantially more return and similar volatilities. The tactical LifeStrategy strategies are inferior to the SIMPLERM strategy over this time interval.

The NASDAQ 100 Composite. The "cubes" are very volatile and experienced a huge drawdown in 2002. The return shown in Table 15 is inferior to that of large cap stocks.

Table 15. Simulated Historical Performance of the NASDAQ 100 Composite. CAGR, mSD and maxDD are inflation-adjusted.

2003 – Sep 2022 (~ 20 years)	CAGR	mSD	Sharpe	maxDD	UPI
SIMPLERM (Top2 of 7) 78	7.7	3.0	0.90	17 9/2022	1.51
SIMPLERM (Top2 of 9) 97	8.9	3.1	0.96	20 4/2016	1.63
LrgCapUS 36	3.3	4.5	0.35	54 2/2009	0.27
Static QQQext 32	2.9	6.8	0.29	82 9/2002	0.13
LrgCapUS and IGBond					
Static 60:40 37	2.7	2.6	0.46	31 2/2009	0.48
Active LrgCapUS or IGBond	0.0				
QQQext and IGBond					
Static 60:40 33	2.9	4.0	0.35	58 9/2002	0.18
Active QQQext or IGBond 31	5.0	4.4	0.47	34 9/2022	0.57
Tactical					
Composite Timing 34	8.2	4.1	0.70	30 9/2002	0.87
Volatility Control[22] 30	5.0	2.4	0.76	24 9/2022	1.32
Add Bonds to Mix[23] 35	3.7	4.5	0.38	34 10/2008	0.42

Source: Output_10052022 with adjustment.xlsx. The small numbers identify the run number in the source file.

A static 40% allocation to IGBond reduces the volatility and drawdown with no change in the return.

The active strategy of allocating between QQQext and IGBond, run 31, provides better drawdown control and a near doubling of the return.

Composite timing provides about the same volatility and drawdown as active allocation, but a much higher return.

Volatility control provides attractive monthly standard deviation and drawdown with a near doubling of the return as compared to the static 60:40 portfolio.

Adding US bonds to the mix is less attractive than the Composite timing or Volatility Control strategies.

The NASDAQ 100 strategies are inferior to the Top2 of 7 or Top2 of 9 strategies.

[22] 006SPVolNDX

[23] The FundX algorithm was used to select, at each month-end, the highest trending from among 11 funds, QQQext and the following: RiskFree, Short, Core, IGBond, BNDe, VGLTe, TLTe, BankLoan, HiYield and Mortgage. The more effective of the bond funds were VGLTe, TLTe, BankLoan and HiYield.

Sector Strategies. This section illustrates the SPDR select sector strategy, the Fidelity select sector strategy and a strategy combining the SPDR sector and Style universes. Simulation results are summarized in Table 16.

State Street Global Advisors introduced nine sector ETFs, which they called "SPDRs" – and anacronym for Standard & Poor's Depositary Receipts - in December 1988. Each sector SPDR tracks a specific portion of the S&P 500 universe. Real estate and Communication sectors were introduced later, in 2015 and 2018 respectively. The universe tested here includes the nine original SPDRs plus USREIT. See Appendix A for the ticker symbols.

Table 16. Simulated Historical Performance of Sector Universes. The FundX algorithm was used to allocate within the investment universe unless otherwise stated. The ensemble algorithm chooses TopN+1 securities using the FundX and DEMA20 allocation algorithms, equally weighted, and eliminates the most volatile.

CAGR, mSD and maxDD are inflation-adjusted.

2000 – Sep 2022 (~ 23 years)	CAGR	mSD	Sharpe	maxDD	UPI
SIMPLERM (Top2 of 7) 78	7.7	3.0	0.90	17 9/2022	1.51
SIMPLERM (Top2 of 9) 97	8.9	3.1	0.96	20 4/2016	1.63
9 SPDRs and USREIT					
Top2 of 10, No Timing 58	2.0	4.7	0.27	49 2/2009	0.20
Composite Timing, Top2 59	5.1	3.6	0.56	21 9/2022	0.96
Composite Timing, Top4 60	7.1	3.0	0.82	13 3/2020	2.00
Volatility Control, Top2[24] 62	3.1	2.9	0.47	23 9/2022	0.78
Add Bonds, Top2 0f 15[25] 63	3.3	4.1	0.38	38 7/2002	0.33
25 Fidos FundX Allocation					
Composite Timing, Top2 4	7.6	4.9	0.58	37 7/2000	0.72
Composite Timing, Top3 5	10.5	4.5	0.79	27 5/2000	1.59
Composite Timing, Top4 6	10.8	4.2	0.85	26 5/2000	1.84
Add Bonds, Top3 of 39[26] 11	7.2	5.1	0.54	37 3/2003	0.62
25 Fidos Ensemble Allocation					
Top3 of 25, No Timing 3	7.9	5.1	0.58	47 2/2009	0.80
Composite Timing, Top2 7	10.9	4.1	0.88	28 9/2022	1.92
Composite Timing, Top3 8	9.5	4.0	0.82	25 9/2022	1.75
Composite Timing, Top4 9	9.7	3.8	0.86	25 9/2022	1.91
Volatility Control, Top3[27] 10	6.3	2.8	0.81	26 9/2022	1.54
Add Bonds, Top3 of 39[28] 12	6.5	4.4	0.56	34 9/2022	0.76

Source: Output_10052022 with adjustment.xlsx. The small numbers identify the run number in the source file.

[24] 006SPVolSPX

[25] The top FundX trending securities are selected from 15 funds, the 10 sectors plus RiskFree, Short, Core, IGBond and BNDe. *This strategy should be retested with 17 funds, including two long bonds.*

[26] The top FundX trending securities are selected from 39 funds, the 25 Fidos and BankLoan(2 instances), HiYield(2), Mortgage(2), RiskFree, Short(2), Core, IGBond, BNDe, VGLTe and TLTe.

[27] 006SPVolSPX

[28] The top FundX trending securities are selected from 39 funds, the 25 Fidos and BankLoan(2 instances), HiYield(2), Mortgage(2), RiskFree, Short(2), Core, IGBond, BNDe, VGLTe and TLTe.

Based on the testing done to date, the SPDR strategy is not attractive compared to the Top2 of 7 or 9 strategies. *However, the testing of the SPDRs plus bonds universe is incomplete. The bond choices should be expanded to include 3 short bonds, 3 intermediate bonds and 3 long bonds.*

Fidelity Investments has many "Fidelity select sector" mutual funds. The universe tested here includes 25 "Fidos," all of which have history from September 1988. The 25 Fidos strategy has the advantage that it can be backtested from 1990 (results not shown).

The performance statistics for FundX/Top4 strategy and for the Ensemble/Top2 strategy are similar; compare runs 6 and 7. While returns are higher than for the Top2 of 7 (or 9) strategy and the Top4 SPDRs strategy (run 60), the Fido strategies are more volatile and have evidenced higher drawdowns.

The testing of the addition of bonds to the Fido funds is incomplete. Bonds should include three instances each of short, intermediate and long bonds.

The Fidos have a 30-day minimum hold requirement, which was neglected in backtesting. The 30-day hold has delayed investment changes only occasionally since the strategy went live in the author's portfolio about five years ago.

State Street Global Advisors introduced large and small cap growth and value style ETS in 2000 and mid cap growth and value ETFs in 2005. The universe tested here includes all six of the style ETFs.

The Jules Dynamic Sectors Strategy invests in a universe of sector and style ETFs[29]. This strategy provided the inspiration for the investigation summarized in Table 15.

Comparing runs 60 and 68, the Sectors plus Styles investment universe, Top8, and the Sectors only universe, Top4, suggests that adding Styles provides some increase in return with no change in volatility but some increase in drawdown.

Comparing runs 68 and 100 suggests that changing from equal weighting to inverse 60-day standard deviation weighting reduces return without material improvement to the Sharpe ratio or Ulcer Performance Index.

Adding bonds to the investment universe without timing controls volatility and drawdown but at a considerable cost in return and complexity.

None of the Sector or Sector plus Styles categories significantly outperform the SIMPLERM strategies in terms of return, volatility and drawdown.

[29] The technical basis for the Julex strategy is described in the video "Dynamic Sector Strategy Q2 2022" which can be found at www.julexcapital.com/products/tactical-etf-strategies/.

Table 17. Sectors Plus Styles FundX Strategy.
CAGR, mSD and maxDD are inflation-adjusted. Assets are equally weighted except as indicated.

2000 – Sep 2022 (~ 23 years)	CAGR	mSD	Sharpe	maxDD	UPI
SIMPLERM (Top2 of 7) 78	7.7	3.0	0.90	17 9/2022	1.51
SIMPLERM (Top2 of 9) 97	8.9	3.1	0.96	20 4/2016	1.63
9 SPDRs and USREIT					
Composite Timing, Top4 60	7.1	3.0	0.82	13 3/2020	2.00
9 SPDRs, USREIT, 6 Styles					
Composite Timing, Top2 65	5.9	3.6	0.61	21 9/2022	1.06
Composite Timing, Top4 66	7.2	3.1	0.81	16 9/2022	1.88
Composite Timing, Top6 67	7.9	3.0	0.89	15 9/2022	2.06
Composite Timing, Top8 68	8.1	3.0	0.93	17 9/2022	2.04
Composite Timing, Top10 69	7.6	2.9	0.90	20 9/2022	1.82
Add Bonds, Top4 of 24[30] 70	5.5	3.4	0.61	24 9/2001	0.77
Add Bonds, Top6 of 24 71	5.6	3.2	0.65	19 10/2008	0.96
Add Bonds, Top8 of 24 72	6.1	3.0	0.74	18 7/2008	1.18
Add Bonds, Top4 of 34[31] 73	4.6	3.4	0.54	27 9/2001	0.59
Add Bonds, Top6 of 34 74	5.6	3.1	0.66	18 7/2008	1.00
Add Bonds, Top8 of 34 75	5.9	2.9	0.74	20 10/2008	1.12
Inverse 60-day SD Weighting					
Composite Timing, Top8 100	7.9	2.9	0.94	18 9/2022	1.97

Source: Output_10052022 with adjustment.xlsx. The small numbers identify the run number in the source file.

[30] The FundX algorithm was used to select, at each month-end, the top trending securities from among 24 funds, the 10 SPDRS, 6 Styles and RiskFree (2 instances), Short (2), Core, IGBond(2) and BNDe.

[31] The FundX algorithm was used to select, at each month-end, the top trending securities from among 34 funds, the 10 SPDRS, 6 Styles and RiskFree (2 instances), Short (2), Core(2), IGBond, BNDe, VGLTe(2), TLTe(2), BankLoan(2), HiYield(2) and Mortgage(2).

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Conclusions

- Tactical strategies are easy to implement in EXCEL or Portfolio Visualizer.
- Professional management is available for those without the time or inclination to manage on their own.
- Tactical strategies are most profitable in an IRA or qualified account.
- Tactical strategies do not outperform consistently; TA requires time.
- Histories of only two decades tend to understate the risk of future surprises.
- Commodities are not always beneficial.
- Top2 of 7 and Top2 of 9 strategies have performed well and do not require timing.
- New criterion: how do strategies perform when interest rates are rising?

Appendix A. Data Sources

Intraday trading, lower cost and lower capital gain distributions mean that it is better to build a portfolio with exchange traded funds than with mutual funds.

Bur ETS are relatively short-lived. It is therefore necessary to stitch predecessor securities to the beginning of the ETF data histories for backtesting purposes.

The following table summarizes the synthetic securities used in this study and the dates when the histories were stitched together. Vanguard mutual funds are used to extend Vanguard ETFs whenever possible because the mutual funds and ETFs differ only in expense ratios.

	Current	Predecessor & Splice Date	Start Date
RiskFree	DGS1MO FT?	^IRX 7/31/2001	1960
Short	SHV	DGS6MO 1/31/2007	1989
Core	BIV	BILX 4/30/2007 BBG-G[32] 12/31/2001	1989
IGBond	IEI	30% VFISX, 70% VFITX 12/31/2007	1992[33]
BNDe	BND	VBMFX 6/2007	1989
VGLTe	VGLT	VUSTX 12/31/2009	1989
TLTe	TLT	PRULX 12/31/2002	1990
BNDXe	BNDX	PFORX 6/2013	1993
BankLoan	SRLN	BKLN 4/30/2013 SPBDLL[34] 3/31/2011 Core 1 2/31/2001	1989
HiYield	VWEAX	VWEHX 2002	1989
Mortgage	VMBS	VFIIX 11/30/2009	1989
USMarket	VTI	VTSMX 6/2001	5/1992?
xUSMarket	VXUS	VGTSX 2/2012	1996

[32] The Bloomberg US Government/Credit Bond Index is a broad-based flagship benchmark that measures the non-securitized component of the US Aggregate Index. The index includes investment grade, US dollar-denominated, fixed-rate treasuries, government-related and corporate securities. – Bloomberg.com

[33] This simulated history was designed for a smooth transition to the monthly Ibbotson intermediate bond returns which extend back to 1927.

[34] Ticker symbol for the S&P/LSTA Leveraged Loan 100 TR Index, a market-value-weighted index of senior loans issued by banks to corporations. The index went live October 20, 2008; S&P graciously provided the author hypothetical simulated history from 2002.

LSEquity	60% USMarket, 40% xUSMarket		1996
LSBond	70% BNDe, 30% BNDX1		1993
LrgCapUS[35]	VFINX		1989
Foreign[36]	FSPSX	FSIIX 9/30/2011	1998
USREIT[37]	VGSIX		6/1996
QQQext	QQQ	NDX, 4/1999	1989
SPDR Sectors	XLB, XLE, XLF, XLI, XLK, XLP, XLU, XLV, XLY, USREIT		12/1998 XLC 2018 XLRE 2015
SPDR Style	SPYD, SPYV, MDYG, MDYV, SLYG, SLYV		9/2000 11/2005 9/2000
25 Fidos	FBIOX FBMPX FDCPX FDFAX FDLSX FIDSX FRESX FSAVX FSCHX FSCSX FSDAX FSDPX FSELX FSENX FSHCX FSLBX FSPCX FSPHX FSPTX FSRBX FSRFX FSRPX FSTCX FSUTX FSVLX		9/1988
DBCOM	DBC	PCRIX 3/31/2006	1987
BCOM	PCRIX	BTOP 12/31/2002 7/2002?	1987
BCOM2	VCMDX	PCRIX 7/2019 (1/2020?)	1987
WBEnergy		World Bank Energy Index	1960
WBNonEng		World Band NonEnergy Index	1960
WBAg		World Bank Agriculture Index	1960
WBPrecMet		World Bank Precious Metals	1960

[35] LrgCapUS is designed to transition smoothly to monthly Ibbotson data for large cap US stocks. Use VOO for current portfolios; SPY is more expensive.

[36] Foreign is designed to transition smoothly to monthly MSCI-EAFA data for developed markets excluding the US and Canada. Use VEU for current portfolios; EFA is more expensive.

[37] USREIT is designed to transition smoothly to monthly FTSE NAREIT ALL REITs data. Use VNQ for current portfolios; do not use IRY since it tracks a different real estate index and underperforms by about 100 basis points annually.

Commodity Indices. The first investable commodity index began about 1991. There have been considerable changes to index methodology since then, with the result that it is difficult to develop extended histories[38].

Bloomberg Commodity Index (BCOM). Launched in 1998, with historical data available back to 1960, BCOM is a widely tracked benchmark for the commodities market. The index references exchange-traded contracts linked to 23 physical commodities, and the 2022 target weights are updated annually with the constraints that

- No sector weight can exceed 33%.
- The aggregate weight for each single commodity and its derivatives cannot exceed 25%.
- No single commodity weight can exceed 15%.

For 2022, the sector weights are approximately 30% energy, 23% grains, 15% industrial metals, 20% precious metals, 7% sugar, coffee and cotton, and 5% livestock.

The Bloomberg Commodity Total Return Index (BCOMTR) includes the income earned on the collateral, e.g., 3-month Treasury bills.

Barclay BTOP50 Index. The BTOP50 Index seeks to replicate the overall composition of the managed futures industry with regard to trading style and overall market exposure. The BTOP50 employs a top-down approach in selecting its constituents. The largest investable trading advisor programs, as measured by assets under management, are selected for inclusion in the BTOP50. In each calendar year the selected trading advisors represent, in aggregate, no less than 50% of the investable assets of the Barclay CTA Universe. To be included in the BTOP50, the following criteria must be met:

- Program must be open for investment
- Manager must be willing to provide us daily returns
- Program must have at least two years of trading activity
- Program's advisor must have at least three years of operating history
- The BTOP50's portfolio will be equally weighted among the selected programs at the beginning of each calendar year and will be rebalanced annually.

For 2011 there are 28 funds in the Barclay BTOP50 Index; for 2022, there were 22. Go to barclayhedge.com to see the complete list of current constituents.

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[38] Dunsby, Adam; Nelson, Kurt (May 2010). "A Brief History of Commodity Indexes: An evolution from passive to active indexes," Journal of Indices May/June 2010. Accessed 18 Sep 2022.

