Cliff's Perspective

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In Praise of High-Volatility Alternatives[1,2]

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Everyone knows that it's compound returns over time that matter, and everyone knows that volatility ("vol") is a drag on compound returns. E.g., 30% up and then 30% down is 9% down; 50% up and 50% down is 25% down.[3] And, to go to extremes, one -100% means compound returns are -100% forever (there's no compounding your way out of Hades[4]). But there's a caveat that often gets left out. What everyone knows is true is only true if we are discussing an investor's whole portfolio. If anyone believes that only compound returns matter for the components (I'll call these "line items") of the whole portfolio, particularly modest-sized line items, particularly diversifying ones, then they are actually wrong.[5] This is a particular issue for alternative investments, since they are indeed often modest-sized components of a portfolio, are there to provide diversification, and often can be delivered in a wide range of targeted volatility.[6]

Now, high vol, even on small components of the portfolio, doesn't make life easy. Many, certainly including me, talk about the practical difficulties of sticking with an individual investment through periods of large losses, which obviously are more likely the higher the targeted vol.[7] Even a great investment can be spoiled if you can't stick with it through its tough times. This is a particular problem when those losses are coming from unconventional investments.[8] Alternatives, if they're done right, are inherently unconventional. One of the most common ways to

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[1] Alternative titles were "How to Eat Risk-Adjusted Returns" and "In Praise of Big Drawdowns and Lower Compound Returns (Occasionally and Over a Small Part of Your Portfolio)."

[2] EconomPicData (2016) makes an argument close to this piece.

[3] And yes, of course, simple volatility can be far from a perfect measure of risk in a fat-tailed and often skewed world. A topic for another day.

[4] I'm going to follow convention here and assume one -100% on your whole portfolio is investing doom. It may be more complicated as you go on earning and investing for the rest of your life. The world, thankfully, lets you restart.

[5] While I discuss the topic from a practitioner perspective, academics have long debated when it's appropriate to use simple (arithmetic) mean returns versus compound (geometric) mean returns for measuring investment performance in different contexts, often leaning to the latter. I will argue that simple (arithmetic) returns are indeed very relevant for items of modest weight in a diversified and rebalanced portfolio. The neutralizing effect of rebalancing on compounding effects has been much-studied, notably in Fama and Booth (1992) and Erb and Harvey (2006).

[6] I'm going to define these as liquid investments designed to have low to zero correlation with traditional assets like diversified stock and bond portfolios. I'm not going to include illiquid investments that are highly correlated to traditional investments (even if they don't provide the marks to show it) and are not really alternatives at all except in the ostrich-accounting sense. This by no means makes them bad investments. But they ain't an alternative to beta—they are (often levered) beta. The category of "alternatives" should exclude them (but don't hold your breath).

[7] I also believe markets have become less, not more, efficient over my career. Therefore, irrational dislocations may be greater in magnitude and duration now than in the past. This makes it even more challenging to stick with a good investment during tough times (the tough times are now tougher), but it also increases the reward if you do. I write about this at length, as well as why efficient markets matter and what might be driving the decrease in efficiency, in a forthcoming article in the 50th Anniversary issue of The Journal of Portfolio Management titled "The Less-Efficient Market Hypothesis."

[8] The old saw "it's easier to lose conventionally than unconventionally" is sadly true even when the stated up-front point of the investment is that its gains and losses will be achieved unconventionally.

combat this problem is to shy away from very volatile (at least if marked-to-market) investments. Indeed, at AQR we often offer less-volatile options as in truth many cannot stand the heat and will redeem from the kitchen at the worst time when invested at higher vol. Even at modest vol we do think alternatives can help. But this note argues that good higher-vol alternative investments,[9] that are indeed often very hard to stick with, can be important tools in constructing the best overall portfolio, and if (a big if) investors can stick with them are often a more effective tool than their lower-vol cousins.[10] Basically, I think they are underutilized.

Some Basics on Vol and Alternatives

I'm going to explain this using one of the most basic true alternatives I can think of; long-short market-neutral equities.

The return on a $1 long, $1 short portfolio[11] of individual equities is roughly:[12,13]

Cash Return + [Return on Longs – Return on Shorts]

The volatility of this return over the risk-free rate will be the volatility of the [Return on Longs – Return on Shorts] component. Call that volatility ∑. Now imagine instead of $1 long and $1 short you lever the portfolio L times. That is, you're now $L dollars long and $L dollars short proportionately in the same stocks. Now the return is:

Cash Return + L * [Return on Longs – Return on Shorts]

And the volatility of the portfolio is L * ∑. The Sharpe ratio of the portfolio is the same.[14]

Our First Strategy at AQR

Let me tell you about launching our first strategy at AQR in mid-1998 as the story is relevant.[15] At Goldman Sachs our group (7 of us who started AQR came from our 13 person group at Goldman) ran a suite of strategies including alternative investments striving to be uncorrelated by being equally long and short, and traditional investments trying to beat a benchmark by over- and under-weighting securities (both used the same models for what they liked and didn't like). So, what did we launch first at AQR? An uncorrelated alternative, of course.[16] But not just any. Nope, nothing mundane for us. We launched with one of similar volatility to our most aggressive strategy at Goldman. By design, using our own risk estimates, we were taking north of 20% annualized volatility. In complex mathematical terms that's a boat-load of uncorrelated return, and more important for this discussion, uncorrelated risk![17]

While traveling the world for six months launching this strategy, one of my co-founders David Kabiller and I got asked many times something like "hey, we like this, but we don't need to try to shoot the lights out, how about you do ½ or ¼ that aggressiveness?"[18] I responded every time, in a kind of flip manner (if you can imagine that from me), "sure, just give us ½ or ¼ the money." I was mathematically correct. In dollar terms, which is all that should matter, investors would get ½ or ¼ the return for the commensurately lower risk. In fact, it was fair in another important way as the fixed fee would be reduced by ½ or ¾ (the performance fee adjusts most or all the way,

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[9] Of course, this discussion pre-supposes the alternatives offer a good risk-per-return with low correlation to traditional investments. If that is not the case, the high- versus low-vol choice is not your first-order problem.

[10] Spoiler alert: our genius advice to help this problem will be to actually stick with them — hopefully made easier by having this kind of discussion and making high vol a conscious choice upfront. Yes, my advice is basically a Nike slogan.

[11] This will also be market-neutral if the long and short side have equal betas, which for simplicity I'm going to assume.

[12] I said roughly. There is a spread you pay to attain the long-short returns (the street doesn't work for free, despite what they sometimes say). There are transactions costs (you can just assume I mean "net of transactions costs" returns). And there are fees. All very real hurdles the strategy must overcome.

[13] Note when cash goes up the total return on this alternative goes up with it. The spread between the longs and shorts "floats" on top of cash. Empirically that is not true for many investments, including the equity risk premium.

[14] A bit lower because of financing costs, but again I'm keeping it simple here.

[15] Yeah, we've been doing this a long time. Sometimes instead of 26 years at AQR I say "over a quarter century" as I think it has more gravitas. But truth be told, I've been researching what we'd now call quantitative equity strategies since 1989 (35 years) and trading quantitative strategies, initially at Goldman Sachs, since 1994 (30 years). Damn damn damn...

[16] We always intended to do both. But it turned out to run long-only traditional portfolios (no shorting, leverage, derivatives), investors wanted to see a 3-5 year track record (itself often backwards, see #3) and some people who look like I look now, not like I looked 26 years ago. But to start and get investors into an aggressive market-neutral hedged strategy you only had to have done decently well for a couple of years at Goldman Sachs and say you were closing!

[17] The low 20s is well north of long-term U.S. stock market volatility. That much vol in pure attempted alpha is truly a boat-load!

[18] I will not regale you with the rare meetings with benighted investors who did not like it.

depending on any hurdles, on its own). One of the more deceptive, uncool things an active manager can do is to start out aggressive at high fees, do well, then lower the aggressiveness over time, but not lower their high fixed fees (essentially giving less of their strategy for the same fee without stating it up front — i.e., just sneakily raising their effective fee). Nope, none of that for us. Giving us less money at the normal high vol was a clean solution and the fee adjustment was fair.

I will never agree that I was wrong on the math. That is a hill I will still die on. But I was wrong in every other way that mattered – particularly making this our sole offering. We had a terrible start from near minute one.[19] Our first 19 months we were down in the mid to high 30s (it's very bad to start a strategy that is largely based on rational investing minutes before the dot com bubble really takes off). Now, to a quant geek that's a bad initial result, but not super shockingly bad when you run at north of 20% vol (especially in a fat-tailed and sometimes trending world). So, to me, I was a little surprised this was such a big deal to people. That's how freaking naïve I was. Nobody else was surprised. To seemingly every single other person on Earth it was obvious that OMG, this is horrific![20] Thankfully we had a strong explanation for why it occurred and some serious evidence that we'd soon come to reverse that early bad start.[21] That led to us retaining a fairly gratifying fraction of our clients (some even added). But we still lost a lot of investors who just couldn't take it despite my babbling about "uh, we hate this start, but in standard deviation terms we expect this occasionally and it looks great from here…" They couldn't take it despite this statistical argument and despite the reason for our pain, and likely bright future, being rather (IMHO) obvious. So, when I discuss the virtue of high vol below, please be assured I have seen the other side of the argument, and, as I'm guessing most of my readers know, twenty years later I would live (barely) to see it all again.

So, nowadays, unlike my stubborn flip dismissal back in 1998 of "give us half the money" we offer both low- and high-vol alternatives as we do bow to practical reality[22] But I would like to tilt at this windmill again, arguing one more time for the virtues of the higher-vol versions.

Compound Returns Are Overrated

OK, again, the above header is totally false at the overall portfolio level. But it can be true at the line-item level (line-item means each part of the portfolio).

I think a very simple example is edifying. Imagine you face a binary set of possible outcomes on an investment. There is a 2/3 chance you double your money (+100%) and a 1/3 chance you lose it all (-100%). And assume this investment is uncorrelated to anything else on Earth. Two things seem very obvious:

1) The multi-period compound return on this investment viewed alone is clearly going to hit -100% soon and viewed alone stay there. Thus, putting your whole portfolio in this wouldn't be such a swift idea.

2) Anyone should put part of their portfolio in this investment. It's a very positive expected return and -100% on a small part of an overall portfolio is eminently survivable. When you lose (or win) you just reload and do it again.

Now let's try a more complicated example by making up some numbers I think are pretty reasonable (I assume cash is 5% with E[excess] below being the expected return of each asset over cash):

[19] Our first month was good, but that's actually another story in itself. Russia defaulted that month and the S&P 500 was down about 15%. We were up a little, bitter that it would've been a lot if we were fully invested on day 1 (taking those kind of t-costs to get fully invested in a day wouldn't have been ex ante prudent but would've ex post worked out), but still with a lot of high fives all around as up in what was basically a market crash was very satisfying. The high fives were short-lived as the dot com bubble took off immediately thereafter. Never ever high five in this business.

[20] Yes, every single person on Earth was obsessed with our first 19-month return.

[21] Narrator: "They did, a lot, and did it when everything else was in a bear market and you needed your alternatives the most."

[22] Not in every venue, we are working on it.

	E[excess]	Vol	Sharpe	E[compound total return][23,24]
Stocks	6.0%	15%	0.40	9.9%
Bonds	2.1%	7%	0.30	6.9%
Alts[25]	3.0%	10%	0.30	7.5%

With the correlation of stocks and bonds being 0.30,[26] and the correlation of alts with both stocks and bonds being 0.00.

Long-term compound returns, what you indeed care about on the whole portfolio, in this continuous framework are the expected return of the portfolio minus ½ the portfolio's variance.[27] This second term is a mathematical version of the intuitive "volatility drag" discussed earlier with basic examples like +50% followed by -50% being -25%.

Now we're going to solve for the optimal portfolio, defined here as the highest expected compound return with a maximum allowable volatility of 10% and not allowing any leverage (so portfolio weights must add to less than or equal to 100%). Let's first ignore the alts and just optimize over stocks and bonds. Over just stocks and bonds this would be the optimal portfolio and these would be its characteristics:[28]

Stocks/bonds/alts = 58/42/0

E[compound] = 8.9%

Total vol = 10%

Now let's do the same allowing the 10% vol alts into the mix:

Stocks/bonds/alts = 62/0/38

E[compound] = 9.3%

Total vol = 10%

Not surprisingly the optimization gets better when you allow an additional asset (40 bps per annum better[29]). Maybe a bit surprising is the alts almost exactly replaced the bonds, which aren't desired now. With these assumptions alts are essentially just a better version of bonds. They have the same Sharpe ratio as bonds but at zero correlation to the very volatile equity portion. And, because you can't lever (total weights must be less than or equal to 100%) there's no room for bonds anymore.

Now imagine the same set-up but the alts are run at 25% vol. That means they now have an expected excess return of 7.5%. 25% vol is pretty scary on its own! So, what would the optimization want now?

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[23] The expected compound return is the total arithmetic return (E[excess] + cash) minus ½ the volatility squared.

[24] Related to this discussion, people get very jazzed and surprised about the results in Bessembinder (2018), particularly the headline result that the average stock's compound return is less than T-bills. I find the result very obvious. Call the average single stock vol about 40%. The "variance drag" on compound returns is about 8% per annum (1/2 of 40% squared). Of course they underperform T-bills viewed alone! If the average stock had a big advantage over T-bills the market in entirety would have a much larger return than the famous one that drives "Stocks for the Long Run" and is puzzling high to academics. Leading with "the average stock loses to T-bills" as a shocking insight when discussing individual stock compound returns is basically a click-bait headline.

[25] The whole alts world, including us, try to achieve higher Sharpe ratios than this, but let's stay calm here. While hard to live with in the real world (0.30 Sharpes have serious drawdowns!), a truly uncorrelated net Sharpe of 0.30 belongs in a portfolio.

[26] I think this is a reasonable long-term number for a fixed income index that includes credit instruments (like the Aggregate). If it were pure Treasuries I'd use lower. See Brixton et. al. (2023) for a much more in-depth discussion.

[27] Yeah I'm assuming it's continuously tradeable and normally distributed. These unrealistic assumptions do not matter to the basic point but in the real world would probably put an upper limit on how aggressive you should be.

[28] Targeting a vol with just two assets means we really are just solving for the combination of stocks and bonds with a 10% vol with weights summing to 100%. If you relax the no leverage constraint (i.e., allow the sum of the weights to be larger than 100%) you get an optimal allocation of 51% equities 64% bonds (shades of risk parity) but very little improvement, as here I've assumed stocks are higher Sharpe than bonds (if more similar, the risk parity advantage would of course be larger).

[29] The improvement in long-term compound returns may seem modest here but a) they add up, b) obviously if you can find a higher Sharpe portfolio of truly uncorrelated alternatives things get better fast.

Stocks/bonds/alts = 48/28/24

E[compound] = 9.8%

Total vol = 10%

Well, of course it wants a nice slug of the alts (though a bit less than half as much as when the alts were at 10% vol – the optimization is controlling the alts volatility by the amount it invests). You now make 90 bps a year more than not having any access to the alts, and 50 bps more a year than when the alts were only available at 10% vol. Perhaps most interesting though is the bond allocation is resurrected. What's going on? Well, bonds with these assumptions are a pretty good investment, just not as good as alts (same Sharpe but more correlation to equities makes them worse). When the alts aren't very volatile you need to allocate a lot of dollars to them, and that boxes out the bonds. But when the alts are more volatile you don't want or need as many, and there's room again in the portfolio for bonds, which still have low correlation to equities and none to alts, raising the compound return and Sharpe of the full portfolio.

Now one more. Let's relax the no leverage constraint (here I am using the 25% vol alts but it doesn't really matter, as when you can lever or de-lever, the asset-level vols don't matter since you can create any vol you want). Results:

Stocks/bonds/alts = 43/52/22

E[compound] = 9.8%

Invested at = 118% (i.e., now levered at 1.18x)

Total vol = 10%

Yeah, I know, the same compound return as the prior case. In actuality it's 8 bps a year more, but I'm rounding in both cases. But that's the point. It's only such a little gain, as when you have the 25 vol alts you are not very constrained at all by the "no leverage" rule. In fact, if the vol of the alts were another slug higher than 25, the no-leverage and leverage-allowed cases would be precisely the same (as you don't need any leverage when the assets are sufficiently volatile on their own).

Another way to see this is to do the same optimization but with the 10% volatility alts (still allowing leverage):

Stocks/bonds/alts = 42/53/56

E[compound] = 9.8%

Invested at = 151% (i.e., now levered at 1.51x)

Total vol = 10%

Same exact result but you need more leverage. The optimizer is simply putting 2.5x more (10 vs. 25 vol) into the alts (2.5 x 22% = 55% — again some rounding is going on, I promise with more decimals places it would all be exact).

Allowing leverage is equivalent to choosing whatever vol you want on everything.

What Is Going On?

What is going on is simply capital efficiency. A low-vol alternative that could be run at much higher vol may still be additive to a portfolio in this sedate form, but it is not as capital efficient as it could be. And, if (if!) you can live with the swings in the line items, you really want to be capital efficient.

Also note the extreme importance of rebalancing. In my initial example of the binary 2/3 chance of +100% and 1/3 chance of -100%, what I called "reloading" was just rebalancing (the amount to reload will vary slightly by the performance of the rest of the portfolio). Similarly, in the other examples, particularly when the alts are higher vol, it's vital to rebalance the portfolio in both directions.

That's it. High-vol uncorrelated assets are capital efficient and must be rebalanced within a diversified portfolio with great discipline to make it all work. If so, and if they are good to begin with, and if you can stick with it, I think they can really help and help more so than low-vol versions (which also help!).[30]

[30] Another example is the one of leveraged ETFs. Quite a few have pointed out, correctly, that buying and holding a 3x leveraged ETF in an already volatile stock is usually a recipe for terrible compound returns, no matter the return of the underlying, because of the variance drag. But, if a) the exposure was a useful one to the portfolio, b) the size was kept small, and c) the portfolio was rigorously rebalanced at a reasonable cost, it would be a very different story. Sadly though that is not how I believe these securities are used. See Huss and Maloney (2017) for a more in-depth analysis on the role and implications of rebalancing for actively-managed portfolios, including the so-called "rebalancing premium" and the impact of rebalancing on the expected performance of risk-targeted and levered portfolios.

The Robert Vesco Scenario[31]

Now I'm going to a place no marketing department wants me to visit. What if the alternative "blows up"? That is, goes down -100%. Well, then it's likely better you did it at higher vol with fewer dollars. If Mr. Vesco embezzles your money, having given him half at double the targeted vol was actually a much better idea![32] Similarly, -100% may be limited to -100% only because of the limited liability nature of most such investments. In that case you again really wanted to have put half in at double the vol. Imagine the true return at the double vol was a -150% crash (i.e., the alternative manager lost more than all the money). If you put 10% in, you lost 10% in your portfolio (your asset "only" fell -100% because of limited liability). But if you put 20% in at half the vol, the line item was -75% (half of the -150%) and you lost 15% of your portfolio. These are (I hope!) very extreme, very rare events. But it's kind of fun that in these true disaster scenarios the "less money at higher vol" strategy is actually safer.[33,34]

Conclusion

Alternatives should be offered in palatable vol for those who need that. They are still useful particularly if the investor can shift somewhat from less- to more high-risk, high-return assets elsewhere (like bonds to equity as we saw a bit of in the exercise above, when adding low-vol alternatives replaced the bond allocation and led to a slightly larger equity allocation). But they are generally more effective in higher-vol versions (the fees should be proportional to be fair). The latter is mostly (not entirely) missing from the market today and should take on a bigger role.

Of course, the hurdle is big. The biggest problem with these investments is sticking with them, and I am advocating making it harder! Essentially, whatever the opposite of volatility laundering is, I am advocating for it. "Lean in to volatility" is the motto of this piece.

I truly get the line-item risk having lived it. A 25% vol investment having a -2 standard deviation year is ugly to explain, especially if it's not been explained well up front! I get this risk to investors, that they'll bail at the exact wrong time, and I get the analogous business risk to managers of high-vol products. Some, many, maybe most, won't be able to do it and thus shouldn't. But as is usual when doing the right thing is hard, the expected improvement if you can is real and can move the dial in a way that easy things can never seem to achieve. In particular, if such a program is chosen consciously (e.g., everyone knows they are giving 1/3 the money at triple the vol and discussed what that will occasionally look like up front), I hope it would make the inevitable occasional bad times easier to explain/tolerate and to follow your rebalancing plan with discipline. It turns out not offering investors the low-vol option, as we did in 1998, isn't a good plan. But my hope is by offering both it makes the choice and tradeoffs clearer and the path thus easier to stick to.

Some difficulties are just too difficult. Not everyone has to do this. But in general, we shouldn't default to "I guess we just don't have the <whatever> to do what is right." Rather we should look at these things as challenges to overcome that, if we can do them, lead to a better ex ante portfolio. I mean, in a real sense that's our collective job! That the right path can be difficult is why everyone cannot produce a better portfolio, but it is also why those who can overcome these difficulties can outdistance those who cannot.

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[31] I'm dating myself but this would be a good title for a Robert Ludlum book. I'm also dating myself assuming you've heard of Robert Vesco. Google him.

[32] Though you may want to examine other aspects of your due diligence process... Also, obviously these blow-up results can be from illegality like I reference here, or just extreme and imprudent over-leverage and then gigantic losses.

[33] True story. It's 1995 at Goldman Sachs and we're talking to one of the very early potential investors in our very aggressive market-neutral strategy. They were asking a million questions about risk control. That's generally a good idea for a potential investor to do! But finally at some point I randomly mentioned that it was a limited liability investment, which they had not grasped as this was a first foray into such structures for them. Once they understood that they were fine and just went ahead. I like to say this is the first time a strategy was sold with the motto "hey, the worst we could do is lose everything." But that is effectively what happened.

[34] The loser in the double vol -100% case is whoever provided the limited liability leverage.

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