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K2 Perspective

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Portfolio Diversification in the Quantum Age

Physicists the world over have long been faced with a bit of a paradox in terms of their attempts to explain the behavior of matter and energy in the universe. This is because apparently[1] there are two separate and distinct sets of physical laws that dictate how things work. On one hand we have classical mechanics, or the familiar Newtonian laws of motion and gravity that we interact with and observe on a daily basis. On the other hand we have quantum mechanics, a relatively new set of physical laws (early 20th century), that science has only recently begun to explore and understand. Newtonian physics defines the behavior of the macroscopic world – for example, the action of this letter falling as it is summarily crumpled and thrown into the waste basket (hypothetically of course, lest any reader would actually consider such an action!). Alternatively, the principles and laws of quantum mechanics and relativity apply in more obscure and extreme environments – for example particles at the subatomic level, objects traveling at or near the speed of light, or anything that may be falling into a black hole. In the everyday world, with the laws of Sir Isaac Newton in the driver seat, actions seem orderly and predictable. It is in the quantum realm, however, where things can get a bit odd – or as the father of theoretical physics Albert Einstein described, 'spooky'. For example, according to quantum theory it is feasible for matter to jump instantaneously from one location to another without physically moving through intervening space in the classical sense. In other words it seems Gene Rodenberry may have been on to something…beam me up Scotty? In addition, individual electrons in the quantum realm can exist in an infinite number of locations simultaneously, suggesting the existence of multiple universes. Adding to the weirdness, a property known as quantum entanglement describes how the physical state of a particle is only determined when it is observed, but until then it exists in multiple states. This one is particularly hard to convey in simple terms yet is truly odd when comprehended. Consider a single radioactive atom with a half-life of one hour. According to quantum physics, after one hour the radioactive atom will be in a state where it is both decayed and not-decayed. This state cannot be known however until it is observed, or measured. Once a measurement is made, the atom will then collapse into one state, but until then it remains as a superposition of two quantum states. This is a key aspect of quantum physics - it's not just that the scientist doesn't know which state the atom is in, but instead it is that the physical reality of the atom is not determined until the act of measurement takes place. In some unknown way, the very act of observation is what solidifies the situation into one state or another ... so until that observation takes place the physical reality is split between all possibilities. Spooky indeed. To communicate the oddness of this concept in simpler terms Austrian physicist Erwin Schrodinger in 1935 devised a thought experiment called Schrodinger's Cat (naturally).

1. The Fabric of the Cosmos: Space, Time, and the Texture of Reality (2004). Alfred A. Knopf division, Random House, ISBN 0-375-41288-3

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Strategy Focus – January 2014

Long Short Equity

January was difficult for markets worldwide, particularly toward month-end, as correlations jumped across asset classes and volatility spiked. All major equity market indices were down for the month. Despite optimism coming into the New Year, investor sentiment quickly turned negative following the release of softer economic data from both China and the US, increased geopolitical tension, and perhaps most significantly a sharp unwind in emerging markets. Against this backdrop K2's long short equity managers were modestly negative; however they performed quite well in terms of successfully mitigating the potential depth of losses versus sharp declines experienced by most equity markets globally. In terms of sector and geographic focus managers with exposure to healthcare, technology and Asia were the best performers on the month, while those centered on Australia, Europe and China tended to detract. Alpha in January came from managers' long portfolios where strong stock selection and position sizing drove returns.

With regard to healthcare returns were driven primarily by biotechnology companies where there were several positive announcements made over the month. In technology positive earnings announcements and improving customer metrics sent internet shares higher.

Despite the market sell-off, managers' conviction in their holdings remained firm as evidenced by a trend toward the increase of both net and gross exposures. Global allocation.

Specialist Credit

January was a positive month for K2's credit managers as performance was buoyed by strong high yield markets in Europe and the US, along with falling government yields that supported cash bond returns. In aggregate all sub-strategies were positive, led by structured credit, distressed, and trading.

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He proposed that a hypothetical cat be placed in a hypothetical box. In the box with the cat we would place a vial of poison gas, which would instantly kill the cat. The vial is hooked up to an apparatus which is wired into a Geiger counter, a device used to detect radiation. The aforementioned radioactive atom is placed near the Geiger counter and left there for exactly one hour. If the atom decays, then the Geiger counter will detect the radiation, break the vial, and kill the cat. If the atom does not decay, then the vial will be intact and the cat will be alive. After the one-hour period, the atom is in a state where it is both decayed and not-decayed. However, given how we've constructed the situation, this means that the vial is both broken and not-broken and, ultimately, according to quantum physics the cat is both dead and alive. Freaky!

So why the Cliff Note lesson in physics? For the purposes of asset management we need not concern ourselves with understanding the weirdness of quantum mechanics, as it is unlikely we will ever approach the speed of light, nor inadvertently fall into a black hole or be coaxed into a box with a cat named Schrodinger.

That said we do need to concern ourselves with the construction of truly diversified portfolios. And in the same way that physicists face a paradox in terms of rules that define the function of the universe – which appear contingent upon the physical state or realm in which matter is observed – portfolio managers face a similar paradox (forgive the metaphorical stretch) in terms of the rules that dictate whether a portfolio can be considered truly diversified. That is to say, defining a portfolio as diversified is often contingent upon the market state in which it and its underlying assets are observed.

Consider the following. Under normal circumstances, or when markets are behaving 'reasonably' and with nominal volatility (say a market abiding by the laws of Newtonian physics), the rules to achieve portfolio diversification appear fairly straightforward and stable, and conform to the tenets of modern portfolio theory. In these instances mean-variance optimization works very well, where complementary and seemingly uncorrelated assets are combined in a portfolio to diversify systematic risk (i.e. beta) and mitigate idiosyncratic or unsystematic risk (associated with a specific asset or security). In other words, this moves a portfolio towards the efficient frontier, thereby minimizing risk and maximizing potential return (in theory).

So far so good. But what about when things are not so normalized, when things like correlations begin to rise, volatility spikes, and selling contagions begin to take hold? In other words, what happens when markets approach a metaphorical black hole, or an extreme environment like that experienced in 2008? In these instances it is quite clear that the traditional rules/laws of portfolio diversification fail to work. That is to say, when experiencing severe tail events, a seemingly diversified portfolio on paper will quickly become undiversified – and regrettably when diversification is needed most. Again, looking at 2008, in many instances the more investors bought into a broad array of assets under the assumption that they were uncorrelated, the more correlated their overall portfolios tended to become. Therein lay the paradox of the mean-variance approach to portfolio optimization. While it has utility in normal environments – when exposed to the 'quantum' realm of turbulent and extreme market regimes – it fails.

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Specific performance drivers included high yield corporate bonds, investment grade corporate bonds, loan portfolios and legacy liquidations, all of which tended to be profitable for managers. A combination of strong technicals and fundamentals raising valuations helped to boost performance in structured credit as well. Detractors from gains included sovereign debt shorts, emerging market credit exposures, and post-reorganization equities.

After coming into the year with lower exposures, credit managers have since added to long positions in an attempt to take advantage of the recent volatility. Shorts have also seen an uptick as managers looked for convexity in financials and emerging markets sovereign debt. In addition, managers continue to seek opportunities in high yield bonds that have long-term idiosyncratic drivers, and several managers indicated their intention to remain net long over the next few months given their positive view of high yield, despite recent volatility.

Event Driven

K2's event driven managers were slightly positive for the month as hard events and credit positions tended to mitigate losses associated with equity market exposure. Specific performance drivers included targeted equity positions related to potential M&A activity, special situations credit, convertible strategies, and manager hedges. Exposure to softer catalyst special situations equity and emerging market debt tended to detract.

Looking ahead, special situations credit investments in the US continue to be focused on liquidations. While in Europe, the focus is on the long-anticipated sale of distressed assets by European banks due to increased regulations and tighter capital requirements.

Global Macro

K2's global macro managers were in aggregate down in January. While exposures to commodities and fixed income were beneficial, gains were not sufficient enough to offset declines in currencies. Detractors included short positions in the Japanese yen and longs in the euro, British pound and Swiss franc. Exposure to US equities also negatively impacted performance for most managers.

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Quite clearly a better approach to constructing truly diversified portfolios is required. If diversification is the proverbial Holy Grail of investment management – which we believe it is – then we should ensure that we obtain it, and not some facsimile thereof. As markets have become more complex over the years, investment structures more sophisticated, and assets across regions and geographies more correlated given certain regimes, diversifying via asset classes is no longer a fully viable approach. In our view, we should seek to diversify across risk factors as well.

Risk Factor Diversification

Risk factors, as opposed to tangible assets or securities, represent the abstract components that contribute to portfolio performance. In essence, they are the building blocks for all pricing functions in a fund, and serve as return drivers. Examples of risk factors include foreign exchange rates, inflation/deflation, commodity prices, interest rates, credit spreads, volatility, and of course equity prices. In addition, some risk factors cannot be readily quantified, such as political or regulatory risk, but are no less important to consider when seeking to form as complete a picture of overall portfolio risk as possible.

What makes risk factors so effective in terms of building truly diversified portfolios is that, as opposed to an asset class, they are generally much less liquid and often not tradable, and so are better insulated from the panic herding and selling contagions that often accompany regime shifts. In fact, academic studies have shown that the average correlation across risk factors is significantly lower than the correlation across asset classes, and that risk factor correlations tend to be more resistant to dramatic market shifts[2].

The Risk Factor

On March 14th 2013 scientists working in Europe reported that, for the first time in history and following a half-century quest, they had confirmed the existence of a particle known as a Higgs boson — the elusive subatomic speck sometimes called the 'God Particle'. For physicists the world over this was a very big deal, and a very big story (although one would be hard pressed to know this judging from media coverage in the U.S., which was virtually non-existent. Perhaps preempted in favor of a report on Justin Bieber and David Hasselhoff, a.k.a 'The Hoff' joining the cast of Bowling with the Stars…but we digress). The Higgs boson is the particle associated with the Higgs field, an energy field that transmits mass to the things that travel through it. Peter Higgs and Francois Englert theorized in 1964 that this is how things in the universe – stars, planets, even people – came to have mass.

We share the story of the great Higgs allegorically (naturally…), as its significance in terms of the universe can be compared to the significance of equity beta for its role in portfolio diversification. In other words, while there are a host of risk factors that influence portfolio performance at any given time, perhaps none is more pervasive, or more influential, than equity beta…investment management's version of the Higgs.

2. Bender, Jennifer, Remy Briand, Frank Nielsen, and Dan Stefek. 2010. "Portfolio of Risk Premia: A New Approach to Diversification." The Journal of Portfolio Management. Winter 2010, Vol. 36, No. 2: pp17-25.

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By month end discretionary managers had reduced overall net exposure by adding shorts in equities and emerging market currencies, however systematic managers continued to be challenged given their long equity positioning.

Looking ahead dispersion in growth rates across global economies and expectations of policy changes by central banks to manage growth and inflation should present attractive opportunities.

Commodities

K2's commodity managers in aggregate posted solid gains in January against a backdrop of broader declines across much of the commodity complex as measured by the majority of major indices. Prices tended to move along fundamental lines as opposed to macro-driven risk-on/off technicals, providing a fertile environment for discretionary commodity trading strategies.

In terms of performance drivers gains tended to come primarily from manager oil and natural gas and agriculture trading strategies, while precious and industrial metal exposures often detracted.

Interestingly, the catalyst behind the move towards risk factor modeling can be traced in large part to the influence of equity market beta in portfolio returns over the last 10+ years. Following the 2001-2003 down market, for example, many institutional investors began shifting their asset allocations towards alternative investments; such as private equity and hedge funds, intending to better diversify their portfolios. While the logic behind the move was sound, i.e. adding a variety of assets to their portfolios to enhance diversification, their methodology was faulty. That is, while many of the asset classes appeared to be uncorrelated on the surface, their underlying risk factors were clearly not – specifically the exposure to equity market risk. Unfortunately for many it was not until 2008 that this failure was glaringly revealed.

The dislocation of 2008 in fact illustrates perfectly the need for robust risk factor diversification when building portfolios. This is because indirect equity risk in a portfolio often remains dormant, and is not recognized until it surfaces during extreme market moves. In normal periods investors often mistakenly attribute returns to good alpha decisions, ignoring the fact that in many instances it may be factor betas like equity moving the needle. For example, tactically using private equity investments as a diversifier against public equity holdings would seem logical on the surface; however, in severe market stress environments this relationship would likely fail as a diversifier. This is because the beta component of many private equity funds is often structurally dependent on equity market returns (and interest rates). Similarly, and implicitly, many long short equity hedge funds incorporate a large element of equity beta as well. We should note that we are not implying that hedge fund strategies cannot be utilized to effectively diversify a portfolio. They can, of course, and often do (lest we be out of a job). But the key is to recognize and measure the underlying risk factors (like equity beta) that drive the returns of those hedge funds, before any meaningful effort to build a diversified portfolio can succeed. Once we have identified, accurately measured, and then designed an optimal portfolio around risk factors, the challenge is in finding a way to practically gain exposure – as the predominance of investment products are offered in some form of asset class. While there are a number of approaches – and at a minimum alternative investments like hedge funds, commodities, and currencies present a viable option – the key is to separate alpha from the beta risks, and then dynamically allocate across both systematic betas (which can be captured via passive and inexpensive index investments) and active alphas (dependent upon tolerance for risk). In other words, we need to properly understand what components of portfolio return are truly uncorrelated – versus those that are simply systemic risk disguised in an alpha wrapper.

In summary, a factor-based investment approach to allocation theoretically enables the remixing of factors to create portfolios better diversified and more efficient than traditional methods. Nonetheless there are significant challenges to overcome, including the need for active, frequent rebalancing; creation of forward looking assumptions; and the use of derivatives and short positions. However, key elements of factor based methodologies can be integrated in multiple ways into traditional asset allocation structures to enhance portfolio construction and illuminate sources of risk.

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Index Definitions

T-bills: A short-term debt obligation backed by the U.S. government with a maturity of less than one year. T-bills are sold in denominations of $1,000 up to a maximum purchase of $5 million and commonly have maturities of one month (four weeks), three months (13 weeks) or six months (26 weeks).

S&P 500 Index: Standard and Poor's 500 Index is a capitalization-weighted index of 500 stocks. The index is designed to measure performance of the broad domestic economy through changes in the aggregate market value of 500 stocks representing all major industries.

Swiss Re Cat Bond Index: The Swiss Re Cat Bond Total Return Index tracks the total rate of return for all outstanding USD denominated cat bonds. The index is based on Swiss Re pricing indications only.

ML High Yield BB Index: The ML benchmark index for BB-rated high yield corporate bonds.

The BofA Merrill Lynch US Floating-Rate Asset-Backed Index: is a statistical composite tracking the overall performance of the US floating-rate asset-backed securities (ABS) market over time. The index includes US dollar-denominated ABS having a floating coupon, a minimum amount outstanding of $25 million and an investment grade credit rating of BBB or higher.

BarCap U.S. Inflation Linked Bonds over 5 Year TR.: A part of the Barclays Capital family of global inflation-linked bond indices, the Barclays Capital US Government Inflation-linked bond index (US TIPS) measures the performance of the TIPS market. TIPS form the largest component of the Barclays Capital Global Inflation-Linked Bond Index. Inflation-linked indices include only capital indexed bonds with a remaining maturity of one year or more.

US Treasury Bill 90-Day On-The-Run Yield: Measured in percentage yield, this is the interest yield payable per year on the most liquid U.S. 3 month Treasury Bill.

The Dollar ("DXY") Index: indicates the general international value of the USD. The USDX does this by averaging the exchange rates between the USD and 6 major world currencies. The FINEX computes this by using the rates supplied by some 500 banks.

The Eurekahedge ILS Advisers Index: is an equally weighted index of hedge funds that explicitly allocate to insurance linked investments and have at least 70% of their portfolio invested in non-life risk.

HFRI Fund of Funds Composite Index: Funds of Funds invest with multiple managers through funds or managed accounts. The strategy designs a diversified portfolio of managers with the objective of significantly lowering the risk (volatility) of investing with an individual manager. The Fund of Funds manager has discretion in choosing which strategies to invest in for the portfolio. A manager may allocate funds to numerous managers within a single strategy, or with numerous managers in multiple strategies.

BarCap U.S. Agg TR Unhedged USD: The U.S. Aggregate Index covers the USD-denominated, investment-grade, fixed-rate, taxable bond market of SEC-registered securities. The index includes bonds from the Treasury, Government-Related, Corporate, MBS (agency fixed-rate and hybrid ARM passthroughs), ABS, and CMBS sectors.

BarCap U.S. Long Treasury TR Index Unhedged USD: The Barclays US Treasury bond index is part of Barclays Capital global family of government bonds indices. The index measures the performance of the US Treasury bond market, one of the largest and most liquid government bond markets in the world. Using market capitalization weighting and a standard rule-based inclusion methodology; the index accurately reflects the performance and characteristics of the Treasury market and provides a basis for customized indices.

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