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The Drawdown Paradox

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How much time should investors in various asset classes and strategies expect to spend in a state of drawdown? Are expectations in line with reality? Inspired and left curious by a talk called “180 years of Market Drawdowns” Robert Frey gave to the Friends of IHES Mathematical Finance colloquium, I decided to dig into some data myself. We will define drawdown as investment decline from most recent historic high.

First we will look at data and comparisons from 2000 - 2017, then we will look at some popular and successful investments since their various inception dates to discover if the characteristics we find in the 2000-20017 data are consistent across time and instruments. For the 2000 – 2017 portion of the study, we look at the SG_Trend Index, S&P 500 Total Return Index, VBINX Balanced Mutual Fund, and two hypothetical portfolio combinations of these. The SG_Trend Index is a hypothetical trend following CTA index with data becoming available in 2000. The S&P 500 Total Return Index is the S&P 500 stock index with dividends reinvested. VBINX is a mutual fund by Vanguard which combines stocks and bonds in approximately a 60/40 mix.

To start, the table below shows results from the 2000 – 2017 part of our study. A discussion on the data and methodology follows at the end for those interested in seeing how all of this was calculated or for anyone wishing to reproduce it.

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Jan 2000 - Aug 2017
Months: 212

	SG_Trend		S&P 500_TR		50% SG / 50% S&P		40% SG / 60% VBINX		VBINX	
Drawdown size	Months in DD	% Time in DD	Months in DD	% Time in DD	Months in DD	% Time in DD	Months in DD	% Time in DD	Months in DD	% Time in DD
up to 0.9%	9	4%	9	4%	**11**	**5%**	**16**	**8%**	28	13%
1% - 4%	31	15%	21	10%	**74**	**35%**	**83**	**39%**	41	19%
5% - 9%	60	28%	23	11%	**49**	**23%**	**30**	**14%**	19	9%
10% - 14%	39	18%	16	8%	**8**	**4%**	**1**	**0%**	17	8%
15% -19%	10	5%	16	8%	**0**	**0%**	**0**	**0%**	7	3%
20% - 24%	0	0%	19	9%	**0**	**0%**	**0**	**0%**	5	2%
25% - 29%	0	0%	10	5%	**0**	**0%**	**0**	**0%**	2	1%
30% - 39%	0	0%	16	8%	**0**	**0%**	**0**	**0%**	1	0%
40% - 44%	0	0%	7	3%	**0**	**0%**	**0**	**0%**	0	0%
45% - 49%	0	0%	2	1%	**0**	**0%**	**0**	**0%**	0	0%
50%+	0	0%	1	0%	**0**	**0%**	**0**	**0%**	0	0%
Drawdown Mths:	149	70%	140	66%	**142**	**67%**	**130**	**61%**	120	57%
Mths in Drawdown Greater than 15%:	10	5%	71	33%	**0**	**0%**	**0**	**0%**	15	7%

SG_Trend Index and combined portfolios are HYPOTHETICAL. Please see Hypothetical performance disclosure at the end of this paper to understand the potential problems and limitations related to hypothetical performance studies.

At first glance the table might be confusing. Investment instrument, index, or portfolio construction is listed across the top. Down the left vertical axis, you will see drawdown ranges which apply across the instruments or hypothetical portfolio combinations. We are counting each month the instrument is in a drawdown within one of those specified ranges. For example, you see that both the SG_Trend Index and the S&P 500 Total Return spent 9 months or 4% of the time in a state of drawdown of up to 0.9%. A summary at the bottom is highlighted and shows total drawdown months as well as months in drawdown equal to or greater than a 15% decline.

We see that the range, regardless of instrument or combination, ends up being roughly 60% - 70% of time as represented by months in some type of drawdown. VBINX had a slightly lower number of months in drawdown at 57% . Answering the original question, an investor in stocks, a stock / bond mutual fund, trend following futures, or a mix of these can expect to be in some type of drawdown 60% - 70% of the time. This might be surprising and shocking to a many investors.

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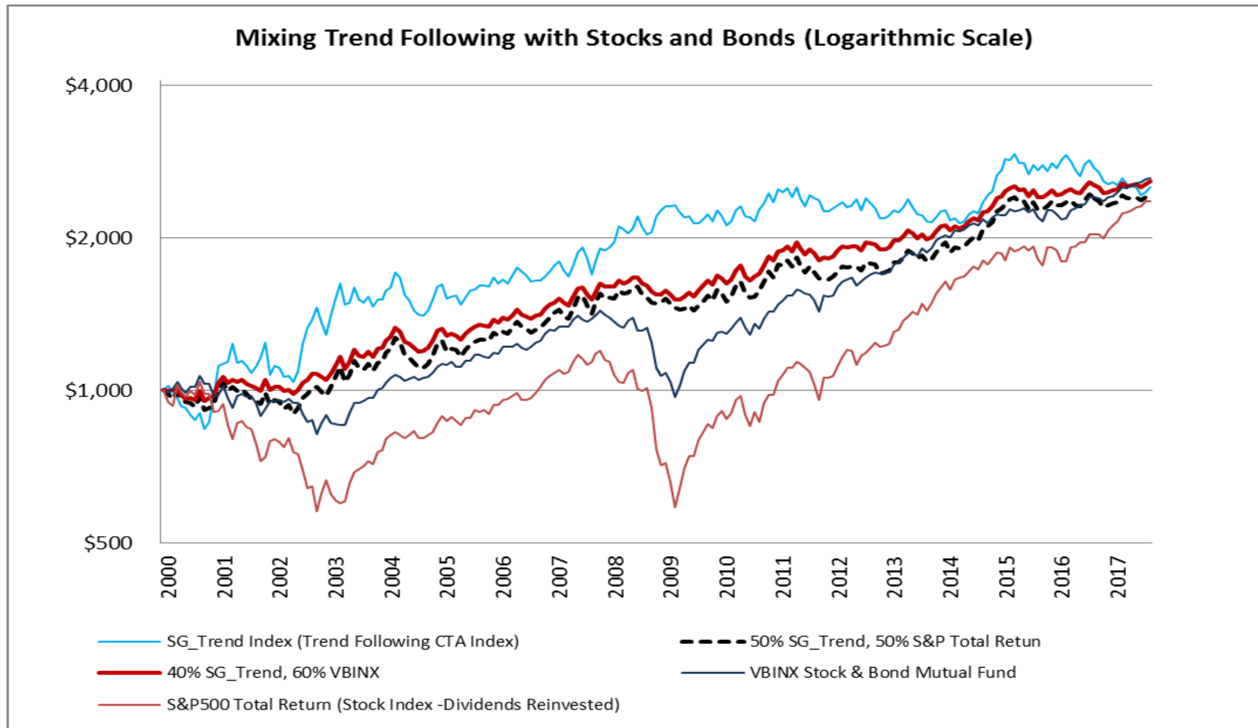
Below is a chart showing what equity curves of instruments and portfolio constructions listed above would have looked like between Jan 2000 -Aug 2017 using the Value Added Monthly Index method starting everything at $1000:



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There are two paradoxes represented in the data above. Let's call them the drawdown paradox and the non-correlated volatility paradox. Even when results are positive over time, the most common state for any given month during the study in any of these strategies, portfolios, or instruments would have been drawdown. This is the drawdown paradox. When discussing this with another money manager over lunch recently, he said: "To win you have to be good at losing". An endurance athlete might put it another way and say you have to suffer to get in shape and be able to perform. Any skier will relate in that conditions are not so great much of the time and that every ski day is definitely not a powder day.

We can also see that combining two volatile but non-correlated indexes together actually results in less volatility. Weighting an initial $1000 by 50% SG_Trend Index and the other 50% S&P 500 Total Return Index resulted in less volatility and better returns. We can easily visualize this in the VAMI equity curve

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chart above. Using SG_Trend Index to augment and diversify stocks (represented by the S&P 500 TR Index) had more impact than diversifying with bonds (represented by VBINX). The impact of the non-correlated SG_Trend Index also remained powerful when mixed with the balanced mutual fund (VBINX). This is the non-correlated volatility paradox –adding volatility when it is non-correlated can actually result in less volatility and better returns.

Longer view

After studying the original 2000-2017 period, I was curious if those drawdown characteristics were somewhat consistent over time or not. I wondered what drawdown stats for some of the best performing and most loved stocks of our time would look like.

Data for the S&P 500 goes all the way back to 1950. The stocks selected for the study were partially inspired by a recent article mentioning some these stocks as being responsible large wealth creation. I found the numbers very interesting, and believe you will as well.

S&P 500 Yahoo Finance Symbol: ^GSPC Jan 1950 - Aug 2017 Months: 812		
Drawdown Size	**Months in DD**	**% Time in DD**
up to 0.9%	52	6%
1% - 4%	124	15%
5% - 9%	97	12%
10% - 14%	66	8%
15% -19%	64	8%
20% - 24%	38	5%
25% - 29%	26	3%
30% - 39%	26	3%
40% - 44%	10	1%
45% - 49%	4	0%
50%+	1	0%
Drawdown Mths:	508	63%
Mths in Drawdown Greater than 15%:	169	21%
Mths in Drawdown Greater than 20%:	105	13%

Exxon Mobil Symbol: XON Jan 1970 - Aug 2017 Months: 572		
Drawdown Size	**Months in DD**	**% Time in DD**
up to 0.9%	29	4%
1% - 4%	92	11%
5% - 9%	93	11%
10% - 14%	47	6%
15% -19%	29	4%
20% - 24%	20	2%
25% - 29%	15	2%
30% - 39%	6	1%
40% - 44%	0	0%
45% - 49%	0	0%
50%+	0	0%
Drawdown Mths:	331	58%
Mths in Drawdown Greater than 15%:	70	12%
Mths in Drawdown Greater than 20%:	41	7%

Apple Symbol: AAPL Dec 1980 - Aug 2017 Months: 441		
Drawdown Size	**Months in DD**	**% Time in DD**
up to 0.9%	4	0%
1% - 4%	21	3%
5% - 9%	23	3%
10% - 14%	18	2%
15% -19%	18	2%
20% - 24%	20	2%
25% - 29%	27	3%
30% - 39%	43	5%
40% - 44%	18	2%
45% - 49%	15	2%
50%+	127	16%
Drawdown Mths:	334	76%
Mths in Drawdown Greater than 15%:	268	61%
Mths in Drawdown Greater than 20%:	250	57%

Amazon Symbol: AMZN May 1997 - Aug 2017 Months: 244		
Drawdown Size	**Months in DD**	**% Time in DD**
up to 0.9%	6	1%
1% - 4%	16	2%
5% - 9%	15	2%
10% - 14%	14	2%
15% -19%	10	1%
20% - 24%	16	2%
25% - 29%	4	0%
30% - 39%	10	1%
40% - 44%	6	1%
45% - 49%	6	1%
50%+	66	8%
Drawdown Mths:	169	69%
Mths in Drawdown Greater than 15%:	118	48%
Mths in Drawdown Greater than 20%:	108	44%

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Google (now Alphabet, Inc.)
Symbol: GOOG
Aug 2004 - Aug 2017
Months: 157

Drawdown Size	Months in DD	% Time in DD
up to 0.9%	3	0%
1% - 4%	18	2%
5% - 9%	19	2%
10% - 14%	15	2%
15% -19%	12	1%
20% - 24%	4	0%
25% - 29%	8	1%
30% - 39%	10	1%
40% - 44%	4	0%
45% - 49%	0	0%
50%+	5	1%
Drawdown Mths:	98	62%
Mths in Drawdown Greater than 15%:	43	27%
Mths in Drawdown Greater than 20%:	31	20%

Microsoft
Symbol: MSFT
Mar 1986 - Aug 2017
Months: 378

Drawdown Size	Months in DD	% Time in DD
up to 0.9%	6	1%
1% - 4%	18	2%
5% - 9%	22	3%
10% - 14%	25	3%
15% -19%	12	1%
20% - 24%	9	1%
25% - 29%	7	1%
30% - 39%	22	3%
40% - 44%	31	4%
45% - 49%	25	3%
50%+	61	8%
Drawdown Mths:	238	63%
Mths in Drawdown Greater than 15%:	167	44%
Mths in Drawdown Greater than 20%:	155	41%

Berkshire Hathaway, Inc.
Symbol: BRK-A
March 1980 - Aug 2017
Months: 450

Drawdown Size	Months in DD	% Time in DD
up to 0.9%	16	2%
1% - 4%	59	7%
5% - 9%	69	8%
10% - 14%	53	7%
15% -19%	81	10%
20% - 24%	9	1%
25% - 29%	14	2%
30% - 39%	14	2%
40% - 44%	1	0%
45% - 49%	0	0%
50%+	0	0%
Drawdown Mths:	316	70%
Mths in Drawdown Greater than 15%:	119	26%
Mths in Drawdown Greater than 20%:	38	8%

Vanguard Balanced Index Mutual Fund
Symbol: VBINX (stocks and bonds)
Sept 1992 - Aug 2017
Months: 300

Drawdown Size	Months in DD	% Time in DD
up to 0.9%	38	5%
1% - 4%	58	7%
5% - 9%	24	3%
10% - 14%	17	2%
15% -19%	7	1%
20% - 24%	5	1%
25% - 29%	2	0%
30% - 39%	1	0%
40% - 44%	0	0%
45% - 49%	0	0%
50%+	0	0%
Drawdown Mths:	152	51%
Mths in Drawdown Greater than 15%:	15	5%
Mths in Drawdown Greater than 20%:	8	3%

Amount of time in drawdown does not change much despite varying start dates and varying instruments. Histories in some cases spanned multiple decades, such as the S&P 500 from 1950. We still see the 60% to 70% range of months in drawdown for everything included, with exception of VBINX and Exxon which spent 51% and 58% of the time in drawdown respectively.

Important to note is VBINX would have underperformed the others in terms of absolute returns when comparing each head to head against VBINX from inception date of whichever of the two had the most recent inception. So the reduction in drawdown derived from diversifying with bonds via the VBINX mutual fund would have also reduced absolute returns in many cases. This historic characteristic of less volatility but less return in a stock / bond portfolio is widely known, but I mention it just in case.

We are all aware that Warren Buffet's Berkshire Hathaway has been a great performer in absolute returns. For some stretches Berkshire has actually underperformed the S&P 500, but BRKA has gained more than the S&P 500 when measuring each from Berkshire's inception to present. Investors in Berkshire would have needed to spend 70% of the time in some type of drawdown since inception, and 26% of that time in drawdowns greater than 15%. There were a number of underperforming periods for Berkshire that might have challenged investors. For example, during the first tech boom of the late 90s Berkshire was in significant drawdown while the S&P 500 and Nasdaq 100 were experiencing significant gains. People wondered if the Oracle of Omaha had lost his touch back then. We all have hindsight now of course.

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A recent article mentioned Apple as possibly the greatest wealth generating stock of all time. To get there, anyone holding it from inception would have spent 76% of the time in drawdown, 61% of the time in drawdown greater than or equal to 15%, 57% of months in drawdown greater than or equal to 20%, and 16% of months in drawdown of 50% or greater. Could the average investor hold on to that ride without either knowing the future or without knowing that drawdown is a normal state?

CONCLUSION

Investing is not easy. These numbers suggest investors searching for returns need to be willing and able to psychologically and financially stomach long and painful drawdowns. Exceptional returns also seem to come along with exceptional drawdowns. Properly expecting to spend a majority of time in drawdown ahead of time might help investors control behavior and maintain objectivity. Expectation of constant and consistent returns is not in line with reality. Expectation of positive returns every month, quarter, or even year are not in line with reality. Knowing these drawdown characteristics might help investors to think strategically over the long-term rather than last month, quarter or even last year.

We don't know they are winners with drawdowns until the end. Plenty of other stocks spent time in drawdown and never came back. A systematic and quantitative process for investing and allocating might be helpful in this regard. A systematic quantitative process could be related to price trend, price or capitalization momentum, some intrinsic value metric, or a mix. Combining a few non-correlated quantitative systematic processes might be best. The important thing is that strategies should be understandable, repeatable, manage risk systematically, and have positive mathematical expectancy over time. Even the systematic and quantitative processes will have drawdowns as we see with both SG_Trend Index and S&P 500 Index. SG_Trend Index follows systematic trend following CTAs. The S&P 500 is a capitalization weighted momentum stock selection system. Trend and momentum are slightly different, but that is for another discussion. Using drawdowns for allocation might be useful in flipping the brain's switch so drawdowns are seen as opportunity.

Investing represents a drawdown paradox. Even when results are positive over time of the two studies above, the most common state at any given time during the study in any of these strategies, portfolios, or instruments would have been drawdown. No matter which one of these indexes, instruments, or combinations investors would have chosen, they would have spent roughly 60% - 70% of the time measured in months in some type of drawdown. I suspect this is a normal characteristic for any viable long-term investment whatsoever.

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It is useful and important for investors to understand and accept the drawdown paradox characteristic of investing. Misalignment between expectations and reality is likely to lead to significant periods of frustration, regret, lack of patience, and short-term thinking. Misalignment between expectations and reality always opens the door for human biases to compromise long-term investment planning.

We know loss avoidance bias can lead humans away from taking risks because a loss is approximately twice as psychologically powerful as a gain of the same size. So, while the loss avoidance bias can keep humans from taking worthwhile risks, failure to understand how much time will likely be spent in drawdown once risk has been taken is likely to lead humans to mismanage the risk by selling strategies at lows and buying them at highs. When returns in the recent past have been good, it is not uncommon for investors to jump on board as if they have a time machine of some sort. Remembering the drawdown paradox and the non-correlated volatility paradox might aid an investor in more objectively selecting non-correlated strategies and then buying those strategies in deep drawdown.

The S&P 500 Index represented the largest drawdowns in the original 2000-2017 data, spending 33% of the time in a drawdown of 15% or greater. We can see from the individual stock data set that individual names would have likely spent more time in larger drawdowns. Buying and holding stocks is often considered a standard and relatively safe investment. This opinion grows with bullish stock trends and wanes with bearish stock trends. Popular opinion might be misaligned with reality. Perhaps it is better to use strategies which are designed for a more uncertain future than linear extrapolation of the present would provide.

There is possible relief from the drawdown paradox through knowledge of the non-correlated volatility paradox. Combining two or more volatile but non-correlated strategies has the potential to reduce portfolio volatility while also potentially improving returns. Because of the non-correlation involved, adding volatility in the case of this hypothetical study actually resulted in less volatility and better portfolio returns.

If time in drawdown is expected to be roughly 60% - 70%, then constructing a portfolio of non-correlated assets and strategies might be wise. A portfolio consisting of components which are likely to be in drawdown and uptrend at different times (non-correlation) potentially reduces the overall pain and volatility in the portfolio while also possibly improving returns. The popular stock data added to the 2000-2017 data presented earlier works to confirm drawdown as the common state for investors. The 2000-2017 study shows adding trend following futures to an otherwise traditional portfolio has the potential to both reduce drawdowns and improve returns.

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Data Discussion for Drawdown Study

Data for the study includes the SG_Trend Index, S&P 500 Total Return Index (dividends reinvested), Vanguard's VBINX mutual fund (approximately a 60/40 stock/bond fund), individual stocks, and hypothetical portfolio combinations of these. The period chosen was mainly guided by the fact that that is when data for the SG_Trend index becomes available.

SG_Trend Index follows a pool of larger CTAs of trend following methodologies. Data for SG_Trend was collected from Barclayhedge. The SG_Trend Index is a clearly a hypothetical composite as it is unlikely any investor combined all those CTAs in a portfolio and with the same weighting as the index. Individual CTAs are often more volatile including both significantly larger gains and drawdowns. SG_Trend index was used in this study due to the desire to study a period longer than Anderson Creek Trading's relatively short history.

The S&P 500 is widely regarded as the best single gauge of large-cap U.S. equities. We used the Total Return version of this index for the 2000-2017 data. We used the basic version of the S&P 500 Index for the second part of the study that begins in 1950. By using the Total Return version of the index, returns are improved over those of S&P 500 price index alone through inclusion of dividends. We retrieved S&P 500 Total Return and basic S&P 500 data from Yahoo Finance. The S&P 500 is a capitalization weighted index, meaning the largest stocks in terms of market capitalization have the largest impact on the index. In essence the S&P 500 is a systematic market cap momentum investing strategy. When people say "how is the stock market", or "the market is up or down", they are most likely talking about the S&P 500 Index which is reported regularly through news outlets. Choice of using S&P 500 for this study was easy. The S&P is a quick and simplified measure of buy-and-hold U.S. stock market investing. By including dividends in the 2000 – 2017 data, we think we are giving it more than a fair shake here.

Vanguard's VBINX is a "Balanced Index" mutual fund. According to marketing materials VBINX is designed to offer "an easy low-cost way to gain exposure to stocks and bonds", and "invests roughly 60% in stocks and 40% in bonds." VBINX data, like S&P 500 data, is easily attainable from Yahoo Finance. VBINX was an easy choice for several reasons. First we don't have to do the work of combining stocks and bonds ourselves for the study. Vanguard has already done it for us. VBINX is also an instrument easily accessible to the public, and therefore relevant. Vanguard funds often come up in investing conversations and in the media. Mixing stocks and bonds is a common practice used in traditional portfolio construction with the goal of reducing the volatility of stocks alone.

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We combine some of these instruments and indexes in order to build hypothetical portfolio constructions. Our method for doing this is simple consistent weighting. When weighting two or more instruments or indexes, a weighting multiple is applied to each instrument's Value Added Monthly Index (VAMI) consistently across the time of the study. The weighted VAMIs are then added together to arrive at the combined portfolio VAMI. No leverage is applied to the weightings, so weighting schemes add up to 100% in the hypothetical portfolios.

For the individual stocks section, all data was retrieved from Yahoo Finance. This is not exactly an out of sample data set for the instruments previously included in the 2000-2017 comparison because that data is still there. Also some of the individual stocks have been a part of the S&P 500 Index during the 2000 – 2017 periods. However, a significant amount of new data is added. My reasoning here is that I believe seeing the data from inception to present might be more interesting to the reader than a true out of sample set. I do believe we could cherry pick periods using some hindsight where time in drawdown would be either worse or better, but I think looking at this data from inception helps us confirm the drawdown paradox as a characteristic of investments with gains. We see similar drawdown characteristics over significant periods of time and across varying instruments. These are popular household names and many investors are thought to have them or the S&P in their portfolios. We could always slice it up differently and leave out the original 200-2017 data but I suspect the characteristics would remain. Those characteristics being what I am calling The Drawdown Paradox –that even with significantly positive returns over time you will spend most of your time as an investor in some sort of drawdown in the specific instruments you choose. Portfolio construction with The Non-Correlated Volatility Paradox in mind could potential improve the condition dictated by The Drawdown Paradox.

Please see the disclosure regarding hypothetical performance data at the end of this letter. SG_Trend is a hypothetical index. Portfolio allocations we explore are also hypothetical and have a hindsight bias among other challenges and issues relevant to hypothetical performance.

Lastly, there is no depositing or withdrawing for the study. Each portfolio choice starts with $1000 allocation and that is the allocation studied over the period.

Risk Disclosure

THE RISK OF LOSS IN TRADING COMMODITIES CAN BE SUBSTANTIAL. YOU SHOULD THEREFORE CAREFULLY CONSIDER WHETHER SUCH TRADING IS SUITABLE FOR YOU IN LIGHT OF YOUR FINANCIAL CONDITION. IN CONSIDERING WHETHER TO TRADE OR TO AUTHORIZE SOMEONE ELSE TO TRADE FOR YOU, YOU SHOULD BE AWARE OF THE FOLLOWING: IF YOU PURCHASE A COMMODITY OPTION YOU

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MAY SUSTAIN A TOTAL LOSS OF THE PREMIUM AND OF ALL TRANSACTION COSTS. IF YOU PURCHASE OR SELL A COMMODITY FUTURE OR SELL A COMMODITY OPTION YOU MAY SUSTAIN A TOTAL LOSS OF THE INITIAL MARGIN FUNDS AND ANY ADDITIONAL FUNDS THAT YOU DEPOSIT WITH YOUR BROKER TO ESTABLISH OR MAINTAIN YOUR POSITION. IF THE MARKET MOVES AGAINST YOUR POSITION, YOU MAY BE CALLED UPON BY YOUR BROKER TO DEPOSIT A SUBSTANTIAL AMOUNT OF ADDITIONAL MARGIN FUNDS, ON SHORT NOTICE, IN ORDER TO MAINTAIN YOUR POSITION. IF YOU DO NOT PROVIDE THE REQUIRED FUNDS WITHIN THE PRESCRIBED TIME , YOUR POSITION MAY BE LIQUIDATED AT A LOSS, AND YOU WILL BE LIABLE FOR ANY RESULTING DEFICIT IN YOUR ACCOUNT. UNDER CERTAIN MARKET CONDITIONS, YOU MAY FIND IT DIFFICULT OR IMPOSSIBLE TO LIQUIDATE A POSITION. THIS CAN OCCUR, FOR EXAMPLE, WHEN THE MARKET MAKES A “LIMIT MOVE”. THE PLACEMENT OF CONTINGENT ORDERS BY YOU OR YOUR TRADING ADVISOR, SUCH AS A “STOP LOSS” OR “STOP LIMIT” ORDER, WILL NOT NECESSARILY LIMIT YOUR LOSSES TO THE INTENDED AMOUNTS, SINCE MARKET CONDITIONS MAY MAKE IT IMPOSSIBLE TO EXECUTE SUCH ORDERS. A “SPREAD” POSITION MAY NOT BE LESS RISKY THAN A SIMPLE “LONG” OR “SHORT” POSITION. THE HIGH DEGREE OF LEVERAGE THAT IS OFTEN OBTAINABLE IN COMMODITY TRADING CAN WORK AGAINST YOU AS WELL AS FOR YOU. THE USE OF LEVERAGE CAN LEAD TO LARGE LOSSES AS WELL AS GAINS. IN SOME CASES, MANAGED COMMODITY ACCOUNTS ARE SUBJECT TO SUBSTANTIAL CHARGES FOR MANAGEMENT AND ADVISORY FEES. IT MAY BE NECESSARY FOR THOSE ACCOUNTS THAT ARE SUBJECT TO THESE CHARGES TO MAKE SUBSTANTIAL TRADING PROFITS TO AVOID DEPLETION OR EXHAUSTION OF THEIR ASSETS. THIS BRIEF STATEMENT CANNOT DISCLOSE ALL THE RISKS AND OTHER SIGNIFICANT ASPECTS OF THE COMMODITY MARKETS.

YOU SHOULD ALSO BE AWARE THAT THIS COMMODITY TRADING ADVISOR MAY ENGAGE IN TRADING FOREIGN FUTURES OR OPTIONS CONTRACTS. TRANSACTIONS ON MARKETS LOCATED OUTSIDE THE UNITED STATES, INCLUDING MARKETS FORMALLY LINKED TO A UNITED STATES MARKET MAY BE SUBJECT TO REGULATIONS WHICH OFFER DIFFERENT OR DIMINISHED PROTECTION. FURTHER, UNITED STATES REGULATORY AUTHORITIES MAY BE UNABLE TO COMPEL THE ENFORCEMENT OF THE RULES OF REGULATORY AUTHORITIES OR MARKETS IN NON-UNITED STATES JURISDICTIONS WHERE YOUR TRANSACTIONS MAY BE EFFECTED. BEFORE YOU TRADE YOU SHOULD INQUIRE ABOUT ANY RULES RELEVANT TO YOUR PARTICULAR CONTEMPLATED TRANSACTIONS AND ASK THE FIRM WITH WHICH YOU INTEND TO TRADE FOR DETAILS ABOUT THE TYPES OF REDRESS AVAILABLE IN BOTH YOUR LOCAL AND OTHER RELEVANT JURISDICTIONS. THIS COMMODITY TRADING ADVISOR IS PROHIBITED BY LAW FROM ACCEPTING FUNDS IN THE TRADING ADVISOR’S NAME FROM A CLIENT FOR TRADING COMMODITY INTERESTS. **YOU MUST PLACE ALL FUNDS FOR TRADING IN THESE TRADING PROGRAMS DIRECTLY WITH A FUTURES COMMISSION MERCHANT.**

Past results are not necessarily indicative of future results.

Hypothetical Performance Disclosure
The drawdown study above includes one or more CTA indexes which are a combination of multiple CTAs or managers. Also included are hypothetical portfolio combinations created by weighting CTA indexes, stock indexes, and one or more mutual funds. These weightings and indexes while not exactly simulated trading, are

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hypothetical or simulated portfolio combinations or composites. The following disclosure therefore applies where CTA indexes or hypothetical portfolio combinations or composites are utilized:

THIS COMPOSITE PERFORMANCE RECORD IS HYPOTHETICAL AND THESE TRADING ADVISORS HAVE NOT TRADED TOGETHER IN THE MANNER SHOWN IN THE COMPOSITE. HYPOTHETICAL PERFORMANCE RESULTS HAVE MANY INHERENT LIMITATIONS, SOME OF WHICH ARE DESCRIBED BELOW. NO REPRESENTATION IS BEING MADE THAT ANY MULTI-ADVISOR MANAGED ACCOUNT OR POOL WILL OR IS LIKELY TO ACHIEVE A COMPOSITE PERFORMANCE RECORD SIMILAR TO THAT SHOWN. IN FACT, THERE ARE FREQUENTLY SHARP DIFFERENCES BETWEEN A HYPOTHETICAL COMPOSITE RECORD AND THE ACTUAL RECORD SUBSEQUENTLY ACHIEVED.
ONE OF THE LIMITATIONS OF A HYPOTHETICAL COMPOSITE PERFORMANCE RECORD IS THAT DECISIONS RELATING TO THE SELECTION OF TRADING ADVISORS AND THE ALLOCATION OF ASSETS AMONG THOSE TRADING ADVISORS WERE MADE WITH THE BENEFIT OF HINDSIGHT BASED UPON THE HISTORICAL RATES OF RETURN OF THE SELECTED TRADING ADVISORS.
THEREFORE COMPOSITE PERFORMANCE RECORDS INVARIABLY SHOW POSITIVE RATES OF RETURN.
ANOTHER INHERENT LIMITATION ON THESE RESULTS IS THAT THE ALLOCATIONS DECISIONS REFLECTED IN THE PERFORMANCE RECORD WERE NOT MADE UNDER ACTUAL MARKET CONDITIONS AND THEREFORE CANNOT COMPLETELY ACCOUNT FOR THE IMPACT OF FINANCIAL RISK IN ACTUAL TRADING. FURTHERMORE, THE COMPOSITE PERFORMANCE RECORD MAY BE DISTORTED BECAUSE THE ALLOCATION OF ASSETS CHANGES FROM TIME TO TIME AND THESE ADJUSTMENTS ARE NOT REFLECTED IN THE COMPOSITE.

PAST PERFORMANCE IS NOT NECESSARILY INDICATIVE OF FUTURE RESULTS. THERE IS RISK OF LOSS AS WELL AS OPPORTUNITY FOR GAIN WHEN INVESTING WITH ANDERSON CREEK TRADING, LLC.