



Portfolio Management for The Defensive Growth Portfolio



Directed by Macroeconomics



Implemented through Volatility Targeting

Step 1:

Macroeconomic Analysis

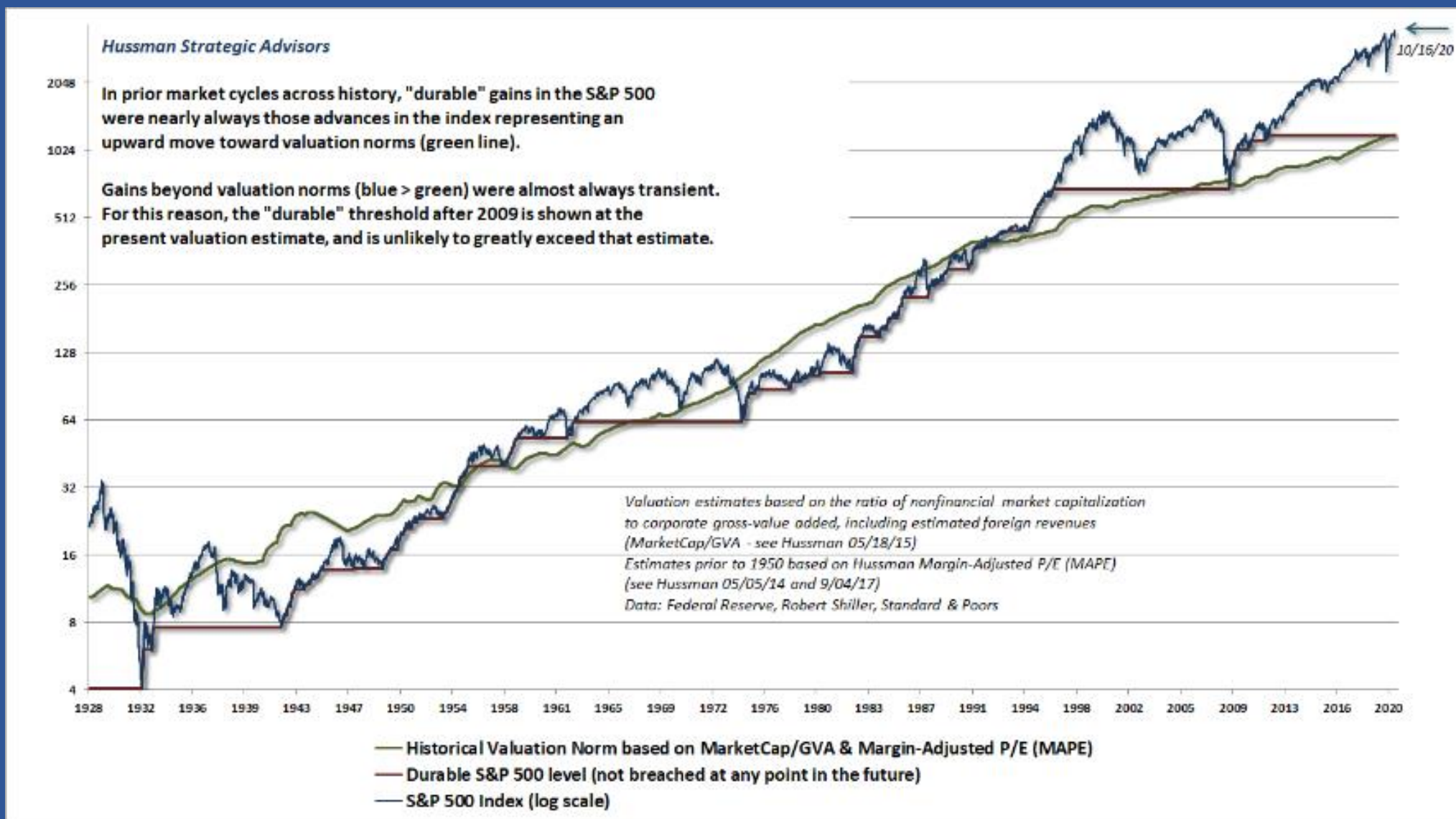


Follow Dr. John Hussman



Follow Dr. Lacy Hunt

Dr. John Hussman on Why the S&P 500 will likely fall to 1200



Step 2: Volatility Targeting

An active form of investment management in which the portfolio's risk level is consciously selected, i.e. targeted, and adjusted in response to the increase or decrease in perceived market risk.

Volatility targeting is a quantitative method of portfolio construction and management, with Efficient Set Theory providing the underlying mathematical framework.

Efficient Set Theory

This theory is the basis upon which volatility targeting is conducted.

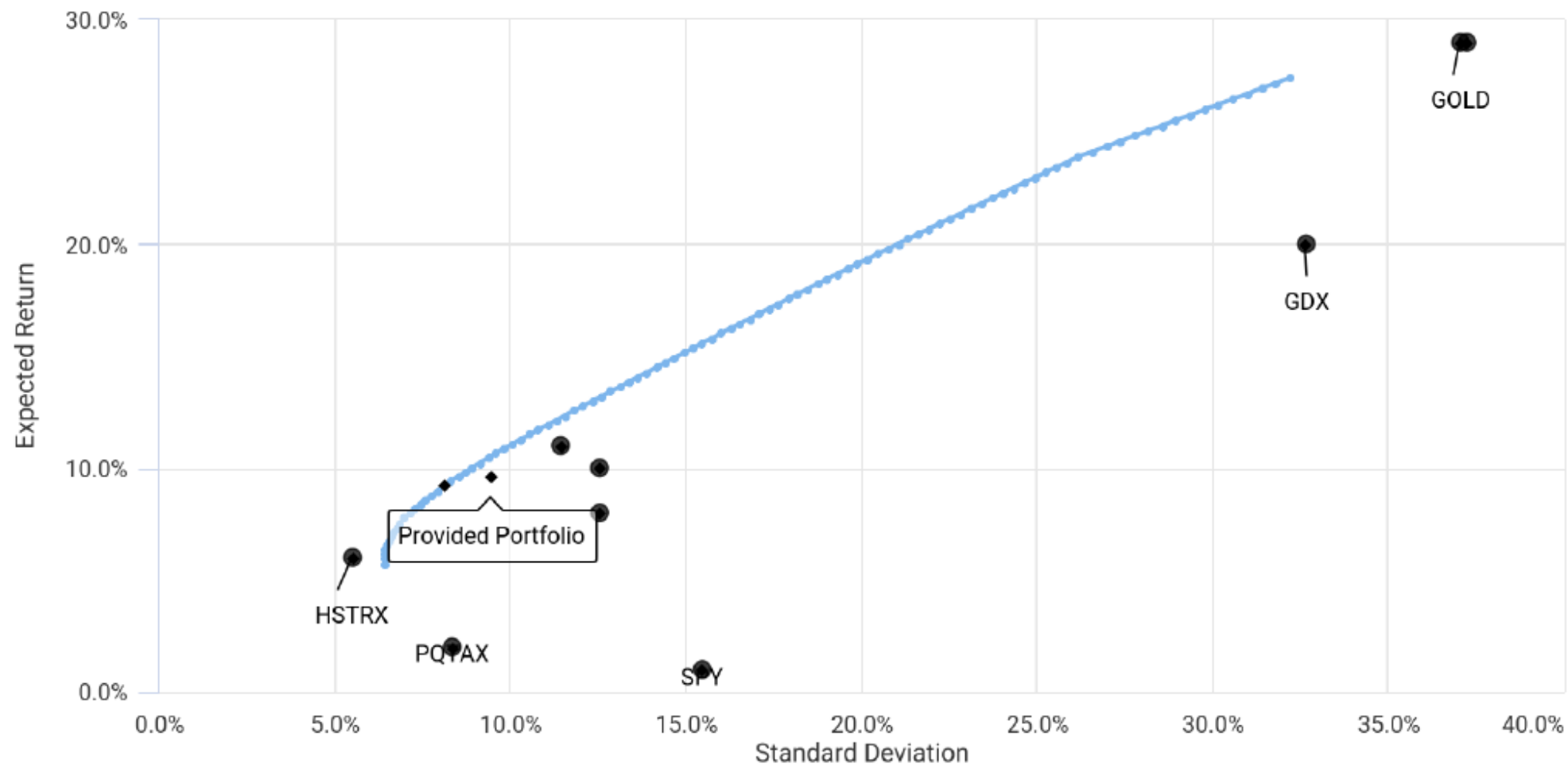
Efficient Set Theory is used to mathematically create “optimized” portfolios, which are the combination of investments which provide the highest expected return at every level of risk.

Only 3 numbers are needed to create these ideal portfolios:

1. The standard deviation or volatility of each asset.
2. The correlations between all the assets in the portfolio
(This theory created the concept of diversification mathematically)
3. The expected rate of return

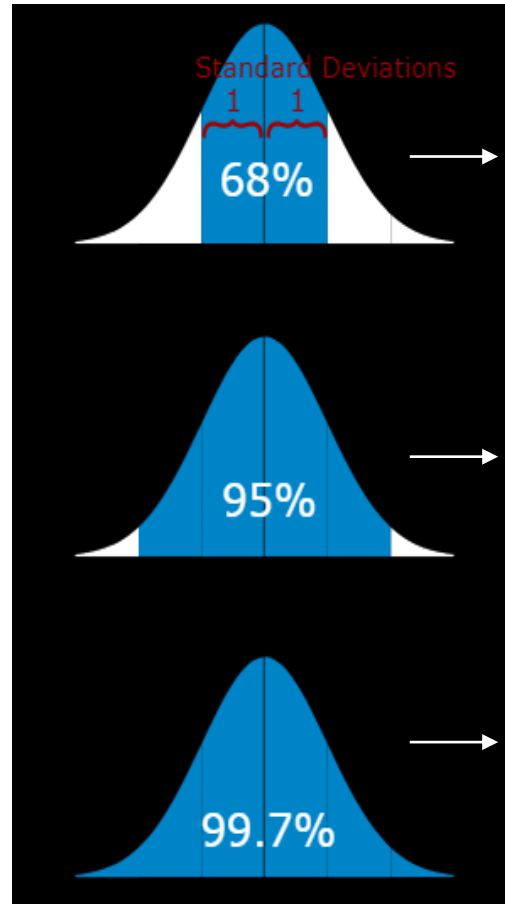
With these 3 numbers for each asset, we can create “The Efficient Frontier”

Efficient Frontier



1. Standard Deviations

The Standard Deviation is a measure of how spread out numbers are. When we calculate the standard deviation we find that **generally**:



68% of values are within
1 standard deviation of the mean

95% of values are within
2 standard deviations of the mean

99.7% of values are within
3 standard deviations of the mean

Efficient Frontier Assets

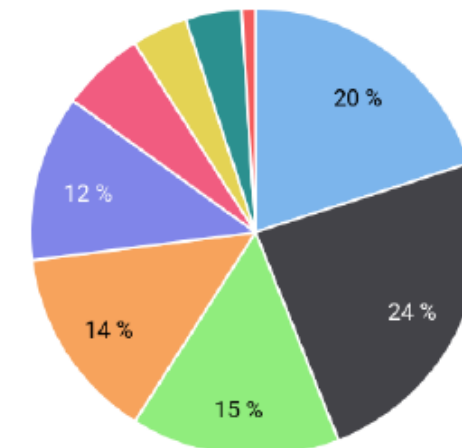
#	Asset	Expected Return	Standard Deviation	Sharpe Ratio	Min. Weight	Max. Weight
1	Hussman Strategic Total Return (HSTRX)	6.00%	5.49%	1.073	1.00%	25.00%
2	iShares 20+ Year Treasury Bond ETF (TLT)	8.00%	12.53%	0.630	1.00%	30.00%
3	AlphaCentric Premium Opportunity I (HMXIX)	11.00%	11.41%	0.954	1.00%	20.00%
4	PIMCO TRENDS Managed Futures Strat A (PQTAX)	2.00%	8.32%	0.227	1.00%	100.00%
5	SPDR Gold Shares (GLD)	10.00%	12.52%	0.790	1.00%	15.00%
6	VanEck Vectors Gold Miners ETF (GDX)	20.00%	32.64%	0.609	1.00%	100.00%
7	Barrick Gold Corp (GOLD)	29.00%	37.03%	0.780	1.00%	100.00%
8	Wheaton Precious Metals Corp (WPM)	29.00%	37.22%	0.776	1.00%	100.00%
9	SPDR S&P 500 ETF Trust (SPY)	1.00%	15.45%	0.058	1.00%	2.00%

Results based on the provided capital market expectations. Ex ante Sharpe Ratio calculated using the current 3-month treasury bill return as the risk-free rate (0.11% annualized).

Provided Portfolio

Ticker	Name	Allocation
HSTRX	Hussman Strategic Total Return	20.00%
TLT	iShares 20+ Year Treasury Bond ETF	24.00%
HMXIX	AlphaCentric Premium Opportunity I	15.00%
PQTAX	PIMCO TRENDS Managed Futures Strat A	14.00%
GLD	SPDR Gold Shares	12.00%
GDX	VanEck Vectors Gold Miners ETF	6.00%
GOLD	Barrick Gold Corp	4.00%
WPM	Wheaton Precious Metals Corp	4.00%
SPY	SPDR S&P 500 ETF Trust	1.00%

Provided Portfolio: Expected Return – 9.59%;
Expected Volatility 9.44%, and
Sharpe Ratio 1.00



Notes:

- Past performance is no guarantee of future results, which may vary. All use is subject to terms of service.
- Investing involves risk, including possible loss of principal. The value of the investments and the income derived from them may fluctuate over time.
- All portfolio returns presented are hypothetical and backtested. Hypothetical returns do not reflect trading costs, transaction fees, or taxes.
- Portfolio optimization determines target weights for portfolio assets based on mathematical models that can use either historical or forecasted data as inputs. Optimization results are not guarantees of future performance.
- The results are based on information from a variety of sources we consider reliable, but we do not represent that the information is accurate or complete.
- The results do not constitute investment advice or recommendation, are provided solely for informational purposes, and are not an offer to buy or sell any securities.
- The results are based on the total return of assets and assume that all received dividends and distributions are reinvested.
- Historical asset statistics are based on monthly returns from Oct 2016 to Sep 2020
- The efficient frontier is based on the monthly returns, volatilities, and correlations of the specified assets
- The displayed standard deviation and expected return in the efficient frontier are annualized from the monthly returns
- Ex-ante Sharpe Ratio for the efficient frontier forecast is calculated using the current 3-month treasury bill return as the risk free rate (0.11% annualized)

In other words

These aren't guarantees or promises or anything except what **could** occur if events unfold as we **expect**. Seeing the future through probability theory is, by definition, impossible. It tells us the likelihood something may occur, but doesn't predict exactly what will happen, or when. Therefore, there is always a chance that probability theory will be "wrong," meaning a very low probability event(s) will occur. In other words, there is no crystal ball.

Defining Risk Using Standard Deviations

1. We focus on the 99.7% probability level.
2. Calculated by taking the STD x 3.

Example:

Using a Portfolio with a STD of $9.44 \times 3 = 28.32$

- Subtract from the mean of 9.59%
- You get a maximum potential loss at 99.7% confidence level of 18.73%

This will be the Defensive Growth Portfolio's target when stocks are confirmed in a bear market

Tightening the risk through volatility targeting

An 18.73% loss would be far too high, for us and our clients. It happened to many in March, and we dropped 2.4%.

We “cut off the left tail” through volatility targeting, including a trading program.

Volatility Targeting –Trading Long Treasury Bonds

When it works
WHOSX

Buy	4/1/2019	for	\$16.32
	5/10/2019		\$16.42
Sold on	9/19/2019		\$19.47

Gained 18.8% (Internal Rate of Return or IRR)

When it works ZROZ

Buy	Sold on	For
11/18/2019		\$137.04
1/29/20		\$146.07
2/24/20		\$149.99
2/25/20		\$152.45
2/26/20		\$156.69
	3/12/20	\$168.61
	3/13/20	\$156.59
Gained 22.01% IRR		

When it
doesn't work

TLT

Buy	Sold on	For
3/16/20		\$160.58
3/17/20		\$164.90
	3/18/20	\$152.00
3/23/20		\$163.03
4/21/20		\$171.51
	6/4/20	\$157.77
6/26/20		\$164.47
	10/23/20	\$157.38

Lost 17.64%

Total Long-Term Treasury Trading Results

Gains/Losses through 3 Rounds of Trades

From 4/1/19 – 3/16/20:

2 rounds of trades. *IRR* = +50.76%

From 3/16/20-10/26/20:

3 rounds of trades. *IRR* = -17.34%

Total Return (IRR): 16.92% over 18 months

What Did We Learn?

The Efficacy of the Trading Program

First, we must adjust it for an error – selling too late in early June (-8.47% vs -4.3%). Had all 3 sales been as quick as #3, we would have dropped 13%. This would be at the 99th percentile in terms of risk probability. Given the potential return, this would be considered quite good.

This corresponds to a 56% reduction in risk through the use of the trading program, i.e. it lowers the standard deviation of our Treasury holdings from 12.53 for TLT to 7. Compared to ZROZ it drop from 19.6 to 7, a 64% reduction in risk.

At a 25% allocation to long Treasuries, this means the trading program allows us the opportunity to capture large upside gains while risking no more than 3.25% on our entire portfolio. In rare cases where Treasuries would bounce up and down like they have since April 3 times, the concept would be to balance out those 3.25% losses with gains in the remaining 75% of the portfolio.

What Did We Learn?

Process Improvements

In addition to learning to always sell as quickly as possible, there are three much more important lessons:

1. Don't ever own any assets with a negative correlation to the stock market unless internal market sentiment has turned clearly negative.
2. When risk is elevated and you want to be safe – set the standard deviation at 5 no matter what (aka where we are today).
3. You can't be afraid to trade when needed, but if you pay attention to short-term market sentiment (the willingness of investors to speculate versus exhibit fear) fewer trades should be necessary.

Buy Low/ Sell High?

The trading program by definition doesn't sell at the highest point or buy at the lowest point. Like basically all trading programs, there is an element of trend following required to establish the most reliable outcome. Trend following never predicts markets will turn around right away but rather responds to, hopefully, the earlier signals.

Buying low and selling high should be accomplished over the time horizon which encompasses an entire business cycle. From this perspective the question is not "Did you buy and sell in March or April of 2020 but "Did you buy long Treasuries either before or in the early stages of the (still) approaching, major market realignment." Then, "Did you sell them near the bottom of this entire business cycle?"

2. Correlations



Portfolio Visualizer

Efficient Frontier Forecast

Asset Correlations

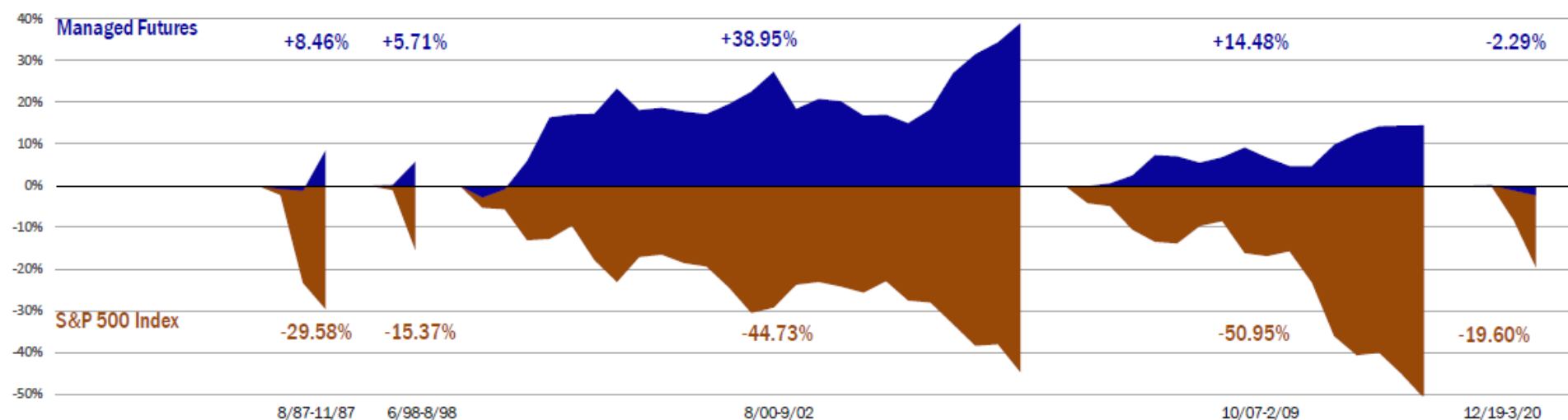
Name	Ticker	HSTRX	TLT	HMXIX	PQTAX	GLD	GDV	GOLD	WPM	SPY
Hussman Strategic Total Return	HSTRX	1.00	0.45	0.14	0.27	0.81	0.91	0.83	0.83	0.25
iShares 20+ Year Treasury Bond ETF	TLT	0.45	1.00	0.10	0.43	0.48	0.26	0.30	0.40	-0.39
AlphaCentric Premium Opportunity I	HMXIX	0.14	0.10	1.00	0.41	0.08	0.03	0.14	0.09	0.01
PIMCO TRENDS Managed Futures Strat A	PQTAX	0.27	0.43	0.41	1.00	0.25	0.10	0.21	0.25	-0.23
SPDR Gold Shares	GLD	0.81	0.48	0.08	0.25	1.00	0.80	0.67	0.70	0.18
VanEck Vectors Gold Miners ETF	GDV	0.91	0.26	0.03	0.10	0.80	1.00	0.83	0.88	0.39
Barrick Gold Corp	GOLD	0.83	0.30	0.14	0.21	0.67	0.83	1.00	0.68	0.19
Wheaton Precious Metals Corp	WPM	0.83	0.40	0.09	0.25	0.70	0.88	0.68	1.00	0.21
SPDR S&P 500 ETF Trust	SPY	0.25	-0.39	0.01	-0.23	0.18	0.39	0.19	0.21	1.00

Based on monthly returns from Oct 2016 to Sep 2020

Managed Futures approaches have performed well during many shocks to global equity markets, including during the worst drawdowns and quarters of the S&P 500 Index since 1987.

Worst 5 Drawdowns for the S&P 500 Index Vs. Managed Futures Index

January 1987 - March 2020



The chart above shows the performance of managed futures, represented by the Barclay BTOP50 Index. Prospective investors should note that Millburn did not manage any account represented by the Barclay BTOP50 Index, and that this chart is presented for illustrative purposes only to show the performance of managed futures during periods of stress for equities, represented by the S&P 500 Index. Prospective investors should also note that the index performance is not the performance of the Fund. The index is not subject to certain investment restrictions, diversification requirements and other restrictions of the 1940 Act of the Code, which if they had been applicable, might have adversely affected its performance. Past performance does not guarantee future results.

Please see Important Risk Information on page 21.

If stocks fall 65%
as expected.....

If stocks fall 65% as expected, we should mirror 2000-2002 in severity. If we replicated that event, managed futures would make 56%.

The precise negative mirror image in the returns simply tell us these returns are all being generated by computer trading programs. This tells us the probability of them “doing what they do” is through the roof.

This is why we are likely to end with up to 35% in managed futures.

3. Estimated Returns

A (very) optimistic Efficient Frontier Forecast

Discussion of how Dr. Harry Markowitz explained that improper expected returns are the primary misuse of Efficient Set Theory.

Portfolio Visualizer

Efficient Frontier Forecast

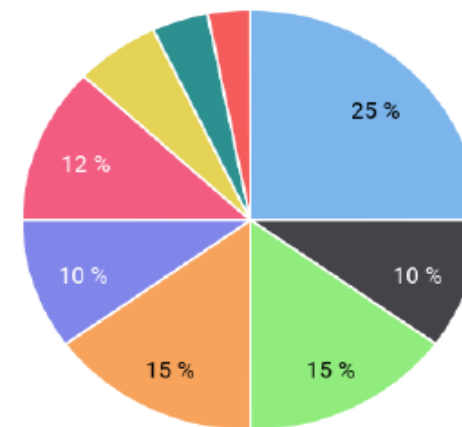
Efficient Frontier Assets

#	Asset	Expected Return	Standard Deviation	Sharpe Ratio	Min. Weight	Max. Weight
1	iShares 20+ Year Treasury Bond ETF (TLT)	30.00%	12.53%	2.386	0.00%	30.00%
2	Hussman Strategic Total Return (HSTRX)	30.00%	5.49%	5.447	0.00%	30.00%
3	AXS Aspect Core Diversified Strategy I (EQAIX)	30.00%	9.27%	3.225	0.00%	30.00%
4	PIMCO TRENDS Managed Futures Strat A (PQTAX)	30.00%	8.32%	3.592	0.00%	30.00%
5	AlphaCentric Premium Opportunity I (HMXIX)	30.00%	11.41%	2.619	0.00%	30.00%
6	SPDR Gold Shares (GLD)	100.00%	12.52%	7.977	0.00%	25.00%
7	VanEck Vectors Gold Miners ETF (GDX)	300.00%	32.64%	9.188	0.00%	7.50%
8	Barrick Gold Corp (GOLD)	300.00%	37.03%	8.098	0.00%	5.00%
9	Wheaton Precious Metals Corp (WPM)	300.00%	37.22%	8.058	0.00%	5.00%

Results based on the provided capital market expectations. Ex ante Sharpe Ratio calculated using the current 3-month treasury bill return as the risk-free rate (0.11% annualized).

Provided Portfolio

Ticker	Name	Allocation
TLT	iShares 20+ Year Treasury Bond ETF	25.00%
HSTRX	Hussman Strategic Total Return	10.00%
EQAIX	AXS Aspect Core Diversified Strategy I	15.00%
PQTAX	PIMCO TRENDS Managed Futures Strat A	15.00%
HMXIX	AlphaCentric Premium Opportunity I	10.00%
GLD	SPDR Gold Shares	12.00%
GDX	VanEck Vectors Gold Miners ETF	6.00%
GOLD	Barrick Gold Corp	4.00%
WPM	Wheaton Precious Metals Corp	3.00%



Provided Portfolio: Expected Return 59.43%; Expected Volatility 9.24%; Sharpe Ratio 6.42%

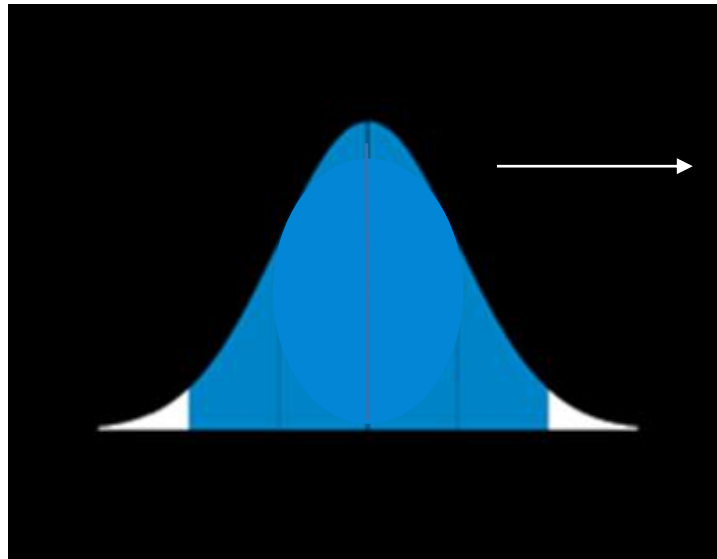
Important Note: If you think this means you are now *guaranteed* to make 59% over the next year, please see slides 10 & 16.

Discussion: Where did we get those high expected returns from?



Finding Elevated Expected Returns

We get the *potential* for extraordinary gains if you realize we are living in the far right tail, in terms of asset valuations and historic risk.



Markets now have two states: the far left and far right. They can, and likely will, flip back to the far left side of extreme risk. This may catapult high-beta assets with a high correlation to extreme risk, and negative correlation to stocks, to 6.4 times their normal return (9% expected return jumps to 59% - specifically a Sharpe Ratio of 6.4).

Systems theory describes this as an imbalanced system so stretched it can burst at any time. We're sitting in a 1 out of 1,000-year scenario in terms of market and economic imbalances.

Where are We Now?

Our volatility is targeted at 5, short-term, with a 3% stop-loss (fully triggered at -3% though it functions as a “full stop” not a “stop loss”) on the entire portfolio over a 12-month time period.

In other words, *we are ultra-safe now.*

Once the markets recognize risk, we plan to raise our Standard Deviation to 9.44

Conclusion and Summary

Our total risk is now quite low, but will likely soon return to a healthy STD of over 9.

For that risk, if our macroeconomic and market historical analysis turns out to be correct, **we would expect to make six times the amount of return for a portfolio at our level of risk**, as measured by the portfolio's monthly and 3-year volatility (and Sharpe Ratio of 6.42).

The risk is calculated using Efficient Set Theory and managed using volatility targeting.

Defensive Growth Portfolio Facts

October 2020

The Defensive Growth Portfolio Objectives:

1. Protect and conserve principal throughout the current economic and business cycle.
2. Allocate and position the portfolio investments to capture above average returns during the volatile periods when stocks and other “risk” assets decline in price.
3. The portfolio will be actively managed to avoid unnecessary losses and allocations will be changed to reflect an opportunistic approach to market conditions.

Portfolio Investment Composition:

Asset Classes Used

- U.S. Treasury Bonds (Maturities 1 to 30 years)
- Precious Metals (Physical gold and silver, Miners)
- Managed Futures (Futures are traded through Chicago Mercantile Exchange)
asset classes include: Stock Indexes, Commodities, Currencies, Interest Rates
- Cash/ Cash Equivalents

Portfolio Allocations: As of October 15, 2020

Portfolio 1

Ticker	Name	Allocation
TLT	iShares 20+ Year Treasury Bond ETF	25.00%
IEF	iShares 7-10 Year Treasury Bond ETF	22.00%
HSTRX	Hussman Strategic Total Return	24.00%
GLD	SPDR Gold Shares	12.00%
GDV	VanEck Vectors Gold Miners ETF	6.00%
TIPZ	PIMCO Broad US TIPS ETF	11.00%

