SAFE HAVEN INVESTING - PART ONE

# NOT ALL RISK MITIGATION IS CREATED EQUAL

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There is a movement today among pension funds toward systemic risk mitigation—or "safe haven"—strategies. This makes great sense as a potential solution to the widespread underfunding problem. Many pensions still haven't fully recovered from the crash of 2008, and can't afford another. Moreover, truly effective risk mitigation must lead to an incrementally higher long-run compound annual growth rate (CAGR); and a higher CAGR is the way to raise a pension's funding level over time.

Just how does risk mitigation raise the CAGR? Well, it usually doesn't, on its own. Modern Portfolio Theory tells us to mitigate risk through diversification, but this tends to lower CAGRs (in the name of higher Sharpe ratios); one is then forced to apply leverage to raise the CAGR back up, which just adds back a different risk by magnifying the portfolio's sensitivity to errors in one's spurious correlation estimates. Diversification is unfortunately not "the only free lunch in finance" that it has been made out to be. So much risk mitigation is simply about moving from concentration (or typically beta) risk to levered model risk.

True risk mitigation shouldn't require financial engineering and leverage in order to both lower risk and raise CAGRs. After all, lower risk and higher


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Mark founded Universa Investments L.P. in January 2007 and has developed its unique focus on risk mitigation in the context of achieving long-term improvements to portfolio construction. His investment career has spanned over 20 years as a derivatives trader, during which he has cultivated his approach to safe haven strategies, specifically bespoke tail hedging. Mark received an M.S. in Mathematics from the Courant Institute of Mathematical Sciences at New York University and a B.A. from Kalamazoo College.

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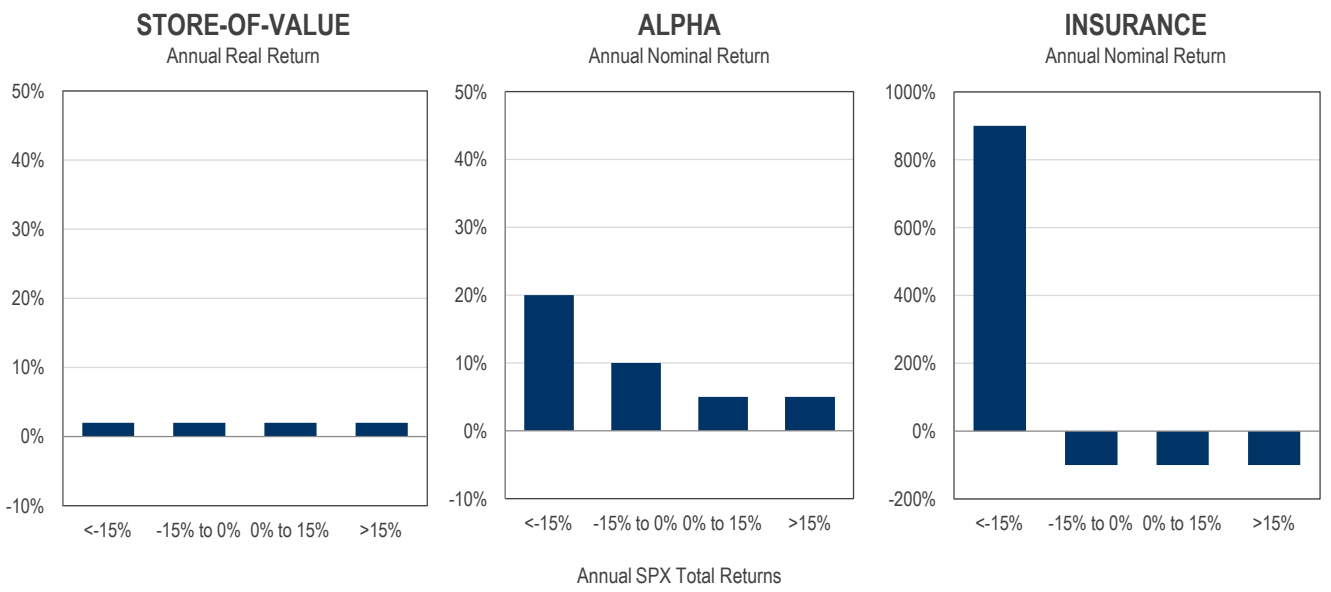
CAGRs should go hand in hand! It is well known that steep portfolio losses (or "crashes") crush long-run CAGRs. It just takes too long to recover from a much lower starting point—lose 50% and you need to make 100% to get back to even. I call this cost that transforms, in this case, a portfolio's +25% average arithmetic return into a 0% CAGR (and hence leaves the portfolio with zero profit) the "volatility tax": it is a hidden, deceptive fee levied on investors by the compounding of the markets' swings.

***The destructiveness of the vol tax to a portfolio explains in a nutshell Warren Buffett's cardinal rule "don't lose money."***

Achieving higher sustained CAGRs through vol tax savings is the name of the game in risk mitigation. All such strategies aim to do it, but not all are created equal. They all ultimately require a tradeoff between the degree of loss protection provided versus the degree of opportunity cost paid by the allocation of capital to that protection rather than to the rest of the portfolio. These are the two sides of the safe haven coin, and we can only measure each side vis-à-vis the other. Evaluating the tradeoff is tricky, and is fraught with mathematical mistakes, as the effect on the vol tax is often indirect or invisible. The best risk mitigation solution can be a counterintuitive one.

We will thus focus only on a straightforward criterion: higher portfolio-level compound annual growth rates from lower risk (or specifically from paying less vol tax). We will use this criterion to evaluate cartoon versions of the three canonical prototypes of safe haven strategies out there, where each exhibits a very distinct protection-cost tradeoff. They are depicted in Figure 1.

## FIGURE 1



Each of the three cartoon safe haven prototypes has its simple dynamics bucketed by four corresponding ranges of annual total returns in the SPX (a natural proxy for the systemic risk we're trying to mitigate). Think of these as contractual contingent payouts, with no noise or counterparty risk.

## STORE-OF-VALUE

The "store-of-value" safe haven on the left makes a fixed 2% real return (or annuity) each year, regardless of SPX returns; it provides great diversification, with a zero correlation in a crash. This might be short-term US Treasuries (being very generous), or even Swiss franc.

## ALPHA

The "alpha" safe haven in the center makes a 20% nominal annual return in the crash bucket (when the SPX is down 15% or more for the year), 10% in the second bucket (when the SPX is down less than 15%), and 5% in the other two buckets; it provides a nice negative correlation in a crash, and is always positive-carry. This looks somewhat like the intended performance (and even the historical performance of the best of survivors, at least for a while) of systematic trend-following CTA strategies, "contrarian global macro" and "long volatility" strategies, or even gold.

## INSURANCE

The "insurance" safe haven on the right makes an explosive profit of 900% in the crash bucket, and loses 100% in every other year (whenever the SPX isn't down by over 15%); it is highly nonlinear or "convex" to crashes (a "9-to-1 longshot"). This looks a lot like a tail risk hedging strategy (at least when done right, though most such funds seek profiles much more like the alpha safe haven), and this extreme asymmetry is the touchstone for what I do as a practitioner.

Over the past 20 calendar years (an arbitrarily selected round number), the stand-alone average arithmetic returns of this store-of-value, alpha, and insurance payoff profile have been about +4% and precisely +7% and 0%, respectively. (There are two years in the crash bucket, or 10% of the data—not exactly "black swans".)

Which of these three strategies would have most effectively mitigated the systemic risk in a portfolio and thus improved its CAGR, historically? Let's see what the empirically correct answer is by testing three portfolios where each strategy was paired with an SPX position. We used a weighting of 90% SPX + 10% safe haven in the first two cases, and 97% SPX + 3% in the insurance case. Changing the 10% allocation sizes would not have materially changed the results, and the much smaller allocation size of the insurance safe haven is due to its extreme convexity. The higher a strategy's "crash-bang"-for-the-buck, the less capital it requires to move the needle and the more capital is available for the rest of the portfolio, in this case for the SPX. All are rebalanced annually, and of course the insurance allocation is replenished each year that the SPX isn't down over 15%.

## FIGURE 2

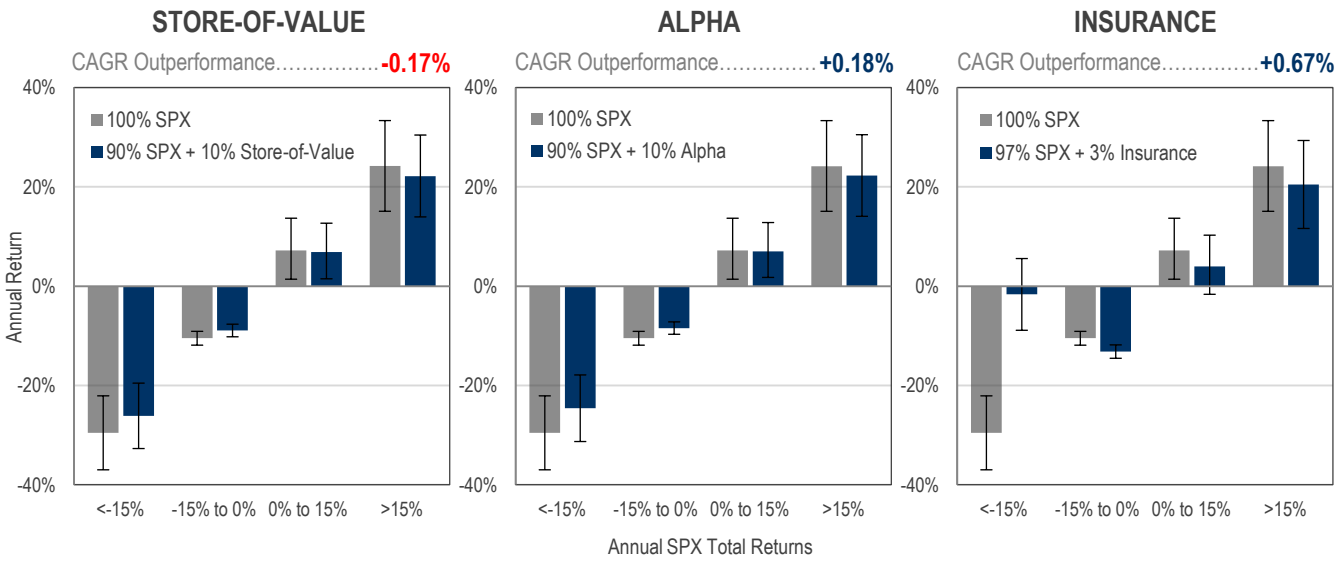



Figure 2 depicts historical performance profiles of each hypothetical portfolio over the past 20 calendar years, bucketed again by corresponding annual SPX total returns. The blue bars are the average annual portfolio returns for that bucket, next to the SPX alone in gray, and the line plots are the ranges of annual returns.

The portfolio with the store-of-value safe haven showed some, but not much, risk mitigation in the crash bucket, though the portfolio CAGR was actually lower than SPX alone by 17 basis points. The opportunity cost of the safe haven versus owning more SPX shows itself quite clearly.

The obvious pick for most would have been the portfolio with the alpha safe haven, with its 7% average return and impressive negative correlation in the crash bucket. Adding it to the SPX portfolio lowered the arithmetic return of that portfolio, but in turn also raised the CAGR of that portfolio by 18 basis points. It created a modest cost savings on the vol tax. But that savings was surprisingly low, and the portfolio still realized heavy 20%+ crash losses.

How did the insurance safe haven compare, with its meager 0% average return? With only a 3% allocation, the crash bucket SPX losses were almost entirely offset and hence the portfolio CAGR outperformed that of the SPX alone by 67 basis points (almost four times the outperformance of the alpha portfolio). The portfolio saved much of the vol tax.

To put this in perspective, in order for a 3% allocation to a store-of-value strategy to similarly raise the portfolio's CAGR by 67 basis points, that store-of-value strategy would require a fixed almost 30% nominal annual return (which would of course attract all the capital in the world).

Hard to believe that math, and it runs contrary to the common perception of this type of insurance protection as expensive. What at first appears to gratuitously lower the arithmetic return of the portfolio (and drag on the portfolio as a line item in 9 out of 10 years) turns out to be a CAGR boon.

We can crank up the alpha allocation size further, up to about 30%, and increase that portfolio's outperformance a bit, but it still never gets anywhere close to the 3% insurance allocation's level of outperformance.

Moreover, during this time period the insurance portfolio outperformed both the HFRI hedge fund index and a 60%/40% portfolio of SPX/Treasuries—including, remarkably, over the majority of the years in frequency.)

Importantly, these results are extremely robust to the time period selected, as they don't materially change whether testing over the past 10, 20, or even all the way back over the past 100 years (though the alpha strategy's CAGR outperformance to the SPX completely disappears).

**A safe haven with zero expected return but very high crash convexity provided the highest incremental impact on the long-run CAGR (of the SPX, in this case).**

This is the ultimate goal of risk mitigation, and effectively achieving this goal—through an effective savings in vol tax—means achieving an optimal protection-cost tradeoff. This tradeoff seems to thus greatly favor maximal convexity. The implications for how pension funds might best approach underfunding problems through risk mitigation are huge.