Raiding the Stationary Cupboard

Once upon a time, when the sun was young and CTAs charged 2 & 20, CTAs ran just trend predictors and risk allocation between these predictions was easy. And then, circa 2011-2014, life became difficult for CTAs. After years of printing positive returns every year and running a secretive premium strategy, a few poor years, coupled with multiple new entrants, meant clients started questioning trend itself. Shamefully, the clients also wanted to pay less for this beautiful strategy.

The industry responded by exploring alternative datasets, alternative signals and alternative markets to try and diversify away from traditional trend following. The difficulty we faced as quants, was that the alternative signals were non-stationery (Maths-speak for inconsistent over time) and risk allocation between signals became a genuine problem. This is a practical problem, so you are unlikely to see any academic papers trying to solve it, but for us quants, it was a very genuine problem, and I suspect many CTAs are still struggling with it. So today I want us to take a trip down signal risk allocation lane…

The small short

For a quant CTA, allocating risk is everything. We are not clever enough to have high Sharpe signals, so whenever we make a bet, we cannot bet the house on it. Not for us is the high conviction "Everything on Red 17" Michael Bury or John Paulson investment style. Indeed, the first commandment of quant trading (SAFI, chapter 2, verse 20) is "Thou shall not make outsized bets". We work very hard at gaining a very small edge in everything we do and then make sure we risk manage that position. We try to make our strategy "stationary": consistently similar in size and distribution over time. This is the path of the righteous so that over time, these stationary bets amount to a long-term winning strategy to our clients. If you want to understand CTA's "one bet at a time" approach, and what consistency means to long term performance, just watch Roger Federer's inspirational speech. (To understand how remarkable Federer was, if each independent CTA bet was a tennis point, we would win only about 52% of them)

The big easy

It is very easy to allocate risk amongst trend signals because it is very easy to construct trend signals that have "roughly equal risk" consistently over time. A trend signals is, essentially, a weighted sum of recent returns. The correlation between those returns is low (I already told you trend is not a strong signal). So once we vol-normalize these returns, each daily return is, roughly, N and the variance of the trend predictor is simply the sum of the weights squared. All we need to do is to ensure that this sum is 1 and, in the long term, those predictors have roughly equal unit risk over time. You can read all about it in Rob Carver's blogs and books.

For breakout trend models, the risk at any time is either 1 or -1 so although breakout models are not *normally* distributed, they still have zero mean and always take precisely one unit of risk.

So, when we allocate 10% to fast breakout or 25% to a medium speed moving average crossover, these allocations make sense. They genuinely represent the contribution each signal makes to the overall exposure. And once set, these allocations are consistent over time. I told you it was easy…

And then we started examining *other* signals and all hell broke loose.

The new normal

In the equities space, we started looking at event predictors: day of the week, time of the month, end of the tax year, earning announcements, sell-in-May and go away, all good predictors and some even have good rationale. The timing of these events can be unpredictable too: "El Nino" affects commodities and "Earthquake" can affect production. I even had a precocious 16-years old intern examining a system that buys equities when the sun is shining, it made sense as a feel-good factor effect!

Any such event predictor may say something very specific during a very specific time, so let us invent an imaginary "Non-Farm-Payroll" event that wants to go long equities ahead of NFP announcements and is long about 10% of the year. If we allocate some of our long-term risk to NFP, for 90% of the time, NFP is 0 and we would be under-risked!

But fear not, if there is one thing quants can do very well, is to push a round peg into a mathematical square hole. We modified our NFP predictor to make it more N(0,1)-like, this is called "normalization". Our risk allocation framework really forced us into the "zero-mean, unit risk" straight jacket. Our approach at the time was to go long +3 risk units for 10% of the time (when NFP was happening) and go short -1/3 units of risk for the remaining 90% of the time (when nothing was happening!). You can check that indeed, the average of this modified predictor is 0 and its variance is 1.

The maths was right, we felt smug about our clever normalization, so we allocated some risk to NFP and started trading.

Woe unto us!

For 90% of the time, we hated this NFP predictor: it was annoyingly short equities when we had no indication whatsoever the market was about to go down! That was bad enough, but for the remaining 10% of the time we REALLY hated NFP: The 3 units of risk the NFP predictor wanted dominated all other predictors: we had an outsized bet that was very far from trend, the stuff our clients expected us to trade.

We strayed from the path of the righteous and forgot: "Thou shall not make outsized bets".

The art of noise

Trend predictors are all happy in the same way, but our new non-stationary predictors were miserable in their own unique ways…

In the FX markets, Carry was annoyingly non-stationary too. Carry is a real quantity: it is a feature of the FX trade and vol-adjusted carry is a genuine feature of any FX position. When we came to allocate risk to FX Carry, we noticed in the developed markets, ever since GFC, carry was simply non-existent. EUR-USD rate differential was at best 1% while the EURUSD annual volatility was 10%. Carry as a signal was stuck at 0.1 for years! How can we allocate meaningfully to it? Perhaps we just need to normalize it? We divided the raw carry signal by its recent magnitude and got a signal which "looked" like unit sized risk.

That normalization is again mathematically correct but lacks an understanding of reality. We were amplifying noise for the sake of mathematical expediency! The reason why the carry signal was low, was because the EURUSD trade genuinely had no carry. Why would you want to trade 10x of the carry signal precisely when it was so meaningless to fundamental flows between EUR and USD? And yet we did.

Trading places

Over the last twenty years I have learnt that my most important role as a seasoned quant is to *temper* the use of Mathematics in quant models. Even simple tools such as normalization, (let alone fancy stuff like AI), are often yielded offhandedly by quants without genuine trading rationale. The easier a tool is to apply, the easier it is to misuse it. The examples I gave are actually very common, especially in big organisations and especially ones with legacy: we have a good working framework, and it is often easier to shoehorn a new innovation into an existing framework rather than spending the effort in rethinking the whole framework. Easier, but wrong.

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Here is how I would trade these predictors nowadays. We must recognize that if our predictors are non-stationary, our allocation must follow suit, every day allocating risk afresh. The NFP event predictor I would construct would be +1 in size, when switched on. I would allocate risk to it, but only during 10% of the time. During 90% of the time, I allocate 100% to the remaining signals and not have to worry about a weird negative signal. For 10% of the time, the NFP signal would be one unit of risk: a reasonably sized bet, comparable to my other signals. The realized impact of the signal is much lower, but that's because NFP just does not happen often! Similarly, if there is no FX Carry, we should be comfortable not allocating to it. And when FX Carry is back (as it is right now!), we shall welcome the return of the prodigal predictor.

Why does this approach work? Because we are raiding the stationary cupboard. We rely upon trend to always being there to pick up the slack. Trend is the stocking-filler that can mop up any unwanted risk allocation. If none of the other signals want their allocated risk, we can always run a pure trend strategy and ensure stationary risk. But when they do want it, trend can be magnanimous and share.

The magic roundabout

If you are an allocator, a similar rationale applies: At any point in time, you can allocate to funds & strategies that make sense to you *right now*. Allocate to Michael Bury if you think the housing market is overheated (but don't bet the house on it… obey the first commandment!), allocate to relative value macro when you see a diversified macroeconomic environment. But once you have allocated to all these non-stationary strategies, you will have some risk left over: perhaps long equity or long bonds are no longer as enticing as they once looked? Fear not, the CTA industry will be there, in your stationary cupboard, waiting to provide additional alpha with your remaining unused risk.

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