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The Benefits of Systematic Trend Following for a Successful Retirement

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THE BENEFITS OF SYSTEMATIC TREND FOLLOWING FOR A SUCCESSFUL RETIREMENT

Introduction

Navigating a financially successful retirement is one of the most important goals in investment management. In broad terms, the pursuit of this goal can be divided into two overarching phases:

- **Accumulation phase:** In the pre-retirement years, the focus is on accumulating the assets necessary to fund retirement.
- **Decumulation phase:** After retirement, the focus switches to sustaining a desired lifestyle and funding expenses from accumulated assets (in addition to Social Security, etc.).

This paper focuses on the decumulation phase. The question to be explored is whether and in what manner systematic managed futures trend following can be employed to improve retirees' odds of maintaining a targeted standard of living from their investments, subject to certain goals and constraints.

Relative to a more basic time-weighted investment return investigation, withdrawals to satisfy income needs in retirement introduce "sequence of returns risk," where inadequate investment performance in the early years can have substantially more detrimental consequences for a retiree than it would in later years. The uncertainty introduced by sequence of returns risk places special emphasis on volatility control and especially drawdown mitigation, potentially even more than is the case in a time-weighted, buy-and-hold scenario (where the primary concern is the effect of volatility and drawdowns on end-to-end returns), and certainly more than in the early years of the accumulation phase, when future expected employment income can effectively smooth out bumps in investment performance encountered along the way.

This paper first lays out the assumptions that will be employed in the subsequent investigations. Several analyses are then presented, using the historical performance of relevant asset classes over different timeframes, to illustrate the different kinds of scenarios an investor can be presented with in retirement and to investigate the role that systematic trend following can potentially play in each of those scenarios.

Goal and Assumptions

In the broadest sense, we assume that an investor's goal in the decumulation phase is to ***maintain a consistent annual income, adjusted for cost of living increases, throughout retirement***.

For this analysis, we will assume that the investor has $1,000,000 of investments at retirement, and plans to withdraw $40,000 (4%) in the first year. From there, for simplicity, we will assume 2.5%/year inflation in the cost of living, to be offset by a 2.5% annual increase in the amount to be withdrawn.

As a final goal, the investor ideally would prefer that invested capital (i.e., investment net worth, the key annual metric we will analyze below) never falls below $500,000 (half of initial investment) over the course of a full 30-year retirement. This last requirement provides a measure of comfort as retirement progresses, a margin of safety for unforeseen extraordinary expenses or additional years of retirement, and—barring such extra expenses—enables a significant bequest. (Notably, if extraordinary expenses are not a concern and if leaving a bequest is not one of a retiree's goals, an annuity with a cost-of-living adjustment could be a viable alternative to an investment portfolio. For detailed considerations, see the side panel on Annuitizing Retirement.)

Note that the dollar amounts that we've selected for analysis aren't as important as the percentages. For example, a retiree with $10MM wishing to withdraw an inflation-adjusted $400,000/year, with a preferred net worth floor of $5MM, would be facing the exact same set of decisions.

A couple other housekeeping items are necessary before we proceed with analyses: Outside of invested assets, other sources of retirement income (e.g., Social Security), are assumed to be the same under all investment scenarios, and so are ignored for this analysis. Also ignored for simplicity are tax considerations. You can think of this exercise as though the invested assets are in a Roth-style retirement account, or alternatively you can consider the figures as after-tax equivalents on a traditional-style tax-deferred investment vehicle. In a taxable account, tax treatment would render this analysis significantly more complex, but would not likely substantively alter the broad conclusions.

Investment Portfolios to be Examined

We will consider retirement withdrawal outcomes on investment portfolios with varying combinations of stocks, bonds, and trend following. For stocks we use the S&P 500 Index of U.S. large-cap equities. For bonds we use the Bloomberg Barclays U.S. Aggregate Bond

Annuitizing Retirement?

Given the stated goal of stable inflation-adjusted income, one option for retirees is a vehicle that promises exactly that: a life annuity or "single premium immediate annuity" (SPIA). A SPIA is a vehicle that directly transforms a lump sum of assets into a guaranteed income stream. As of this writing,[1] a $1MM SPIA with a 2.5% cost of living adjustment (COLA) could potentially pay an annuitant as much as $50,000 initially. For two people (e.g., a married couple) with joint survivorship, the annual benefit decreases, but with careful shopping and plan structure, it still might be possible to lock in the target of $40,000 plus COLA—all guaranteed for life.

However, this arrangement comes with two downsides. First, liquidity is eliminated. I.e., there is typically no way to "sell" part of the annuity to cover unexpected extraordinary expenses. Second, under a basic annuity structure, there is no terminal value. I.e., no matter when the retiree dies, there is nothing to pass on as a bequest.

There are ways of resolving the latter issue. For example, a SPIA can be structured with a death benefit. E.g., per the $500k minimum threshold included in the goals set out in this paper you can structure an annuity with a 50% death benefit. However, doing so would come at a cost, in the form of decreasing the annual payout below the 4% initial target level. This option also fails to address the liquidity issue, since you still can't use any of the annuitized assets to cover extraordinary expenses. For an alternative trade-off that resolves the liquidity issues and still guarantees the bequest, half of the assets could be annuitized and the other half placed in risk-free cash investments. The retiree(s) would then receive half the $1MM annuity payment (say around $20,000) plus income from the cash portion (only about another $5000/year at current interest rates), leaving $500k available and liquid. Obviously, this option requires a severe reduction in annual income in exchange for guarantees.

This paper investigates a different approach: Capturing a market return premium in order to potentially meet all goals: $40,000 initial income, 2.5% COLA, and $500,000 minimum threshold for extra expenses and/or a bequest. However, what you give up in order to aim for all of these goals is *certainty*. Investment markets pay a premium because they are risky, and that risk has the potential to derail a retirement plan in a way that does not occur with a guaranteed option like an annuity. ***While that uncertainty cannot be eliminated, the purpose of this paper is to investigate ways to use systematic trend following to tilt the odds of a successful retirement further in the investor's favor.***

[1] *Estimates based on calculator at www.newretirement.com/annuity-confirm-dashboard.aspx, retrieved October 19, 2017.*

Index. For trend following we use the Aspen Managed Futures Beta Index, as available from 2003 forward. However, as we wish to examine data stretching back to 1987, we use the BarclayHedge BTOP50 Index—a managed futures benchmark—as the trend following return stream prior to 2003.

It is of course possible to run this analysis with other benchmarks, such as world stocks and bonds, or including other asset classes. While the precise outcomes obviously differ with different benchmark selections, the qualitative conclusions are likely to be the same relative to any portfolio that generally conforms to the historic return patterns of a traditional stock/bond portfolio.

We will investigate retirement outcomes with stock-only and stock/bond portfolios, with or without an allocation to trend following. Specifically, we consider the following portfolios, delineated by the indicated light/dark blue/red markers.

"Stocks": 100% stock investments

"Stocks & Trend Following": 80% stocks and 20% trend following

"Stocks & Bonds": 60% stocks investments and 40% bond investments

"Stocks & Bonds & Trend Following": 80% "Stocks & Bonds" portfolio and 20% trend following (equivalent to 48% stocks, 32% bonds, and 20% trend following)

As with the selection of benchmarks, the choice of weightings is somewhat arbitrary. Qualitatively, the results to be investigated below would be similar under a wide range of allocations, though it is an obvious truism that a larger (smaller) trend following allocation will have a more (less) significant impact on retirement outcomes.

Several scenarios are investigated below. The principles to be illustrated include the following:

- When stock/bond returns are good, particularly in the early years of retirement, success is virtually inevitable. Trend following adds little in this case, but it also does not detract significantly from the positive outcome—at any rate, not in a manner that would put income goals at risk.
- When stock/bond returns are poor, particularly in the early years of retirement, sustainable income goals may be in danger. In this scenario, trend following can be a highly beneficial aid toward maintaining a sustainable retirement income.

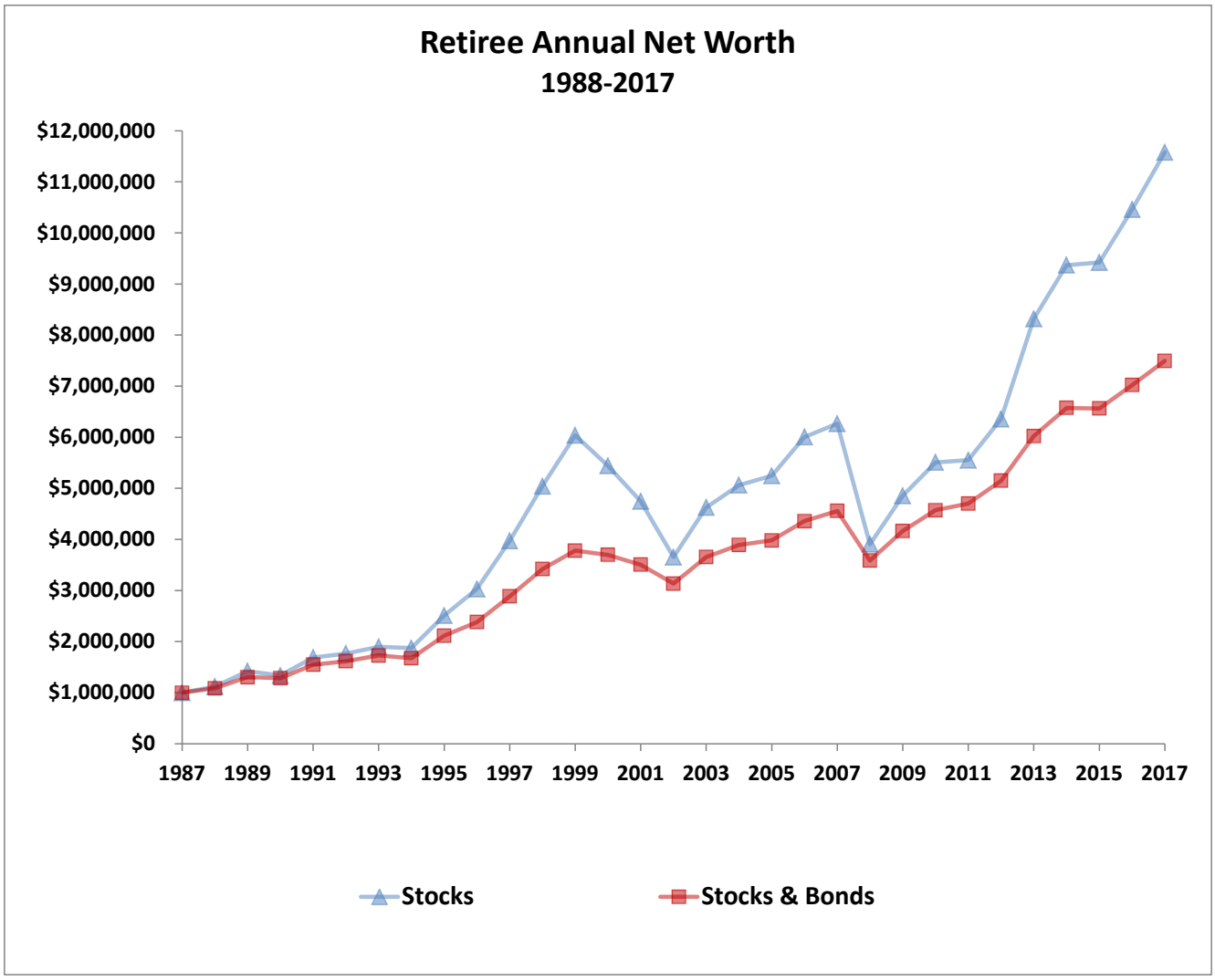
Illustration #1: Strong Stock/Bond Backdrop (1988-2017)

To illustrate the first bullet point above, consider someone who retired on 12/31/1987 (so the full year 1988 was the first year of retirement), such that a 30-year retirement ends in 2017.[1]

The early years of this investor's retirement witness a string of strong performance from traditional assets, such that either the stock-only or the stock/bond investor achieve a sort of "escape velocity" with net worth growing several-fold over the course of the retirement years, withdrawals notwithstanding. The stock-only investor begins with $1 million in investments, completes all scheduled cost-of-living-adjusted annual withdrawals, and still winds up with over $11 million in terminal net worth. For the stock and bond investor, the final net worth figure is over $7 million. (See Figure 1.)

[1] 2017 returns are considered through the month of July.

Figure 1: Stock and Stock/Bond Net Worth, 1988-2017

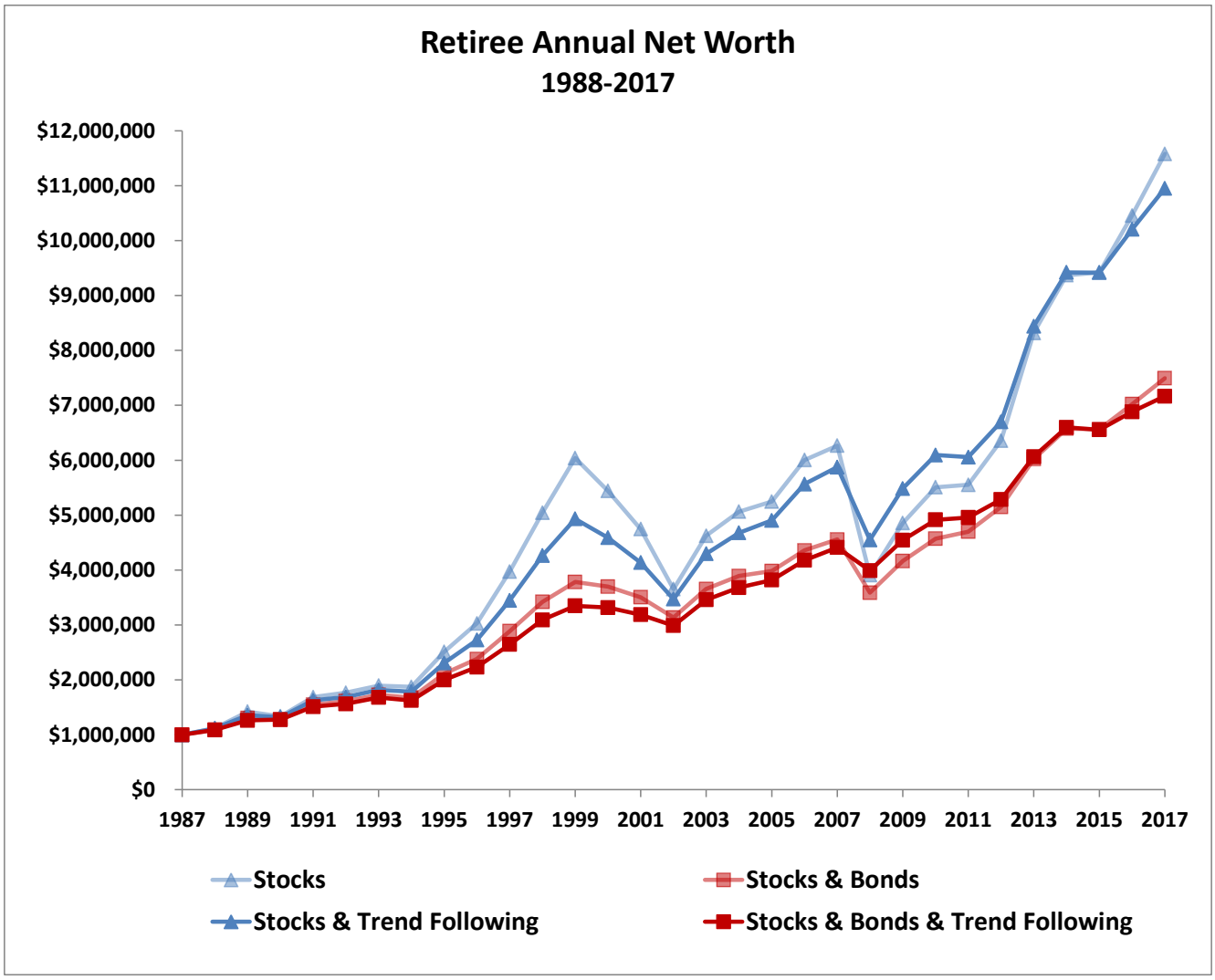


Of course, both portfolios do endure the drawdown years of the Tech Wreck (2000-2002) and Great Financial Crisis (2008), but by then the tailwind of a decade-plus of strong investment performance has virtually eliminated the possibility of late-year asset depletion, even in the event of major bear markets.

Figure 2 illustrates what occurs if the stock or stock/bond investor employs trend following as well. The simple answer is that not much changes. By the final year, a traditional-only investor would have a slightly higher net worth, though at various times—including just a few years earlier—the portfolio with trend following is mildly ahead. Thus end-to-end performance, and even intermediate performance, is largely unchanged.

In other words, in a backdrop where traditional investments provide ample performance to support retirement goals, trend following may not enhance performance; however, because trend drawdowns and negative performance periods tend to be relatively minor in magnitude, the inclusion of trend following historically also would not substantially detract from performance, and certainly wouldn't put otherwise stable retirement goals at risk. Moreover, the inclusion of trend following performance as an uncorrelated return stream does decrease the year-to-year volatility of the retiree's asset base, so it could still be viewed as a good diversifier even when it is not required, such as in the 1988-2017 scenario.

Figure 2: Stock, Stock/Bond, and Stock/Bond/Trend Net Worth, 1988-2017



Intermezzo: A Time Travel Thought Experiment

In the 1988-2017 example above, successful retirements are produced not just by strong stock/bond returns, but particularly by strong stock/bond returns *in the early years of retirement*. When retirement income is funded by investments in volatile assets, retirement outcomes are dependent not just on long-run investment returns, but also by the order and magnitude of periodic returns. In particular, the magnitude and direction of investment returns in the early years of retirement have a greater impact on outcomes than do the magnitude and direction of returns in the later years. This is a principle known as "sequence of returns risk," and its effect can be quite dramatic.

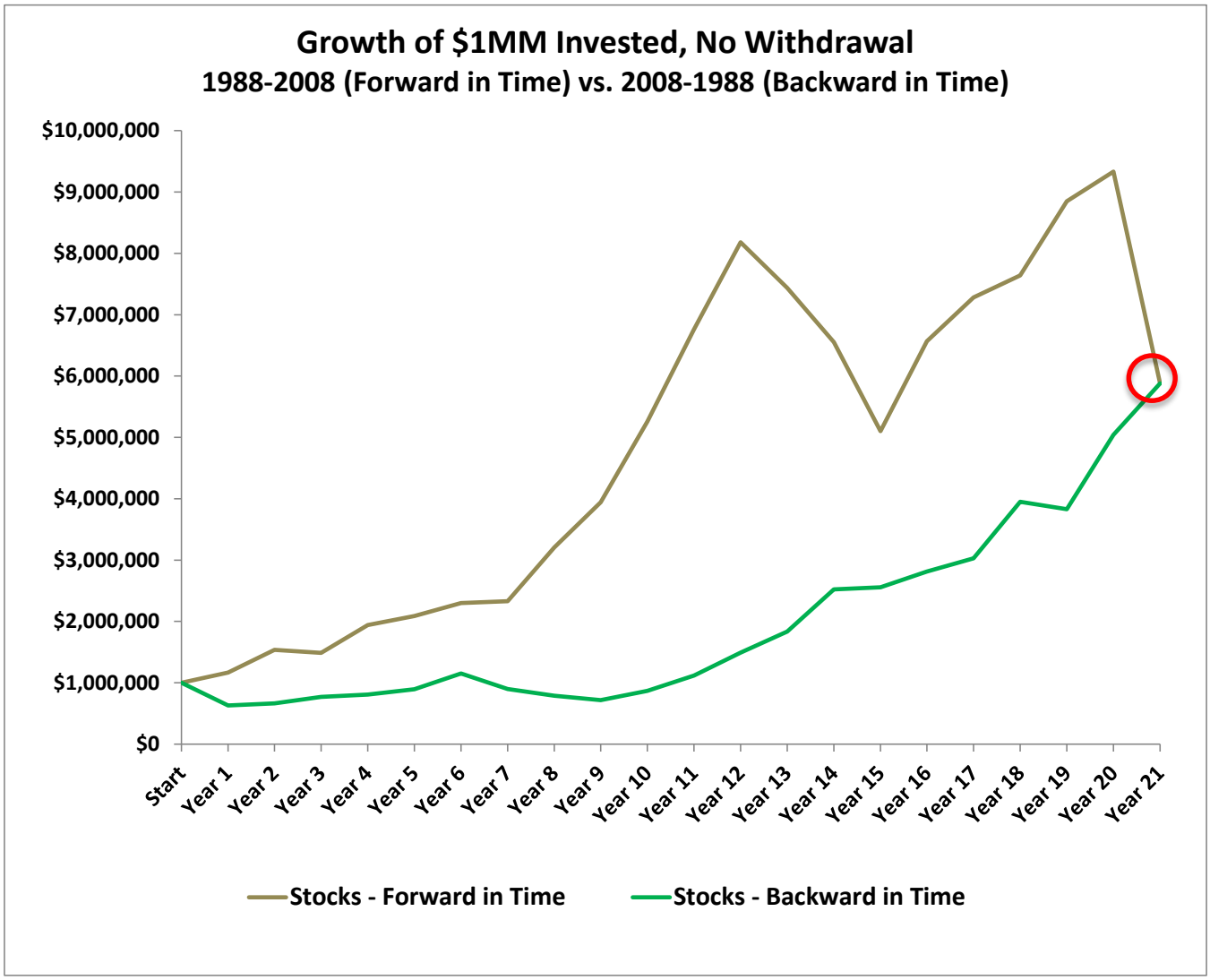
To illustrate this effect, consider the following thought experiment:[2] Suppose two retirees achieved the same overall stock returns, but in reverse order. In particular, suppose the first retiree received investment returns for 20 years equal to those achieved by the stock-only investor in the above example from 1988 through 2008, while the second retiree received the same returns in the reverse order. I.e., for the second retiree, the 2008

[2] Based on an idea proposed in Gil Weinreich, "What Makes Sequence of Returns Risk So Dangerous," 4 June 2015, www.thinkadvisor.com/2015/06/04/what-makes-sequence-of-returns-risk-so-dangerous

stock return is captured in the first year of retirement, the 2007 return is captured in the second year of retirement, etc.

First, to demonstrate that there are no shenanigans, Figure 3 shows what each investor would achieve if they were to put $1MM into a portfolio at the beginning and leave the entire amount untouched for the full 20 years:

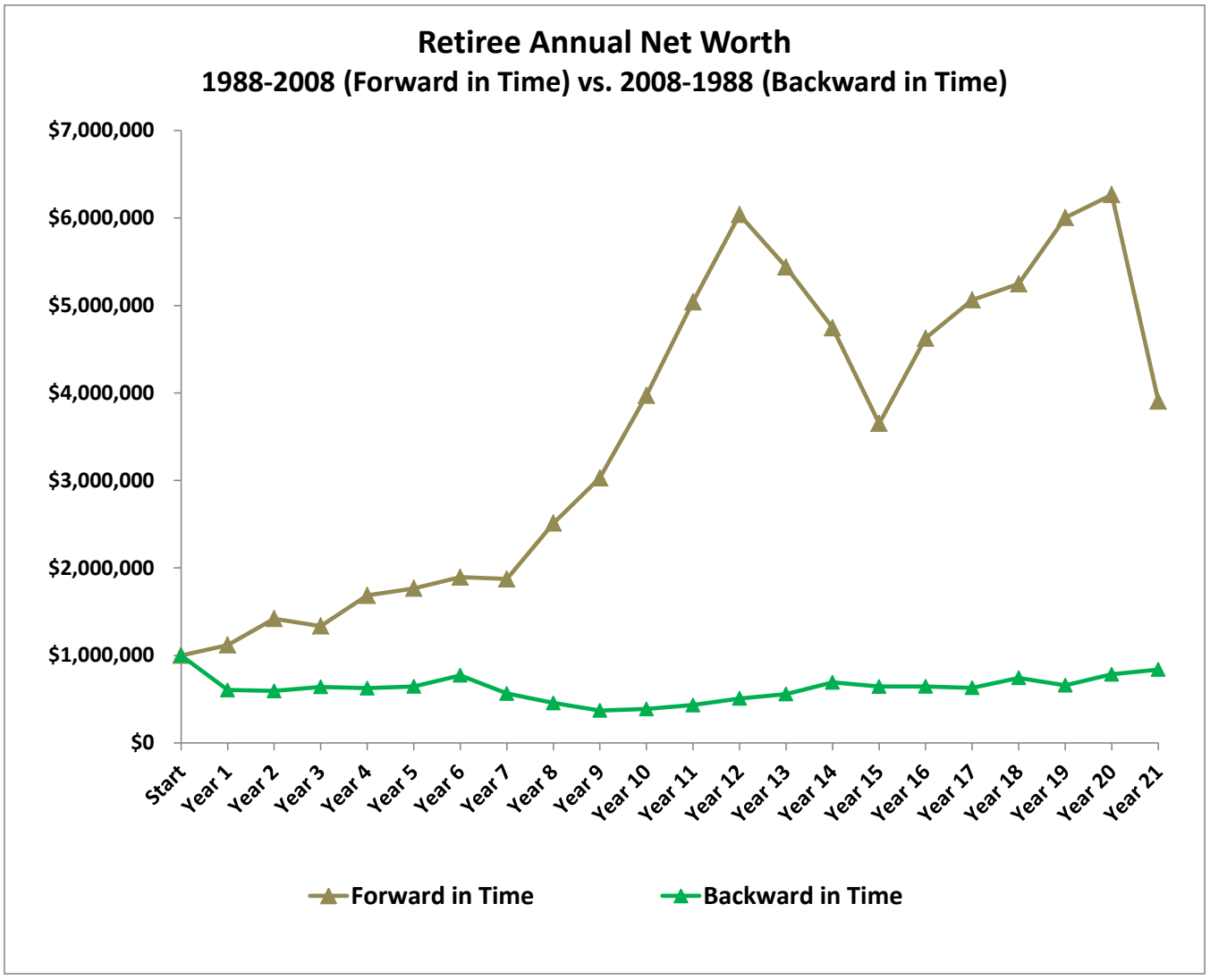
Figure 3: Growth of $1MM in Stocks, Forward (1988-2008) and Backward (2008-1998) in Time



While the paths taken to the end result look very different, both investors in this buy-and-hold example wind up with exactly the same amount of money—as well they should, given that they are ultimately accruing and compounding the same set of 20 annual returns.

But when you introduce annual withdrawals to fund income needs, the situation changes markedly. Returns in the early years, when the majority of required withdrawals for income are still in the future, play an outsized role in determining the path to final net worth. As Figure 4 shows, the "forward in time" retiree performs well (as we've already seen) because stock returns are strong in the early years (late 1980s and early 1990s), while the "backward in time" retiree performs far worse due to substantial drawdowns in the early, reversed, years of retirement (2008 and again in 2002-2000).

Figure 4: Annual Net Worth with Withdrawals, Forward and Backward in Time



Note again that these two retirees' portfolios ultimately receive *exactly the same* set of annual stock returns, with only the order reversed. Yet the outcomes are wildly different, as the forward-in-time retiree winds up with a net worth nearly 4 times the initial amount invested, while the backward-in-time retiree never has even 85% of the initial invested amount after the first year. This occurs despite the fact that the long-run, end-to-end annualized stock return was exactly the same (8.8%) for both investors.

Consequently, even if you could accurately predict beforehand the long-run return of stocks (a dubious proposition), the volatility of stock returns (less dubious, but still difficult), and even the (unordered) annual returns themselves (impossible), the precise, path-dependent order of those returns can still cause major variation in retirement success.

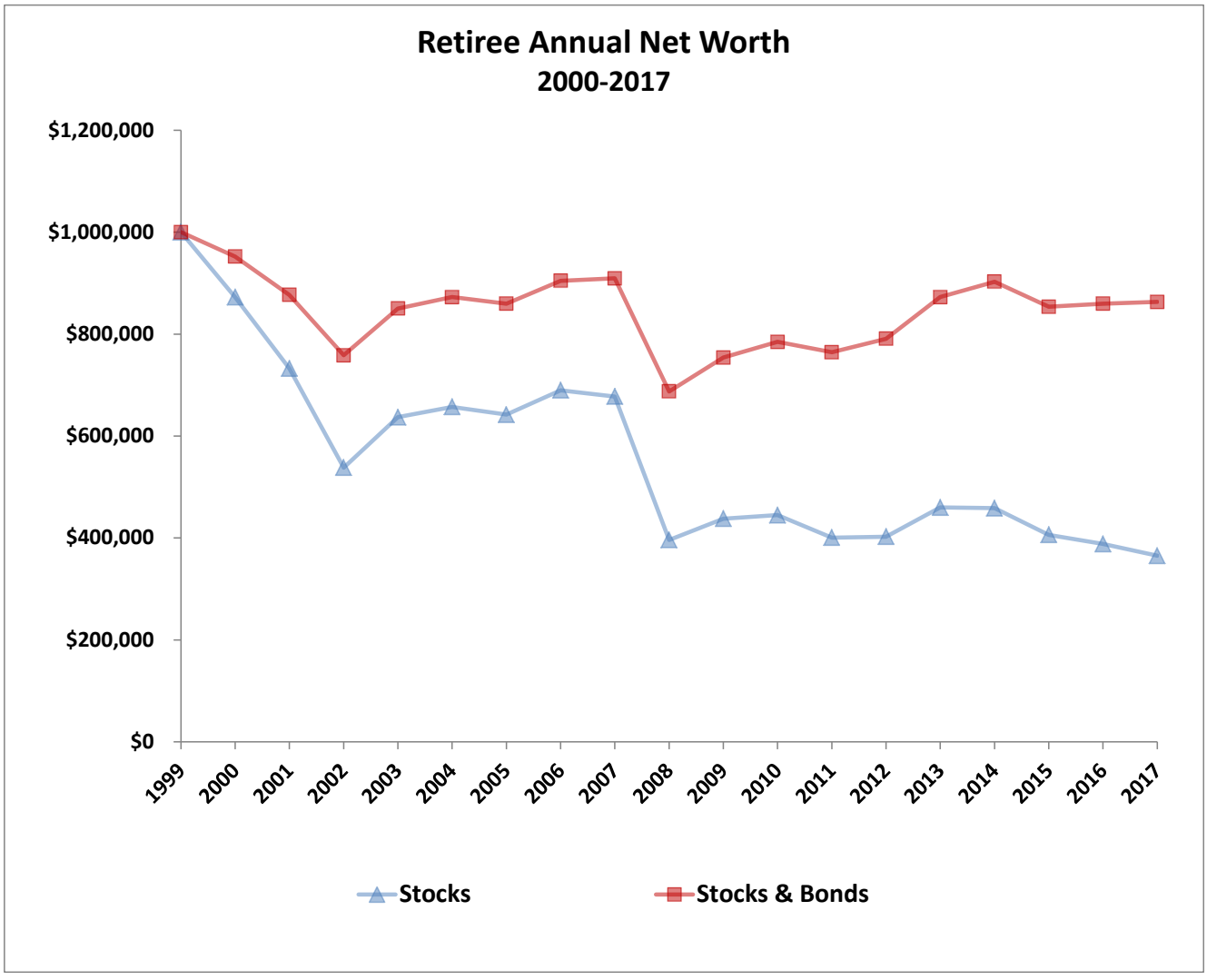
Illustration #2a: Weaker Stock/Bond Backdrop (2000-2017)

Let's next consider an example of a backdrop that begins with difficult portfolio returns but does not involve time travel. Consider someone who retired on 12/31/1999 (so the full year 2000 was the first year of retirement). That retiree's portfolio was hit immediately with the bursting of the tech bubble, managed a few

years of recovery, and then faced the even more severe financial crisis, all in the first decade of retirement. The consequences are not encouraging.

Recall that the all-stock investor's net worth performed incredibly well in the 1988-2017 scenarios. This is because the greater volatility of a stock-only portfolio happened to fall almost entirely to the upside throughout the early years of retirement. Figure 5 illustrates the downsides of concentrated equity risk. If that greater volatility happens to fall to the downside in the early years of retirement, the portfolio can wind up in a very tenuous place. In this example, the all-stock investor's asset base had already fallen below the $500,000 comfort level by the ninth year of retirement. It has also fallen further in the years since, despite positive post-crisis equity performance, for the simple reason that the withdrawal required to support the retiree's annual consumption represents a significantly higher percentage of a depleted asset base (i.e., sequence of returns risk).

Figure 5: Stock and Stock/Bond Net Worth, 2000-2017



The stock/bond retiree has done significantly better up to this point, thanks to the volatility buffer provided by the 40% bond allocation. But even that investor's net worth is below the initial investment level (on a nominal dollar basis), which is a potentially alarming situation with twelve years left to go in the initially planned 30-year retirement period.

Figure 6 illustrates the benefits of including an allocation to trend following alongside traditional investments when traditionals go through a period of choppy performance. Non-correlation and "crisis alpha" mitigate drawdown depth, which reduces the percentage draw demanded by retirees' income needs following a down year for traditionals. This in turn enables the portfolio to participate more fully in the subsequent recoveries. The result is a significantly stronger asset base by 2017. In particular, the portfolio with stocks, bonds, and trend following is above the initial $1 million allocation at the end of 2017.

Figure 6: Stock, Stock/Bond, and Stock/Bond/Trend Net Worth, 2000-2017

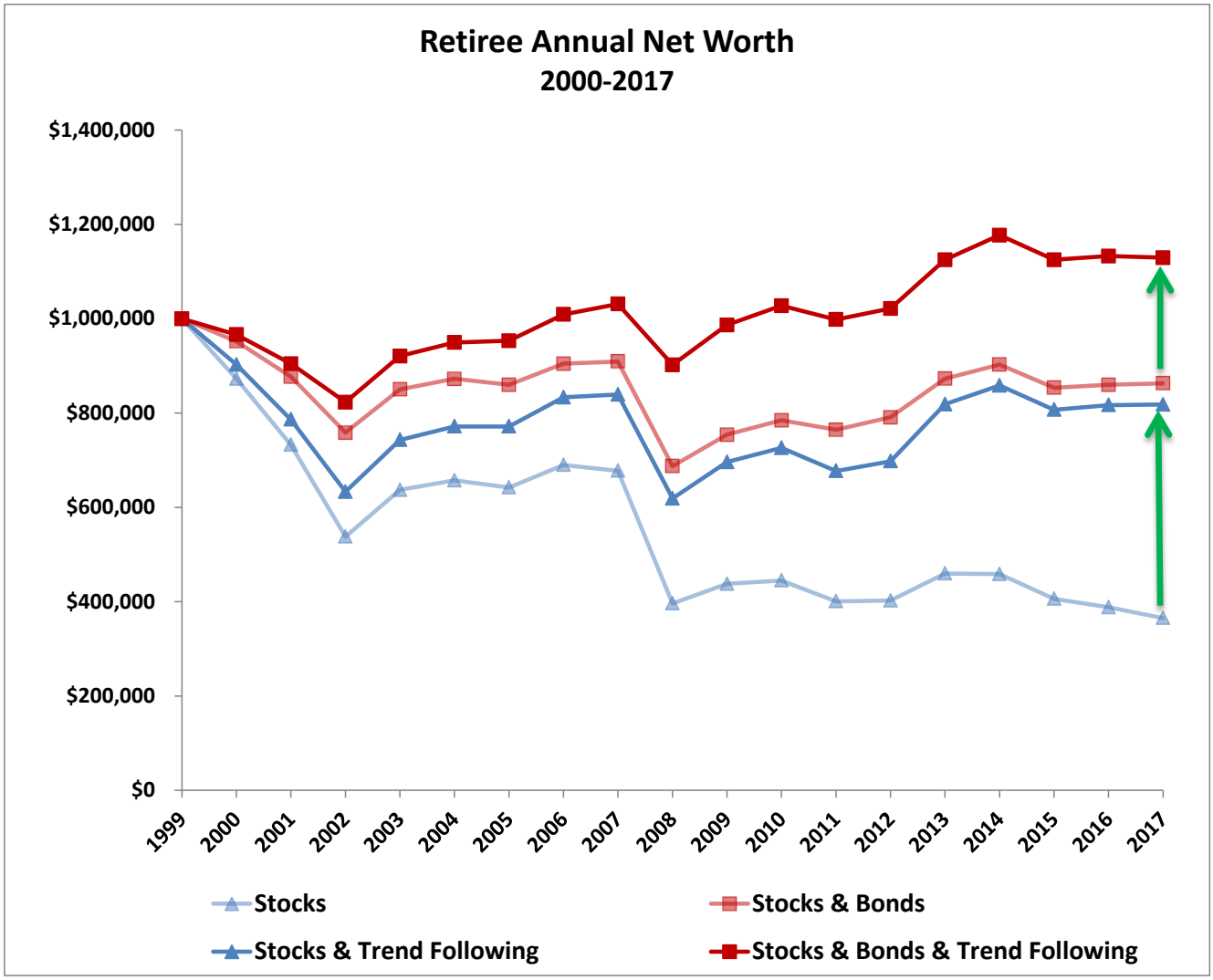


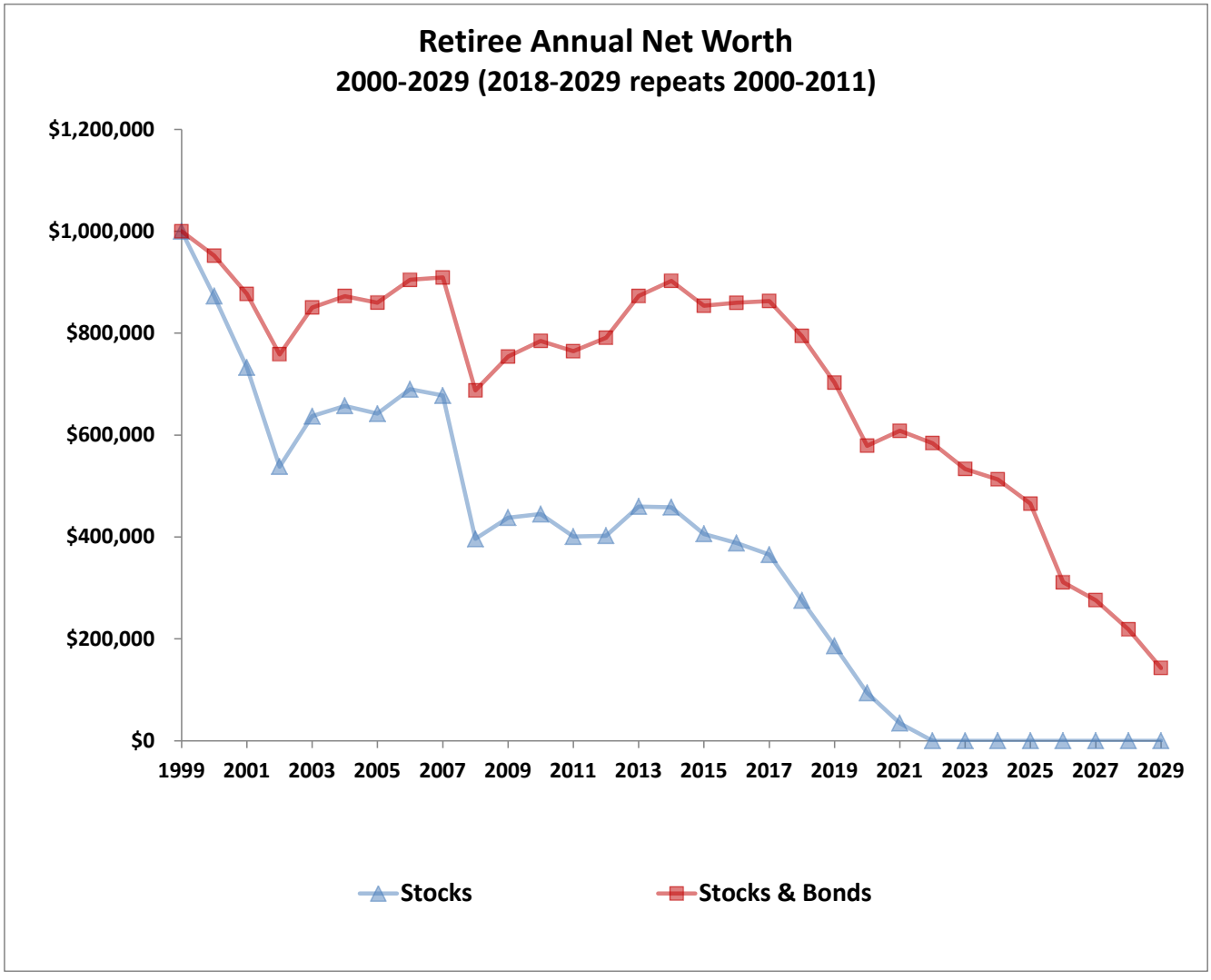
Illustration #2b: Extended Weak Performance (2000-2029, Simulated)

The above example covers the first 18 years of a 2000 retiree's journey, but what will happen over the full 30 year retirement period? Obviously, there are a number of plausible paths, but let's bifurcate them into the same two general categories considered so far: One possibility is that stocks and bonds continue to have the kind of strong performance they have demonstrated thus far in the post-crisis era. While even that may not be enough to ease the financial distress for the hapless stock-only investor (note again the inability of the stock-only curve to rise back above the $500k pain threshold since 2008), the stock/bond investor should be able to ride strong traditional investment performance to a successful conclusion in retirement. Given the

sanguine conclusion, we won't bother simulating this scenario, but recall that a trend following allocation is unlikely to interfere with the happy outcome.

Another possibility is that traditional investment performance goes through another period of weakness, leading to the possibility that even the stock/bond investor may face the risk of failure to meet income and/or asset cushion goals. Here is where trend following can potentially provide a needed boost. To simulate this scenario below, we repeat the 2000+ returns starting in 2018; i.e., we set the 2018 return equal to the 2000 return, the 2019 return equal to the 2001 return, etc., for each asset class. See Figure 7 for results.

Figure 7: Stock and Stock/Bond Net Worth, 2000-2029 (Partly Simulated)



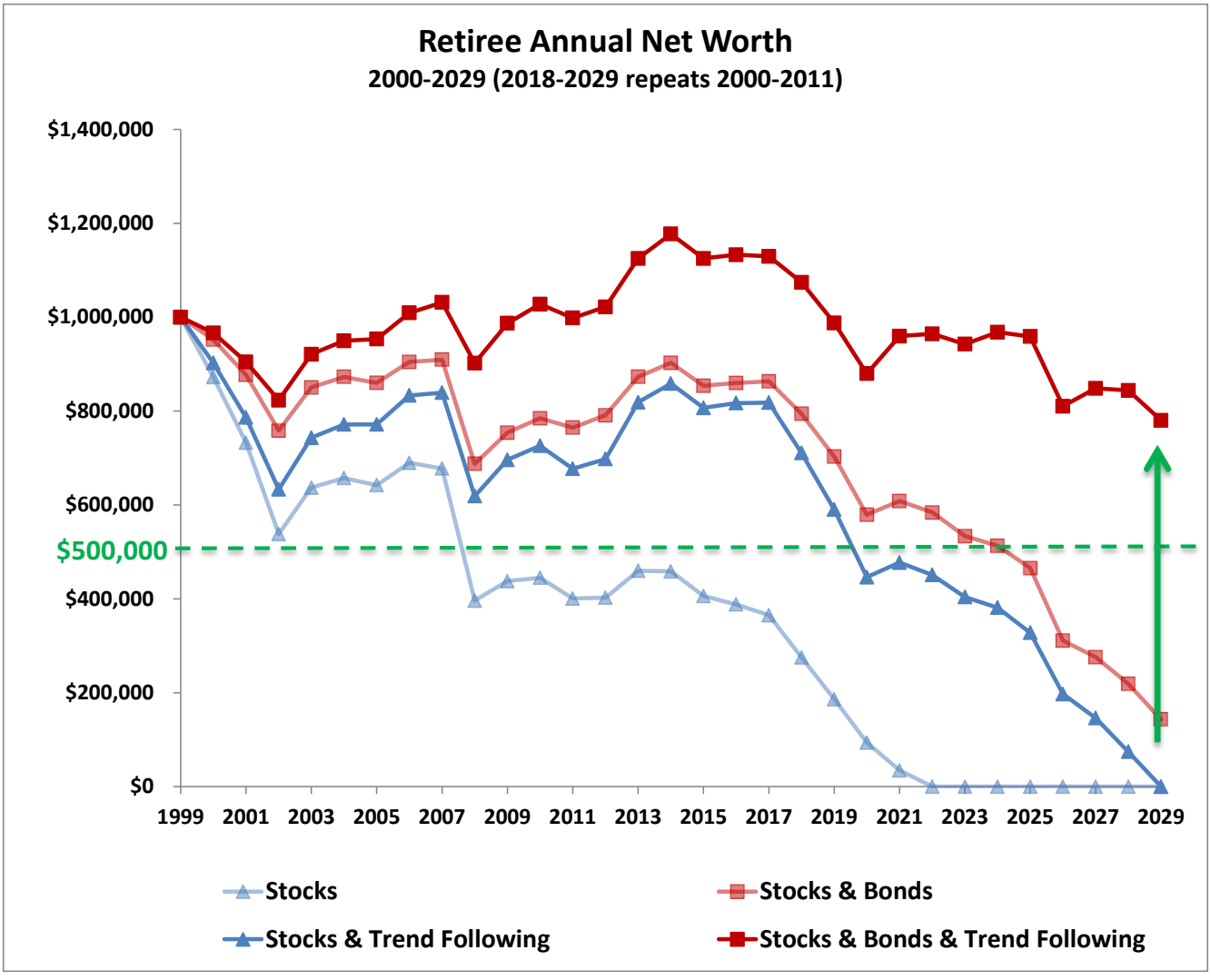
The stock/bond investor managed to muddle through the first 18 years with only a moderate impairment of net worth. But reduced reserves plus larger (nominal dollar) late-year withdrawal requirements combine to produce financial distress toward the end of retirement, as the stock and bond investor limps across the finish line with no margin for error. Slightly worse investment performance or virtually any unforeseen expenditures—or a year or two more of retirement (i.e., extra longevity)—could reduce the asset base to $0.

The ill-fated all-stock investor *does* see retirement assets reduced to zero—with nine years of planned retirement left, no less. If nothing else, hopefully this exercise illustrates why a 100% risk-asset portfolio is a

dangerous proposition in retirement, despite the possibility of the impressively successful outcome in the 1988-2017 example.

Figure 8 shows the results of including trend following in this semi-simulated 30-year example. While the inclusion of a 20% trend position improves the results for the stock-only investor, that retiree's asset base still falls below $500,000 in year 21, and is depleted to $0 in the last year of retirement. On the other hand, the portfolio with stocks, bonds, and trend following fares immensely better than any of the less-diversified portfolios. The fully diversified investor finishes out retirement with a net worth of over $750,000.

Figure 8: Stock, Stock/Bond, and Stock/Bond/Trend Net Worth, 2000-2029 (Partly Simulated)



The biggest benefit of diversification with bonds and trend-following comes from loss reduction when the biggest crises occur in stocks. In the equity crises that occurred in the 2000s (recurring in the late 2010s and early 2020s in the simulation above), the loss mitigation from bonds and trend following combined is sufficient to overcome the otherwise devastating nest egg depletion that a stock-heavy investor experiences—without overly hampering the strong recoveries that occur in the other years.

What Will the Future Actually Look Like?

The retirement draw models investigated above use actual, recent market return data, but obviously the specific time periods were chosen to illustrate nearly polar opposite backdrops for traditional risk assets. The question for near-term retirees, of course, is what future market returns will actually look like.

The reality is that the future could resemble either of those extremes, or be somewhere in between, and a wise portfolio allocation plan will consider all possibilities. One option is to lock in future income with an annuity or something like a TIPS ladder. But if the retiree requires more flexibility or more return than can be obtained by such methods, then an intelligently designed portfolio must at least consider the extremes:

On one side, perhaps the future will more closely resemble the strong early-year returns of the 1988-2017 example. Certainly, both equities and bonds have proven resilient for decades, and even if the total return of fixed income is less than was experienced in that era, similar equity returns alone would be sufficient to guarantee a successful financial picture in retirement. Importantly, historical evidence indicates that the inclusion of trend following will not derail that security, so while trend following might prove to be unnecessary in this sort of future, it is unlikely that it would be significantly detrimental either.

But that is not the only possible future. If future returns look more like the (partly repeating) 2000-2029 example, trend following may be among the best ways to mitigate early-year equity drawdowns, preserving wealth for future income needs. And there are reasons to believe this could be a risk. First, with interest rates near historic lows, there is reason to doubt whether fixed income can provide quite the same cushion in a pullback that it has offered in the past. Low rates also imply lower bond returns going forward; with rates near historic lows, it is improbable that the next ten years of fixed income returns will be as strong as they were over any of the three decades in the 1988-2017 example. Equities don't have capped upside the way bonds do, but there is a historic relationship between equity valuations and long-run future returns, and present valuations are on the high side by historic standards. Admittedly, this does not necessarily imply that large equity drawdowns are in the near-to-mid-term future, and it is such drawdowns—via sequence of returns risk—that pose the greatest threat to retirement income security, rather than lower end-to-end returns *per se*. However, it does imply that if drawdowns do occur, they could be quite severe without driving valuations to anomalously low levels.

Conclusion

The future of a portfolio is best represented not as a best-guess single outcome but as a spectrum of possibilities. The value of trend following is that its historic relationship with traditional assets is such that it can potentially raise the low end of the spectrum without causing significant damage to the high end. An uncorrelated diversifier that grows increasingly negatively correlated when equities suffer their worst drawdowns—characteristics that trend following has historically achieved, for reasons that we would argue have a high probability of repeating—is an asset that can shrink the variance of potential future outcomes, thus increasing the percentage odds of a successfully funded retirement income.

Appendix: Tabular Format Net Worth Calculations

For the 1988-2017, forward/backward in time, 2000-2017, and 2000-2029 simulations, graphics in the main text were shown in a chart form, to offer a visual demonstration of the evolution of a retiree's net worth under various investment scenarios. The same information can also be presented in tabular format, offering less visual intuitiveness but greater detail. Those tables are presented below.

Table 1: Stock, Stock/Bond, and Stock/Bond/Trend Net Worth, 1988-2017

		Stocks		Stocks & Trend Following		Stocks & Bonds		Stocks & Bonds & Trend Following	
Year Ending	Retiree Withdrawal	Investment Return	Year-End Net Worth	Investment Return	Year-End Net Worth	Investment Return	Year-End Net Worth	Investment Return	Year-End Net Worth
12/31/1987			$1,000,000		$1,000,000		$1,000,000		$1,000,000
12/31/1988	$40,000	16.6%	$1,119,405	16.2%	$1,115,765	13.1%	$1,085,925	13.44%	$1,088,980
12/31/1989	$41,000	31.7%	$1,420,111	26.0%	$1,354,540	24.8%	$1,304,313	20.54%	$1,263,248
12/31/1990	$42,025	-3.1%	$1,335,306	0.6%	$1,319,918	1.7%	$1,284,018	4.42%	$1,275,258
12/31/1991	$43,076	30.5%	$1,685,920	27.3%	$1,625,532	24.7%	$1,547,217	22.68%	$1,511,650
12/31/1992	$44,153	7.6%	$1,766,860	6.6%	$1,685,836	7.5%	$1,616,279	6.54%	$1,563,409
12/31/1993	$45,256	10.1%	$1,895,118	10.7%	$1,816,899	9.9%	$1,727,292	10.64%	$1,679,715
12/31/1994	$46,388	1.3%	$1,873,143	0.9%	$1,785,597	-0.4%	$1,674,612	-0.50%	$1,625,098
12/31/1995	$47,547	37.6%	$2,511,613	32.8%	$2,308,865	29.9%	$2,114,150	26.73%	$1,999,219
12/31/1996	$48,736	23.0%	$3,028,360	20.6%	$2,725,632	15.2%	$2,379,941	14.41%	$2,231,561
12/31/1997	$49,955	33.4%	$3,972,100	28.9%	$3,447,903	23.9%	$2,886,382	21.27%	$2,645,724
12/31/1998	$51,203	28.6%	$5,041,434	25.5%	$4,262,818	20.6%	$3,419,846	19.13%	$3,090,942
12/31/1999	$52,483	21.0%	$6,038,702	17.2%	$4,932,860	12.3%	$3,781,418	10.16%	$3,347,301
12/31/2000	$53,796	-9.1%	$5,440,018	-6.0%	$4,588,145	-0.8%	$3,697,343	0.67%	$3,315,606
12/31/2001	$55,140	-11.9%	$4,744,841	-8.7%	$4,136,692	-3.8%	$3,505,483	-2.24%	$3,187,524
12/31/2002	$56,519	-22.1%	$3,652,178	-14.9%	$3,470,438	-9.2%	$3,133,096	-4.59%	$2,987,289
12/31/2003	$57,932	28.7%	$4,625,240	25.9%	$4,297,439	18.9%	$3,654,907	18.07%	$3,458,585
12/31/2004	$59,380	10.9%	$5,062,719	10.4%	$4,678,679	8.3%	$3,892,685	8.30%	$3,681,434
12/31/2005	$60,865	4.9%	$5,247,543	6.2%	$4,905,230	3.9%	$3,981,982	5.43%	$3,817,150
12/31/2006	$62,386	15.8%	$6,004,113	14.9%	$5,565,220	11.2%	$4,358,978	11.25%	$4,177,133
12/31/2007	$63,946	5.5%	$6,266,517	6.8%	$5,874,762	6.1%	$4,556,302	7.26%	$4,411,821
12/31/2008	$65,545	-37.0%	$3,906,747	-21.7%	$4,548,293	-20.1%	$3,587,992	-8.19%	$3,990,338
12/31/2009	$67,183	26.5%	$4,855,685	22.4%	$5,483,921	18.3%	$4,163,393	15.81%	$4,543,321
12/31/2010	$68,863	15.1%	$5,507,881	12.6%	$6,095,237	11.7%	$4,571,732	9.83%	$4,914,469
12/31/2011	$70,584	2.1%	$5,552,120	0.5%	$6,056,281	4.4%	$4,699,366	2.36%	$4,958,131
12/31/2012	$72,349	16.0%	$6,356,724	12.0%	$6,699,787	11.3%	$5,149,322	8.19%	$5,285,962
12/31/2013	$74,158	32.4%	$8,317,372	27.4%	$8,440,063	18.6%	$6,020,327	16.37%	$6,065,143
12/31/2014	$76,012	13.7%	$9,369,481	12.6%	$9,421,293	10.6%	$6,574,385	10.17%	$6,598,173
12/31/2015	$77,912	1.4%	$9,420,150	0.8%	$9,417,655	1.1%	$6,564,703	0.53%	$6,554,694
12/31/2016	$79,860	12.0%	$10,457,382	9.3%	$10,204,576	8.2%	$7,018,861	6.30%	$6,882,906
12/31/2017	$81,856	11.6%	$11,578,046	8.2%	$10,952,825	8.0%	$7,494,713	5.36%	$7,165,595
Annualized Investment Return:		**10.4%**		**10.2%**		**9.1%**		**9.0%**	
Investment Volatility:		**16.9%**		**13.2%**		**10.6%**		**8.3%**	
Ending Balance:			**$11,578,046**		**$10,952,825**		**$7,494,713**		**$7,165,595**

Table 2: Annual Net Worth with Withdrawals, Forward and Backward in Time

Forward in Time				Backward in Time			
Year Ending	Retiree Withdrawal	Investment Return	Year-End Net Worth	Year Ending	Retiree Withdrawal	Investment Return	Year-End Net Worth
12/31/1987			$1,000,000	12/31/2008			$1,000,000
12/31/1988	$40,000	16.6%	$1,119,405	12/31/2007	$40,000	-37.0%	$604,821
12/31/1989	$41,000	31.7%	$1,420,111	12/31/2006	$41,000	5.5%	$594,797
12/31/1990	$42,025	-3.1%	$1,335,306	12/31/2005	$42,025	15.8%	$640,078
12/31/1991	$43,076	30.5%	$1,685,920	12/31/2004	$43,076	4.9%	$626,327
12/31/1992	$44,153	7.6%	$1,766,860	12/31/2003	$44,153	10.9%	$645,527
12/31/1993	$45,256	10.1%	$1,895,118	12/31/2002	$45,256	28.7%	$772,456
12/31/1994	$46,388	1.3%	$1,873,143	12/31/2001	$46,388	-22.1%	$565,603
12/31/1995	$47,547	37.6%	$2,511,613	12/31/2000	$47,547	-11.9%	$456,480
12/31/1996	$48,736	23.0%	$3,028,360	12/31/1999	$48,736	-9.1%	$370,622
12/31/1997	$49,955	33.4%	$3,972,100	12/31/1998	$49,955	21.0%	$388,140
12/31/1998	$51,203	28.6%	$5,041,434	12/31/1997	$51,203	28.6%	$433,229
12/31/1999	$52,483	21.0%	$6,038,702	12/31/1996	$52,483	33.4%	$507,775
12/31/2000	$53,796	-9.1%	$5,440,018	12/31/1995	$53,796	23.0%	$558,214
12/31/2001	$55,140	-11.9%	$4,744,841	12/31/1994	$55,140	37.6%	$692,117
12/31/2002	$56,519	-22.1%	$3,652,178	12/31/1993	$56,519	1.3%	$643,991
12/31/2003	$57,932	28.7%	$4,625,240	12/31/1992	$57,932	10.1%	$645,127
12/31/2004	$59,380	10.9%	$5,062,719	12/31/1991	$59,380	7.6%	$630,376
12/31/2005	$60,865	4.9%	$5,247,543	12/31/1990	$60,865	30.5%	$743,018
12/31/2006	$62,386	15.8%	$6,004,113	12/31/1989	$62,386	-3.1%	$659,503
12/31/2007	$63,946	5.5%	$6,266,517	12/31/1988	$63,946	31.7%	$784,267
12/31/2008	$65,545	-37.0%	$3,906,747	12/31/1987	$65,545	16.6%	$838,064
Annualized Investment Return:		**8.8%**		**Annualized Investment Return:**		**8.8%**	
Investment Volatility:		**19.1%**		**Investment Volatility:**		**19.1%**	
Ending Balance:			**$3,906,747**	**Ending Balance:**			**$838,064**

Table 3: Stock, Stock/Bond, and Stock/Bond/Trend Net Worth, 2000-2017

		Stocks		Stocks & Trend Following		Stocks & Bonds		Stocks & Bonds & Trend Following	
Year Ending	Retiree Withdrawal	Investment Return	Year-End Net Worth	Investment Return	Year-End Net Worth	Investment Return	Year-End Net Worth	Investment Return	Year-End Net Worth
12/31/1999	$40,000		$1,000,000		$1,000,000		$1,000,000		$1,000,000
12/31/2000	$41,000	-9.10%	$872,598	-5.96%	$902,759	-0.81%	$952,202	0.67%	$966,442
12/31/2001	$42,025	-11.89%	$732,756	-8.74%	$786,417	-3.75%	$876,998	-2.24%	$904,738
12/31/2002	$43,076	-22.10%	$538,076	-14.94%	$633,151	-9.16%	$758,503	-4.59%	$823,114
12/31/2003	$44,153	28.68%	$636,989	25.93%	$743,094	18.85%	$850,303	18.07%	$920,963
12/31/2004	$45,256	10.88%	$657,349	10.40%	$771,609	8.26%	$872,776	8.30%	$949,610
12/31/2005	$46,388	4.91%	$642,158	6.22%	$771,561	3.92%	$859,948	5.43%	$953,456
12/31/2006	$47,547	15.79%	$689,868	14.92%	$833,343	11.21%	$904,760	11.25%	$1,009,104
12/31/2007	$48,736	5.49%	$677,609	6.79%	$839,144	6.08%	$909,357	7.26%	$1,031,369
12/31/2008	$49,955	-37.00%	$396,204	-21.71%	$618,845	-20.10%	$687,613	-8.19%	$902,160
12/31/2009	$51,203	26.46%	$437,882	22.38%	$696,201	18.25%	$754,037	15.81%	$986,921
12/31/2010	$52,483	15.06%	$444,926	12.56%	$726,015	11.65%	$784,747	9.83%	$1,027,735
12/31/2011	$53,796	2.11%	$400,730	0.52%	$677,067	4.40%	$764,510	2.36%	$998,253
12/31/2012	$55,140	16.00%	$402,456	11.96%	$697,834	11.29%	$790,941	8.19%	$1,021,815
12/31/2013	$56,519	32.39%	$459,804	27.39%	$818,695	18.62%	$872,831	16.37%	$1,124,951
12/31/2014	$57,932	13.69%	$458,489	12.64%	$858,517	10.60%	$902,837	10.17%	$1,177,082
12/31/2015	$59,380	1.38%	$406,100	0.79%	$806,950	1.05%	$853,779	0.53%	$1,125,060
12/31/2016	$60,865	11.96%	$388,188	9.28%	$816,963	8.23%	$859,816	6.30%	$1,132,843
12/31/2017*	$62,386	11.59%	$365,260	8.20%	$818,101	8.04%	$863,184	5.36%	$1,129,438
Annualized Investment Return:		**4.9%**		**5.8%**		**5.5%**		**5.9%**	
Investment Volatility:		**17.1%**		**12.9%**		**9.7%**		**7.0%**	
Ending Balance:			**$365,260**		**$818,101**		**$863,184**		**$1,129,438**

* 2017 as available through 7/31/2017

Table 4: Stock, Stock/Bond, and Stock/Bond/Trend Net Worth, 2000-2029 (Partly Simulated)

		Stocks		Stocks & Trend Following		Stocks & Bonds		Stocks & Bonds & Trend Following	
Year Ending	Retiree Withdrawal	Investment Return	Year-End Net Worth	Investment Return	Year-End Net Worth	Investment Return	Year-End Net Worth	Investment Return	Year-End Net Worth
12/31/1999	$40,000		$1,000,000		$1,000,000		$1,000,000		$1,000,000
12/31/2000	$41,000	-9.10%	$872,598	-5.96%	$902,759	-0.81%	$952,202	0.67%	$966,442
12/31/2001	$42,025	-11.89%	$732,756	-8.74%	$786,417	-3.75%	$876,998	-2.24%	$904,738
12/31/2002	$43,076	-22.10%	$538,076	-14.94%	$633,151	-9.16%	$758,503	-4.59%	$823,114
12/31/2003	$44,153	28.68%	$636,989	25.93%	$743,094	18.85%	$850,303	18.07%	$920,963
12/31/2004	$45,256	10.88%	$657,349	10.40%	$771,609	8.26%	$872,776	8.30%	$949,610
12/31/2005	$46,388	4.91%	$642,158	6.22%	$771,561	3.92%	$859,948	5.43%	$953,456
12/31/2006	$47,547	15.79%	$689,868	14.92%	$833,343	11.21%	$904,760	11.25%	$1,009,104
12/31/2007	$48,736	5.49%	$677,609	6.79%	$839,144	6.08%	$909,357	7.26%	$1,031,369
12/31/2008	$49,955	-37.00%	$396,204	-21.71%	$618,845	-20.10%	$687,613	-8.19%	$902,160
12/31/2009	$51,203	26.46%	$437,882	22.38%	$696,201	18.25%	$754,037	15.81%	$986,921
12/31/2010	$52,483	15.06%	$444,926	12.56%	$726,015	11.65%	$784,747	9.83%	$1,027,735
12/31/2011	$53,796	2.11%	$400,730	0.52%	$677,067	4.40%	$764,510	2.36%	$998,253
12/31/2012	$55,140	16.00%	$402,456	11.96%	$697,834	11.29%	$790,941	8.19%	$1,021,815
12/31/2013	$56,519	32.39%	$459,804	27.39%	$818,695	18.62%	$872,831	16.37%	$1,124,951
12/31/2014	$57,932	13.69%	$458,489	12.64%	$858,517	10.60%	$902,837	10.17%	$1,177,082
12/31/2015	$59,380	1.38%	$406,100	0.79%	$806,950	1.05%	$853,779	0.53%	$1,125,060
12/31/2016	$60,865	11.96%	$388,188	9.28%	$816,963	8.23%	$859,816	6.30%	$1,132,843
12/31/2017*	$62,386	11.59%	$365,260	8.20%	$818,101	8.04%	$863,184	5.36%	$1,129,438
12/31/2018**	$63,946	-9.10%	$275,299	-5.96%	$710,654	-0.81%	$794,293	0.67%	$1,074,212
12/31/2019**	$65,545	-11.89%	$186,232	-8.74%	$590,168	-3.75%	$702,931	-2.24%	$987,665
12/31/2020**	$67,183	-22.10%	$94,014	-14.94%	$446,224	-9.16%	$579,013	-4.59%	$879,794
12/31/2021**	$68,863	28.68%	$34,528	25.93%	$477,334	18.85%	$608,322	18.07%	$959,420
12/31/2022**	$70,584	10.88%	$0	10.40%	$450,939	8.26%	$584,043	8.30%	$964,498
12/31/2023**	$72,349	4.91%	$0	6.22%	$404,028	3.92%	$533,580	5.43%	$942,449
12/31/2024**	$74,158	15.79%	$0	14.92%	$381,154	11.21%	$512,935	11.25%	$967,977
12/31/2025**	$76,012	5.49%	$0	6.79%	$327,838	6.08%	$465,468	7.26%	$958,714
12/31/2026**	$77,912	-37.00%	$0	-21.71%	$197,166	-20.10%	$311,165	-8.19%	$810,413
12/31/2027**	$79,860	26.46%	$0	22.38%	$145,941	18.25%	$275,824	15.81%	$848,294
12/31/2028**	$81,856	15.06%	$0	12.56%	$74,382	11.65%	$218,803	9.83%	$844,001
12/31/2029**	$83,903	2.11%	$0	0.52%	$0	4.40%	$142,978	2.36%	$780,120
12/31/2030**	$86,000	16.00%	$0	11.96%	$0	11.29%	$65,744	8.19%	$753,243
Annualized Investment Return:		**3.5%**		**4.9%**		**4.9%**		**5.7%**	
Investment Volatility:		**17.1%**		**12.9%**		**9.7%**		**7.0%**	
Ending Balance:			**$0**		**$0**		**$142,978**		**$780,120**

* 2017 as available through 7/31/2017

** 2018-2030 repeats 2000-2012 performance

Important Disclosures

Past performance is no guarantee of future results.

All AMFBI monthly returns shown do not include transaction cost, but are net of 1.50% for estimated fees and other expenses. An investor cannot invest directly in an index.

This document does not constitute an offer to sell or solicitation of an offer to buy any security. The information contained herein is provided for educational purposes only and is not intended to solicit interest in any investment opportunity.

Data has been obtained from reliable sources. Aspen Partners believes the information herein to be reliable; yet no warranty or guarantee is made as to its accuracy or completeness.

Benchmarks & Indices

AMFBI is constructed using a quantitative, rules-based model designed to replicate the trend-following and counter-trend exposure of futures markets by allocating assets to liquid futures contracts of certain financial and commodities futures markets. The index therefore seeks to reflect the performance of strategies and exposures common to a broad universe of futures markets, i.e., managed futures beta.

The Bloomberg Barclays U.S. Aggregate Bond Index is a market capitalization-weighted index, meaning the securities in the index are weighted according to the market size of each bond type.

The BarclayHedge BTOP50 Index is an index of the largest investable CTA programs, as measured by assets under management.

The S&P 500 Total Return Index is a widely recognized, unmanaged index of U.S. large-cap common stock returns.

The Barclays AGG, BTOP50 Index, and S&P 500 are unmanaged and do not represent the attempt of any manager to generate returns on an investment. These benchmark indices do not include transaction costs and other expenses, save for the BTOP50, which is net of the costs and expenses of the individual CTA programs embedded in the index.

Definitions

Annualized Return: The year-over-year growth rate of an investment over a specified period of time.

Maximum Drawdown: The greatest peak-to-trough decline during a specific period of an investment.

Standard Deviation: A measurement of the annual rate of return's dispersion from its mean, indicating an investment's volatility.