



Refashioning beta - 1 November 2009

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The emergence of alternative systematic equity indices raises profound questions about how we define 'the market', and how pension funds should benchmark and invest their core portfolios, writes Martin Steward

Asking how we might get away from market capitalisation weighting (MCW) to more efficient benchmarks for pension funds' core portfolios calls to mind the old joke about asking the country yokel how to get to the local inn: "Well, you wouldn't start from here."

When the S&P500 index launched in 1957 it was never conceived as an 'efficient portfolio' or called 'beta'. That term emerged from the development of the capital asset pricing model (CAPM) in the early 1960s, which built upon Markowitz's research into diversification: here, 'beta' is the most efficient, non-diversifiable, systematic risk. But under the assumptions of CAPM, all assets would be priced rationally and idiosyncratically, making the market portfolio the most efficient – 'beta' – and it was a small step to assume that, because MCW indices represent ownership in a given section of the market, they must therefore be the most efficient portfolios – 'beta'.

This confuses efficient markets with efficient portfolios – and with hindsight, the discrepancy is obvious: Markowitz's work is all about covariance; an MCW index is all about price, and pays no heed to risk at all. Even if the market were risk-efficient, there is no reason the MCW index should be. But, in any case, the market is not risk-efficient – smaller and/or keenly-valued companies attract a systematic risk premium, for example. Fama and French added these two factors to CAPM in 1993. Carhart added 'momentum' as a fourth factor a few years later.

Momentum, together with large-cap and growth, are the key biases inherent in MCW portfolios. If you believe that stocks deviate from their fundamental values, you must also accept that MCW portfolios will always have more than half their weight in over-valued stocks. And 50% is a best-case scenario: in 2000, Cisco Systems briefly became the biggest firm in the world, representing a full 5% of the S&P500.

The same dotcom boom saw Ericsson expand to almost one-fifth of the Swedish equity market, so perhaps we should not be surprised that AP Fonden 2 and AP Fonden 3 have led the way in re-thinking MCW benchmarks. AP2 chose to give its global equities portfolio a GDP-weighted regional exposure as early as 2002. Within that, Swedish equity managers were set against an equally-weighted benchmark (when they under-performed, AP2 sent them packing and brought the portfolio in-house). In 2006, North American equities were benchmarked against a fundamental index calculated by Research Affiliates, which ranks stocks according to sales, cash flow, gross dividends paid and book value, agnostic of price – an approach that was extended to the global level last year.

From 2006, AP3 benchmarked SEK2bn-worth of pan-European equities against the FTSE Global Wealth Allocation index (based on net profits, cash flow and book value) as part of a project to "look at smarter indexation strategies that could create value above the standard market cap weighted indices", as CIO Erik Valtonen puts it. CalPERS, FRR and a number of Japanese and Australian institutions are among those that have followed a similar path, buying into the logic outlined by Research Affiliates CIO, Jason Hsu: "If your starting point is that market prices are inefficient, cap weighting is not your optimal investment approach."

Research Affiliates' indices are cap-weighted in one sense – the RAFI 1000 index represents the 1,000 largest US companies (which are then weighted according to fundamentals). Denmark's Stockrate Asset Management is one of the few firms that takes the concept of price-agnostic, fundamentals-based management to its logical conclusion. It aims to invest in the companies that make the most money and best protect their value, by ranking a global universe of 50,000 stocks according to their profit and loss account and balance sheet strength. Portfolios are constructed from 20-40 of the top-rated stocks, which are equally-weighted (there is not much to choose between the top 0.08% of global firms in terms of fundamental strength). The portfolio is re-constructed just once a year.

Is Stockrate an index? It certainly looks different from the MSCI World index: Stockrate can be more volatile, but it seems to pay off in an alpha-like way: skewness is -2.0 (-1.9 for World index), kurtosis 5.02 (3.73 for World index). But while CEO Peter Andersen says “we are most definitely stockpickers”, he adds: “You could see this as a benchmark: ours is a completely representative ‘index’; MSCI World reflects 85% of market-cap, but only contains about 2,200 out of 50,000 stocks.”

Could fundamental-weighting be used as a core equity beta? Iyad Farah, Aviva Investors' head of quantitative strategies, thinks it is possible. “We've managed to convince our life company and other big clients to treat our fundamentally-weighted indices, priced by HSBC, as a beta,” he says. “They want exposure to certain styles, and that's what these products provide – style bias.”

Both Hsu and Andersen point out that RAFI and Stockrate are price agnostic. “There is no statement in RAFI about the fair value stocks,” as Hsu says – and therefore they are not strictly value strategies. Nonetheless, most observers discern a value bias and, indeed, they pick this out as the systematic exposure that defines it as beta. AP3 defines its FTSE GWA exposure as passive because fundamental indices “are simple rule based strategies”, as Valtonen says, adding: “Obviously you should also devote time in understanding the sector exposures that the fundamental indices give you.” Tomas Franzén, chief investment strategist at AP2, says that style attribution explains much of RAFI's excess return, which he calls ‘better beta’. “This is not about having a clever index – it's about avoiding a stupid index,” he argues.

But, as Franzén suggests, ‘stupid’ is relative. A MCW portfolio is ‘stupid’ because it outperforms only when the market is concentrating in a bubble, while a value-tilted index would outperform over a greater share of time. But the market sometimes indulges momentum. This is why Carhart added it to the CAPM framework. And fundamental indices can also do ‘stupid’ things: Franzén himself notes that his current large weighting in financials is “challenging and under observation at AP2”. Even Hsu stops short of advising everyone to move away from MCW indices. “Fundamental indexation is a good diversifier,” he says. “Replace cap-weighting with fundamental weighting and you still have the problem of being pegged to one single belief system.”

This recognition raises the possibility of recreating the CAPM ‘beta’ by identifying key risk premia and bringing them together with weights reflecting their significance in the market. MCW portfolios clearly contain all those premia, but their price-centric weighting simply results in a gross over-representation of large-cap, growth and momentum. Adding beta alternatives to it should redress the balance.

“Once we have all these styles differentiated and commoditised, that will help asset allocators to capture more of the total performance of the economy than they can with cap-weighted benchmarks,” says Aviva's Farah.

If Mark Anson's concept of the ‘beta continuum’ or Watson Wyatt's ‘beta creep’ describe this process of commoditisation, products such as S&P's Strategy indices provide some of the tools. This range includes a S&P500 Volatility Arbitrage index and a S&P500 Long-Only Merger Arbitrage index, various dividend-themed products – even a S&P500 130/30 index. “Beta in the pure academic

sense is the market portfolio – and all of these strategies together make up the market portfolio,” notes executive managing director for index and portfolio services, Alex Matturi.

Perhaps the most interesting of these indices, however, are the ‘alpha strategies’ that pair-off style indices with their correspondent MCW benchmarks and weight them dynamically for a target volatility, or the ‘risk control’ indices that also target a volatility by combining and rebalancing a riskless with a risky asset. “If you look at traditional cap-weighted indices, risk is the undefined variable – they are defined by the return set,” says Matturi. One might add that price-agnostic, fundamentals-based strategies also ignore risk. As Stockrate’s Andersen puts it: “Because we are focused on their quality, not portfolio characteristics, we allow companies to produce their own level of risk.”

This is the key differentiator among index- and portfolio-construction approaches – some look to ‘pick winners’ (whether by largest market-cap or healthiest earnings metrics). Others look to control risk (like S&P’s ‘risk control’ indices or minimum variance portfolios). This is important because risk is at the centre of the CAPM beta. Indeed, if we were to bring together a number of different systematic strategy betas as described, the resulting diversification of risk is arguably the true benefit, as even Hsu suggests. “Fundamental indexation is just one method to avoid the return drag from cap weighting,” notes AP2’s Franzén. “Any weighting that breaks the link with prices does the trick, because better diversification is the key driver.”

We can take this insight further if looking at minimum variance portfolios. Classically, these simply allocate to stocks with the lowest historical variance, and they outperform a MCW portfolio over the cycle with, unsurprisingly, much lower volatility. That looks like a robust efficient portfolio – an equity ‘beta’.

“I do think this should be a core exposure,” says Ric Thomas, head of alternative investments at State Street Global Advisors, whose ‘managed volatility’ strategies follow minimum-variance lines. “It’s almost a unique asset class. It certainly has a unique return distribution, correlated with market-cap weighted portfolios but with tighter distribution and less kurtosis.”

That may be true – but it is also true of price-agnostic fundamentals-based strategies, and these still exhibit a systematic value tilt. Minimum variance also exhibits a value tilt, just because value stocks tend to be less volatile than growth stocks. Even more significantly, a ‘pure’ minimum variance portfolio would find itself massively concentrated in defensive sectors, which is why real-world portfolios impose sector limits or use covariance matrices to introduce more volatile stocks – violating the very definition of the CAPM beta.

“Minimum variance is very interesting, but it doesn’t work,” says Yves Chouefaty, president of Parisian quants house TOBAM, whose ‘anti-benchmark’ strategy aims to build portfolios that achieve maximum internal correlation and beta diversification. “Practitioners have to add all sorts of constraints. And what is the effect of adding those constraints? To add diversification,” says Chouefaty.

A number of managers work in a similar space to TOBAM. One of the more recent entrants is Lombard Odier, whose head of systematic investment strategies, Jérôme Teiletche, will shortly publish a paper with former SGAM colleagues Sebastien Maillard and Thierry Roncalli that considers a strategy that “equally-weights all the risk contributions of the different securities or strategies on an ex-ante basis”, a concept that “we are currently starting to use in our portfolios”.

Another firm whose philosophy is built on these foundations is INTECH Investment Management, whose CIO, Robert Fernholz, demonstrated that the weighted-average relative volatility of individual stocks minus the volatility of the portfolio of those stocks produced an excess growth rate, which he called ‘gamma-star’. “This is consistent with Markowitz’s idea of the efficient frontier, because our measure of portfolio volatility is the classical Markowitz derivation of variance,” notes CEO Robert

Garvy. “Minimum variance focuses on the second part of our equation, taking the Markowitz idea of covariance to minimise the variance of the portfolio. [By contrast] we have a starting point of generating, and the effect of that is not only driving the portfolio variance down, but also driving the relative stock variance up, because the excess growth rate is dependent on both of those terms.”

The link back to CAPM is made explicit by US quants shop First Quadrant, which calls its approach – described by co-director of global macro Ed Peters as “combining assets to give the highest mean-variance portfolio for a particular risk level”, dynamically switching between two state-dependent high-vol and low-vol covariance matrices – “essential beta”. The firm applies this to portfolios of equities and leveraged bonds, within which the equities themselves are managed according to the same methodology.

What all these portfolios have in common, at least theoretically, is that one could feed any combination of Barra risk factors in and they should all be weighted equally. They are perfect if you believe that the market is efficient enough to make it impossible to forecast prices accurately. “We are the portfolio without bets, the neutral risk allocator,” says Choueifaty. “If you believe that equity markets are relatively efficient, then you’d better diversify.” Not surprisingly, Choueifaty and Garvy tell the same fable about Martians coming to earth to invest in the stockmarket for 30 years – a market they know nothing about and which they are unable to monitor as they travel the cosmos: “They wouldn’t go for cap-weighted investment, they’d go for diversity-weighted,” says Garvy.

These portfolios also look like the CAPM ‘beta’. “Think of beta as the output, not the input to asset allocation,” writes First Quadrant’s Peters with his colleagues Jia Ye and Max Darnell in their paper, ‘Rethinking Beta’: “Beta is the result of combining sources of risk in such a way that the diversifiable risk has been diversified away.” While INTECH thinks of it as “excess return”, conceptualised (and sold) as alpha, First Quadrant and TOBAM embrace the beta mantle as a ticket into investors’ core portfolios.

“In my mind, the role of an asset manager in society is not to provide alpha but to provide access to risk premia, to intermediate between capital and work,” muses Choueifaty. “We sell ourselves as core. We even publish Maximum Diversification indices. One potential client even insisted that we couldn’t call it the ‘anti-benchmark’ because in fact it was the benchmark! Unfortunately that wouldn’t work as a marketing idea.”

It should not be such a hard sell. Benchmarks with significant momentum biases make the equity-risk premium look far more volatile than the CAPM-style beta of these unbiased strategies suggests is the reality. More risk can be allocated to a less volatile beta, so unbiased portfolios should make using equities to match liabilities much easier. MCW indices distributions “look nothing like the distributions of a pension fund’s liabilities”, as SSgA’s Thomas observes: “It’s an ugly, high-tracking error mismatch.”

But while more diversified portfolios bring tracking error against liabilities down, they take tracking error against the ubiquitous MCW benchmarks through the roof. “One of the first questions I’m asked by consultants is, ‘What’s the benchmark for this?’” says First Quadrant’s Peters. “It’s a real problem – essential beta’s tracking error is huge.” Even Choueifaty, who says that “every single client” has made TOBAM part of its core and sold MCW exposure to do so, concedes that the client that awarded one of the firm’s first and largest mandates had one eye on tracking error when it requested a dynamically-managed blend of anti-benchmark and MCW.

Fiona Frick, head of equities at Unigestion, says that her firm’s minimum-variance approach exhibits a 10-15% tracking error. “That’s far too high to be considered passive,” she says. RAFI simulation from 1984 to June 2009 exhibited tracking errors varying from 4.5% for Switzerland to 19.4% for Finland.

As Stockrate’s Andersen observes, a risk-agnostic, fundamentals-based strategy results in a random

tracking error: “Because most investors work on a traditional risk measurement basis, many will look at us as some kind of add-on,” he says. “We can only fit into a core portfolio if you can live with more floating statistics.”

The statistics telling us that skewness will translate that tracking error into long-term outperformance do not preclude some hairy periods of underperformance. As Franzén observes, fundamental indexation would have lagged a MCW index by 30% during the dotcom bubble, and 2008 was “a nightmare”. But that is precisely why AP2 does this as core. “If you use fundamental indexation as an alpha source, there is great temptation to throw it out when it ‘underperforms’,” says Franzén. “The long-term benefits that it offers have to be protected.”

AP3 takes a similar view. “These strategies can, under some circumstances, severely underperform traditional indices,” says Valtonen. “Our alpha portfolio would not be the natural bearer of that over/under performance. Instead, we include the mandates in our beta portfolio, but still benchmark them against the traditional indices. Probably the right way would be to decide to use fundamental-based indexes as starting point and not try to benchmark these on daily or monthly basis, to ensure that the long-term focus is maintained.”

These are courageous positions that turn the broadly accepted logic of benchmarks back on itself. Who’s to say that a beta alternative has tracking error against the MCW index, and not the other way around? The potential rewards could stretch well beyond making it easier for an individual pension fund to match its equity risk to its liabilities.

Redefining beta could even improve the efficiency of markets altogether. Consider one other impediment to widespread adoption of beta alternatives – transaction costs. Although MCW index funds require their fair share of rebalancing, they nonetheless have low turnover and hold the most liquid stocks because they are equilibrium portfolios – supply always equals demand, by definition. But given that the beta alternatives are price-agnostic, if any one of them became dominant their portfolios could start to look very similar indeed to the MCW portfolio. Could they fulfil the role of the equilibrium portfolio?

Peters is loathe to make the case for ‘essential beta’, although he concedes that it could hypothetically be an equilibrium portfolio in a CAPM context where “risk stays constant over time”. Choueifaty is more willing to argue that ‘anti-benchmark’ is an equilibrium portfolio, under certain assumptions, and he does so with reference to a ‘paradox’ that demonstrates how TOBAM’s portfolios really do replicate CAPM beta – the non-diversifiable risk of the market. The very definition of an ‘anti-benchmark’ portfolio is that it contains the stocks that are individually the least correlated with the portfolio, so no stock outside the portfolio can bring any more diversification benefit: therefore, the portfolio is more highly correlated with any external stock than with any internal stock. “I have even more exposure to what I don’t hold than to what I do,” Choueifaty explains.

The more inefficient the market is and the less idiosyncratic stock pricing, the fewer stocks an ‘anti-benchmark’ portfolio would contain. The more efficient the market, the more stocks in the portfolio. In a perfectly efficient market, ‘anti-benchmark’ could theoretically hold every stock. Moreover, because ‘anti-benchmark’ transacts when the market moves a stock away from its proper risk-weighting, it fulfils the role of liquidity provider and contributes to market stability, argues Choueifaty. In theory, everyone should be able to hold this portfolio: “Anti-Benchmark is not designed to be an equilibrium model, but if a few assumptions about the market are true then we would become the equilibrium model by default.”

Of course, the idea is, as Choueifaty observes, “science fiction”. But the best science fiction is always rooted in good science. It is debatable whether or not the equilibrium hypothesis from CAPM is good science, but it certainly provides us with useful assumptions in the relatively efficient equity markets. And that is why the new, systematic equity portfolio and index construction techniques should not be seen as mere satellite alpha engines, but as tools for re-thinking what we mean by ‘beta’. The process could take us some way to improving the stability of markets, making them a better match for our

liabilities.

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