PARTNERS CAPITAL

Intellectual Capital Whitepaper – Portfolio Construction Series

Asset Allocation

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Many investment academics make the case that asset allocation matters more to relative portfolio performance than any other contributor including asset manager selection. We will refrain from using valuable text to debate this but will make the, perhaps obvious, observation that looking back with 20:20 hindsight at how one portfolio performed relative to its peer group, overall portfolio risk level tends to explain performance differences where they are extreme. However, peers tend to cluster around similar overall risk levels, leaving asset allocation to explain more of the difference than manager selection. For example, the Yale Endowment's outperformance of the Harvard Endowment is mostly explained by the larger allocation Yale has had to private equity and venture capital in particular. Manager selection also played an important part.

After setting the overall risk budget and agreeing the high-level investment policies (e.g., tolerance for illiquid assets), we seek to establish the long-term strategic asset class allocation targets for the overall portfolio. The Partners Capital investment approach is predicated on long term multi-asset class diversification. We seek to earn excess returns with lower risk by optimizing asset allocation across the various asset classes or market betas including equity, credit, inflation and interest rates, and through capturing 'alpha' opportunities in less efficient asset classes.

The asset allocation process starts with deep fundamental analysis of the global macroeconomic and market environment including an assessment of the universe of investment opportunities in each asset class.

We construct portfolios based on the long-term (10 years) macro-economic scenario analysis to establish a 'base' case and probabilities of alternative outcomes, usually articulated as the downside and upside macroeconomic scenarios.

The macro analysis is focused on answering the following key questions:

1. Where are we in the long-term economic growth cycle?
2. What are the prospects for inflation?
3. What is the general direction of interest rates?
4. What are the major geopolitical risks?
5. Which geographic markets and sectors will have headwinds or tailwinds?

The macro-economic scenario development informs the research that follows on the attractiveness of each asset class and the most attractive investment strategies within each asset class.

The essence of asset allocation across a broad set of asset classes is about having "more eggs in the basket." But the science starts to kick in when we observe that different asset classes perform differently in different macro-economic environments as you can see in Exhibit 1. The shading indicates that asset class performance is expected to be strong in the environments described in the column headings. Bonds tend to perform relatively better in low growth, declining inflation environments, while equities thrive in high growth environments. Inflation linked bonds, property and commodities do best to generate returns in inflationary environments. Absolute return hedge funds, by definition, are expected to perform well in all environments.

Exhibit 1: The core thesis underpinning multi-asset class diversification is that it hedges against different economic scenarios, which explains why their returns are not highly correlated.

Asset Class	Economic Scenarios			
	Low Growth	High Growth	Declining Inflation	Increasing Inflation
Government Bonds	(shaded)		(shaded)	
Corporate Bonds	(shaded)	(shaded)	(shaded)	
Absolute Return Hedge Funds	(shaded)	(shaded)	(shaded)	(shaded)
Equities		(shaded)		
Inflation Linked Government Bonds	(shaded)			(shaded)
Commodities		(shaded)		(shaded)
Real Estate		(shaded)		(shaded)
Private Equity		(shaded)		

Source: Partners Capital
Note: shaded cell indicates asset class performance is likely to be strong in that economic environment.

What asset classes do we consider and how do we define them?

We do not exclude any major asset class from consideration for our investment program but may at times tactically avoid investing in an asset class based on the current market environment and the attractiveness of the opportunity. Exhibit 1 captures the most important of the 14 major asset classes that we generally consider for any given client portfolio. Our definitions for each of the 14 asset classes are provided below.

Cash: Cash and cash equivalents (money market funds, short term notes and bonds).

Fixed Income (Government Bonds): Nominal bonds issued by developed market sovereign governments which offer contractual income yield and repayment of principal, typically with limited or no credit risk.

Liquid Credit: Offers contractual income yield and repayment of principal with the risk of loss due to credit risk. Includes investment grade bonds, high yield bonds, bank loans, emerging market sovereign bonds and asset-backed credit such as residential and commercial mortgage-backed securities and student loans.

Private Debt: Offers contractual income yield and repayment of principal with the risk of loss due to credit risk. Strategies include direct corporate lending, mezzanine financing, collateralised loan obligations (CLO's), structured credit originations and securitizations, peer to peer lending, and healthcare and pharmaceutical financing. The asset class also incorporates uncorrelated income streams such as insurance and litigation funding.

Absolute Return: These are liquid securities trading strategies aiming to generate returns with little exposure or correlation with financial markets (i.e., any of the four core betas defined below). These managers classify themselves as hedge funds and bring highly specialized skills in relatively narrow market arenas and come with high fees. The most common strategies include macroeconomic event trading, merger arbitrage, equity market neutral and fixed income arbitrage.

Hedged Equities: These are strategies which will typically take both long and short positions in publicly listed equities. Investing in both long and short positions results in a lower equity market exposure than long-only equity investing and higher scope for outperformance given the ability to bet both ways on a stock's performance.

Developed Market ("DM") Public Equities: Long-only or long-biased strategies investing in publicly listed equities of developed countries.

Emerging Market ("EM") Public Equities: Long-only or long-biased strategies investing in publicly listed equities of emerging market countries.

Private Equity (buyouts and growth equity): Typically, these are investments made in the equity of private companies. The source of returns is a combination of equity beta, leverage, company selection and owner-driven value creation. These asset managers are skilled at improving operating profits through a combination of revenue growth and margin enhancement. Managers will also seek to generate returns through "multiple arbitrage" which involves selling at a higher multiple than that paid to acquire the company. This is generally achieved by the combination of stabilizing earnings and enlarging the company's value to increase the universe of exit opportunities/buyers.

Venture Capital: investments in private companies, generally in the very earliest stages of their creation and development. Returns are expected to exceed those of other forms of private equity due to the much higher risk, from turning business ideas into profitable companies. Risk can be in the form of technology, unit economics (cost exceeds value to user), business execution and competition from larger adjacent competitors. Investments can be from pre-seed, to pre-IPO stages of a company's development.

Private Equity Real Estate: Typically, investments are in private real estate development or redevelopment projects. The asset class also includes strategies including the acquisition of distressed properties and real estate debt. Offers income yield and the opportunity for some long-term capital appreciation and inflation protection.

Core Property: Commercial stabilized properties including offices, retail, logistics, apartments, hotels, etc. Offers income yields and the opportunity for some long-term capital appreciation and inflation protection.

Inflation Linked Bonds: Bonds issued by sovereign governments where the principal and coupon payments are adjusted upward for inflation. Instruments would typically be local in order to hedge against local inflation.

Commodities: Investments generally through futures contracts on oil, gas, agriculture, minerals and metals which provide inflation protection and exposure to global economic growth. Gold is included in metals and behaves differently than other commodities to the extent that it acts as a store of value, responds as a safety asset in some crisis and whose changes in value are inversely correlated with real yields. The higher real yields generally go, the lower gold's value.

How do we think about asset classes vs the core market risks or betas?

While we articulate asset allocation in terms of the long-term average capital allocation to each of these asset classes, behind the scenes at Partners Capital we start our thinking about portfolio construction by optimizing capital allocation across the core four market betas (e.g., equity, credit, inflation and interest rates), and then translate that into allocations to the 14 traditional asset classes.

The reason we start with core market betas is that asset class definitions tend to hide the true underlying market risks being paid for. To appreciate how asset class labels hide true risk, it is perhaps best to start with an example. In the mid-2000s, Partners Capital invested with a natural resource equity long/short hedge fund manager. In an asset allocation construct, it is not clear how you would categorise such a manager. Should we categorise it as a commodity manager given the exposure to natural resources, or within equities given that it invests in the equity market, or should we call it a hedge fund given that it deploys a long-short strategy? The allocation almost certainly will be different depending on which asset class this manager is assigned to. This of course makes no sense because nothing about the investment has changed. What is important is that the manager adds both equity risk and commodity risk to the portfolio given the nature of its underlying exposures, and allocation to this manager should consume bits of the allocation set aside for equity and commodities beta.

As we look through to underlying fund holdings to understand what risks each manager brings, we look for each of four discrete categories of "market risk" or beta[1] that investors should care about. These are equity risk (developed and emerging markets), credit or default risk, inflation risk (property, commodities, inflation-linked bonds) and interest rate or duration risk. Financial exposure to each of these four categories of market risk should be present in any well diversified portfolio as they each pay a long-term return commensurate to the risk borne and each performs differently in different market environments or parts of the business cycle. A manager who is classified in the 'hedge fund' asset class could contain any number of these four underlying risk exposures, or indeed none.

To fully understand the risk of any overall portfolio, it is crucial to look through asset classes and managers to the underlying market risks within it and aggregate the total portfolio exposure to each of the four different market risks.

Exhibit 2 below shows a conceptual map of various asset classes and the underlying market risks that may be embedded in investment funds typically found within those asset classes. We have taken the four core market risks and broken them into seven reflecting developed vs emerging market equity risk and the three different types of inflation risk – property, commodities and inflation-linked bonds. As you can see, there is no way to fully understand a portfolio's actual risk exposures from an asset allocation. It is essential to aggregate each manager's exposures bottom up across the portfolio to understand true exposure to the various market risks.

We believe that the market exposures of the portfolio are the best definition of the risk we are taking in client portfolios and targets should be set for exposure to each of the four core betas or the seven betas shown above breaking out the two forms of equity beta and the three forms of inflation beta. So ultimately, allocations are being made to the seven betas based on each asset manager's normative beta exposures which are established from a combination of historical regression analysis, current manager exposure reports and conversations with the manager. We set beta budgets for each of these seven risks and manage portfolios within defined ranges around those targets, watching how the collection of managers may be moving risks deep within their own portfolios.

Exhibit 2: Asset classes do not accurately describe the true risk exposure of a given investment strategy.

	Equity Risk		Credit Risk	Inflation Risk			Interest Rate Risk
	DM Equity	EM Equity		Inflation linked bonds	Property	Commodity	
Cash							
Government Bonds							✓✓
Liquid Credit			✓✓				
Private Debt			✓✓				
Absolute Return	✓✓	✓	✓✓	✓	✓	✓	✓✓
Hedged Equities	✓✓	✓				✓	
Developed Market Equities	✓✓					✓	
Emerging Market Equities		✓✓					
Private Equity	✓✓	✓				✓	
Venture Capital	✓✓	✓					
Inflation Linked Bonds				✓✓			
Commodities						✓✓	
Core Property					✓✓		
Private Equity Real Estate					✓✓		

Source: Partners Capital

[1]Beta represents the correlation of an asset to its market exposure, adjusted for its relative volatility. It is calculated as the slope of the line when an asset's returns are regressed against those of its market exposure, and therefore describes the asset's returns in relation to the returns from the market. For example, if an asset has a beta of 0.5 to equities, then for a +10% return from the equity market the asset would be expected to return +5%.

How do we go about setting long-term target allocations to betas and asset classes?

Long-term allocation targets are set for each of the seven betas based on the macroeconomic analysis described above which informs our assumptions about the expected returns from each of these seven market risks, the volatility of those returns and the correlation of their returns to one another. Returns, risk and correlation are the three standard inputs to most practitioner's asset allocation models (i.e., Markowitz Mean Variation Optimization (MVO) model), so there is nothing novel at this stage of our approach other than, perhaps, the fact that we start with a beta-based allocation before translating that into 14-asset class allocation targets.

For a given overall portfolio risk budget expressed in equity-like risk terms of say 70%, there will be a mathematical optimal mix of capital allocation to each of the seven betas on the so-called efficient frontier. Beta allocation or asset allocation can start with this MVO approach, but we stress that it generally is moderated through an iterative process as specific investment opportunities, long-term investment themes or specific asset managers influence the allocation to betas or asset classes.

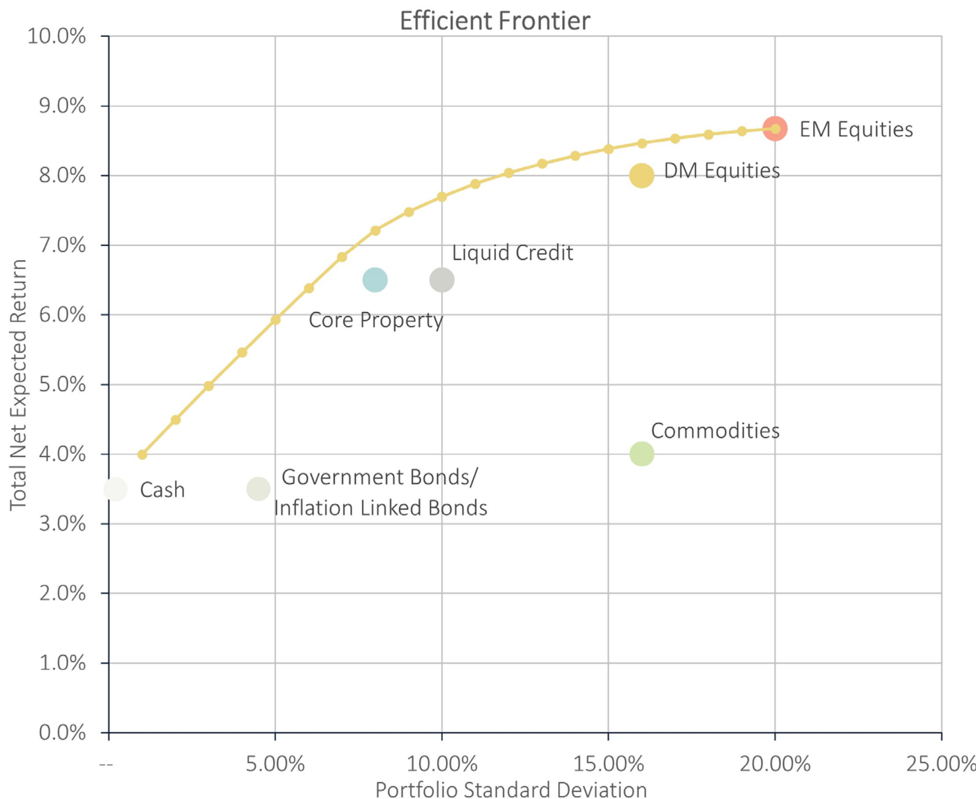
Exhibit 3 provides an illustration of the beta return and risk inputs and simply plots them. The yellow line plots the expected return for the optimal portfolio at each point, left to right, on the overall portfolio risk spectrum – also known as the efficient frontier.

So the optimal portfolio that has a budget of 10% volatility (standard deviation of returns) should generate 7.7% returns over the long-term. What this chart hides is what is determined to be the optimal beta allocation at each point on the efficient frontier. We will illustrate that later when we turn to the asset class efficient frontier.

After landing on a long-term target allocation to each of the seven betas, we translate that into allocations to our 14 asset classes. The first consideration in this process is to overlay the client's illiquidity budget to determine what proportion of the resulting asset allocation can be deployed in illiquid assets versus liquid asset classes (such as private equity, venture capital, property and private credit strategies). We also take into consideration any client-specific investment restrictions at this point in the process (e.g., no hedge funds, overall fee budgets, etc.).

Mean Variance Optimization models are run using expected returns and volatility of each of the 14 asset classes and the matrix of correlations between each pair of asset classes. The assumptions for each asset class will reference the beta return and volatility assumptions (e.g., equity beta returns are assumed to be 8.0%, with developed market equities' returns expected to be 8.0% and emerging market equities at 8.7%, reflecting the higher equity beta of emerging market equities). The 14-asset class MVO will have constraints built into it reflecting the 7-beta allocation conclusions, as well as liquidity and client-specific constraints.

Exhibit 3: At different overall portfolio risk levels (standard deviation) the MVO model points to a different mix of betas to constitute the optimal portfolio allocation.



Source: Partners Capital

Hypothetical return expectations are based on simulations with forward looking assumptions, which have certain inherent limitations. Such forecasts are not a reliable indicator of future performance.

In Exhibit 4 we have added the efficient frontier across the 14 asset classes (dark blue line) to the one in the previous exhibit which were just across the 7 betas (yellow line). We have then constrained the asset class frontier to only allocate a maximum of 40% to illiquid asset classes, which gives the frontier in the middle (mid-blue line). The frontiers show that for a given level of risk, you can generate a higher return if allocations to alternative asset classes are possible. This is a core tenet of the endowment model that the Yale Endowment, under David Swensen, pioneered. Alternative asset classes offer exposure to alternative betas and illiquidity premia, which tend to have low correlation to traditional market betas and thus increase the diversification benefits possible across a multi-asset class portfolio. In the example above, if a client required an 8% return, but could only allocate to the seven market betas, they would need to tolerate c. 12% of annualised volatility. However if they were able to allocate across all 14 asset classes, including up to 40% in illiquid ones, they would only need to tolerate c. 7% of annualised volatility to achieve their 8% target return.

In Exhibit 4, the middle blue line is most important to our asset allocation decision as it incorporates the beta and illiquidity constraints. To illustrate how much judgement versus science is used in the asset allocation process, we show in Exhibit 5 what the pure mathematics of the mean variance optimization model spits out with our 40% illiquids constraint and the core betas constraints. As you would expect, at the high end of the risk spectrum, the model allocates up to the 40% constraint to the highest returning asset class, venture capital. At the low end, a lot if allocated to cash and absolute return hedge funds. A 10% risk budget portfolio (shown in the red box) recommends a barbell, allocating 23% to venture capital and 37% to absolute return.

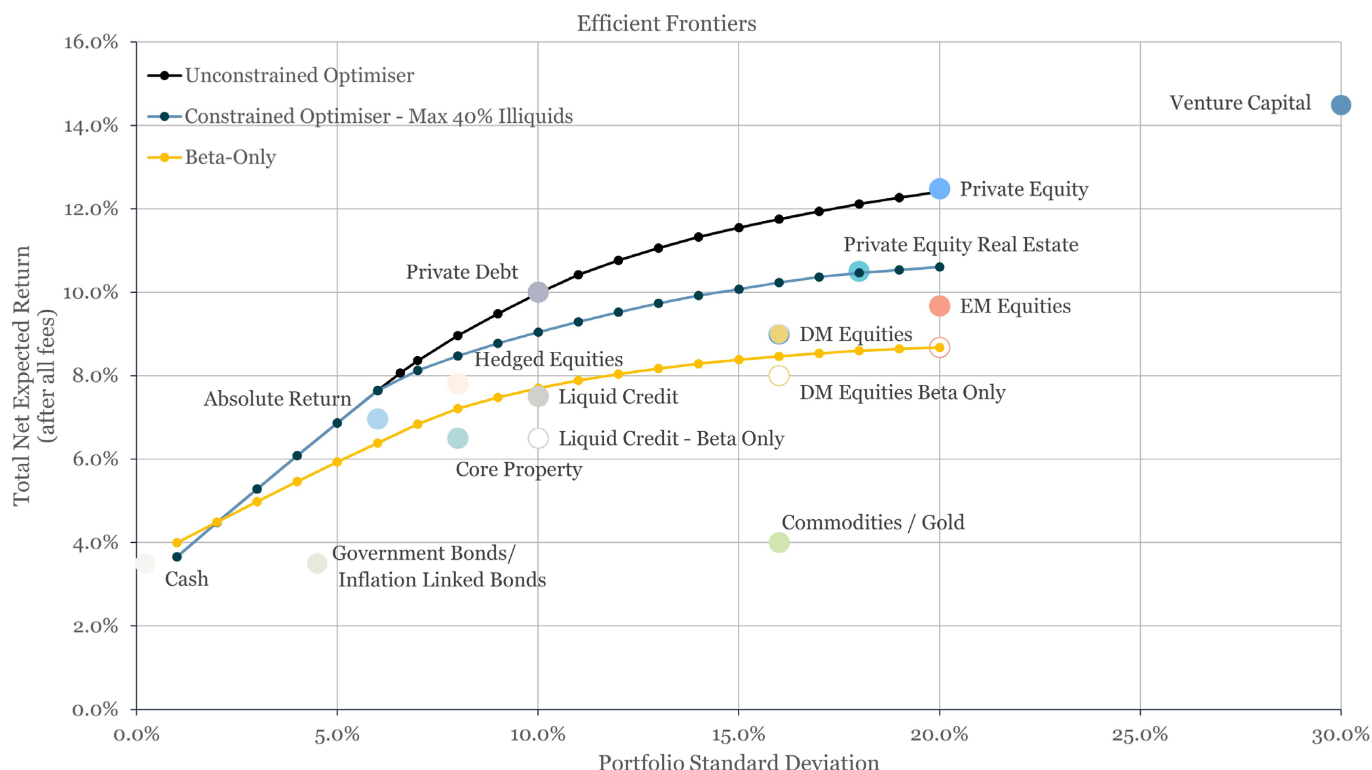
Where we go from here is to constrain asset classes like absolute return and venture capital to judgmentally set maximum allocation levels that reflect the confidence we have in each asset class to deliver against its risk, return and correlation model input assumptions. Venture capital, for example can go 10 years or more without a positive return if we catch the tech bubble formation that drives VC returns at the wrong points in time. Accordingly, we generally limit VC to 25% of the overall illiquid allocation, so 10% of the overall asset allocation in this illustration of 40% illiquidity budget.

After constraining individual asset classes in line with the confidence we have in their model inputs, we then overlay our long-term investment themes (e.g., underweight China, which will result in an underweight to EM equities) and other views on specific investment opportunities that may suggest a larger or smaller allocation on a judgmental basis.

Where do our macroeconomic scenarios come into asset allocation?

At the risk of taking you even further “behind the Partners Capital curtain,” there is an important part of our process where we incorporate our range of macroeconomic scenarios into our beta and asset allocation models. We do not build portfolios for just the base case, but rather for what is optimal across the range of scenarios.

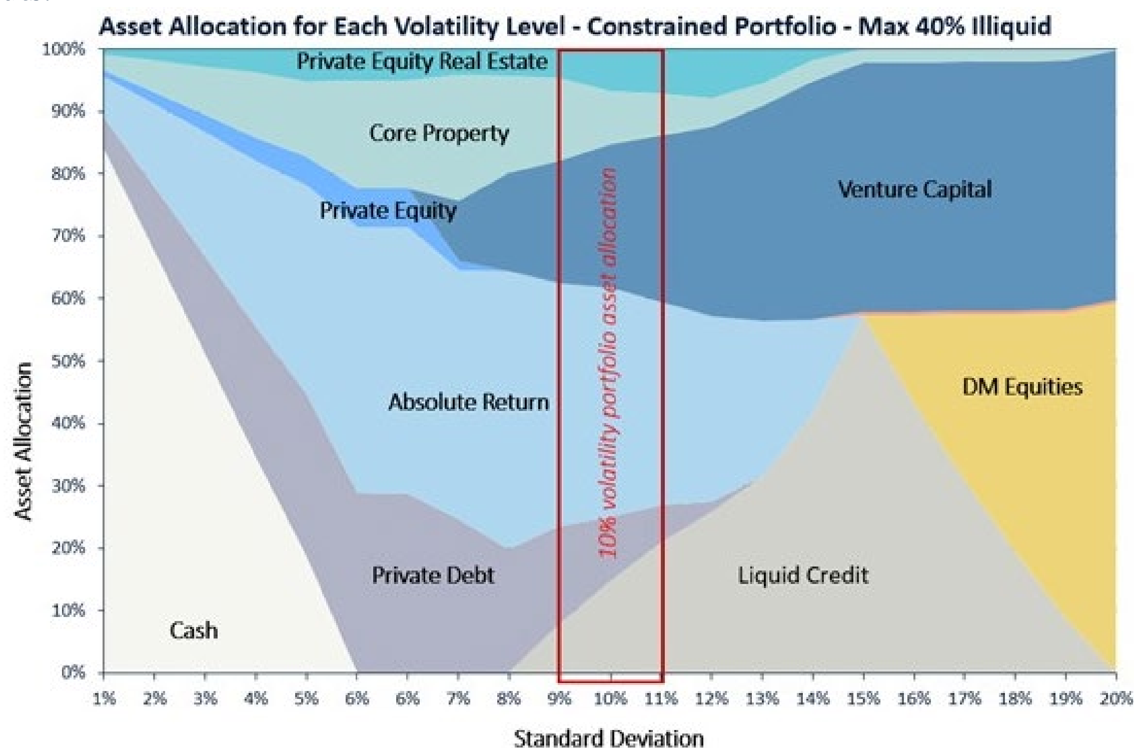
Exhibit 4: At different overall portfolio risk levels (standard deviation) the MVO model points to a different mix of asset classes to constitute the optimal portfolio allocation.



Source: Partners Capital

Hypothetical return expectations are based on simulations with forward looking assumptions, which have certain inherent limitations. Such forecasts are not a reliable indicator of future performance.

Exhibit 5: The raw MVO output can show highly impractical allocations which then need to be constrained by limits around asset classes, overlays of investment themes and other judgmental inputs.



Source: Partners Capital

To that end, we develop returns, volatility and correlation assumptions for each market beta or asset class for each of three scenarios (base, upside, downside) and we create an allocation that is optimal across the three scenarios, generally assuming 20% probability for each of the upside and downside scenarios and 60% for the base case. The scenarios are defined by these probabilities, not the other way around. This involves some fairly complex modelling which we will not go into here. However, in our 20 years of conducting this analysis, our conclusion remains that the endowment model, with high allocations to alternatives, leads to superior risk adjusted returns.

Where does the quality of asset managers come into asset allocation?

At Partners Capital, we have long had a mantra of "manager access can drive asset allocation." Our asset class return and risk assumptions are exactly that, asset class level assumptions. Where we have high conviction that certain asset managers will significantly outperform the average asset class risk-adjusted return assumption, we allocate more to that asset class. But this is somewhat rare as we find very few managers where we think their outperformance can last for our entire 10-year asset allocation time horizon. But this is where judgment intervenes to trump the models.

Once we arrive at the long-term strategic asset allocation targets, we establish a maximum and minimum allocation range around each of the 14 asset classes which defines the tolerance for any tactical deviation from the long-term target. Portfolios are then constructed around the best asset managers representing these asset classes and strategies within the overall portfolio risk budget.

Tactical Asset Allocation

All of the discussion above explains how we establish a long-term (10+ years) strategic asset allocation or "SAA." At the end of this SAA setting process, our asset allocation decisions are only as good as our long-term asset class return assumptions which are based on a combination of fundamental analysis and historical data. These assumptions are reviewed annually for reasonableness and regularly compared with the long-term expectations of other financial professionals and institutions, including Yale, GMO, and Bridgewater. These assumptions reflect our best estimate of the likely returns over a full cycle, but we are aware that asset classes perform differently at various stages of the cycle. To reflect the variability of asset class return assumptions, at the start of every year Partners Capital develops investment strategies for each of the individual asset classes, with a view to having client portfolios deviate from the long-term SAA, where we make tactical asset allocation (TAA) decisions for the upcoming year. Such deviations from the SAA are constrained by the minimum and maximum ranges for each asset class that are documented in the Investment Policy.

Tactical asset allocation moves are rare, but when they are approved, they have been built on deep analysis of the structural aspects of each asset class, both in terms of the supply of attractive opportunities and the scale of demand from investors pursuing them. We translate this structural analysis into shorter term return assumptions and key areas of investment focus for each asset class. The resulting return expectations are then used in various modelling techniques including constrained mean variance optimization and Monte Carlo simulation. This in-depth analysis is published in our annual flagship investment document, *Insights*, and

Exhibit 6: Partners Capital 2023 Tactical Asset Allocation (US endowment example).

	New SAA	2022 TAA	2023 TAA	Change
Cash	1.0%	1.0%	3.0%	+2.0%
Government Bonds	5.0%	2.5%	2.5%	--
Liquid Credit	2.0%	5.0%	5.0%	--
Private Debt	7.0%	8.0%	9.0%	+1.0%
Absolute Return	12.0%	14.0%	15.0%	+1.0%
Hedged Equities	5.0%	11.0%	7.0%	-4.0%
Long Equities	30.0%	29.0%	28.0%	-1.0%
Private Equity	18.0%	14.5%	15.0%	+0.5%
Venture Capital	7.0%	3.5%	5.0%	+1.5%
Inflation Linked-Bonds	5.0%	2.5%	2.5%	--
Real Estate	8.0%	9.0%	8.0%	-1.0%
Total	**100%**	**100%**	**100%**	**--**
Equity-Like Risk	0.66	0.63	0.63	--
Illiquids	40.0%	35.0%	37.0%	2.0%
Highly Liquid Assets[1]	12.0%	8.5%	10.5%	2.0%

Source: Partners Capital

distributed to clients. We gladly invite clients to challenge our views and engage with us regarding how to best position the portfolio for the year ahead. In Exhibit 6, we show our 2023 Tactical Asset Allocation recommendation for a non-taxpaying endowment with an equity-like risk budget of 63% and illiquidity budget of 35%. You can see that the TAA moves from one year to the next are typically in the 1 to 2% range, while our deviations from our SAA.

Just as with our Strategic Asset Allocation process described above, our tactical asset allocation is further refined by a detailed analysis of seven core financial market exposures or betas. While we most often communicate with clients in terms of 14 distinct asset classes, it is the seven betas (Developed Market Equities, Emerging Market Equites, Credit, Property, Commodity, Interest Rates and Inflation Linked Bonds) that will, to varying extents, drive the expected returns of the respective asset classes. The exceptions are Absolute Return hedge funds and cash which should have little or no beta or market risk. The expected returns for the core seven betas will vary depending on the shorter-term macroeconomic scenario that unfolds, and we probability weight different scenarios to establish expected beta returns for each asset class. Using our proprietary equity-like risk framework, we determine whether the likely beta return of an asset class is sufficient to compensate for its associated risk level, and over allocate to those asset classes that provide the highest return per unit of the risk budget. In this way we believe we build portfolios that have the best chance of achieving their objectives in a wide range of economic scenarios.

Finally, the proposed asset allocation is stress-tested against various market scenarios using statistical and Monte Carlo analysis to show how a given mix of asset classes might behave in various past crises.

Conclusion

At the end of either the SAA or TAA process for any investor, the extent to which the allocations prove to have been good ones or bad ones, generally comes down to events that we do not successfully predict. However, building portfolios to weather a range of macro scenarios is a key ingredient to minimize the effect of negative surprises.

Beyond scenario analysis, we rely on deep insights into each asset class to further defend against negative events. Think about the changes affecting each asset class today with rising and high interest rates. The past is clearly not a reliable indicator of future asset class returns. Portfolio allocations need to reflect scenarios for each asset class. For example, what returns should we expect from office property with the change in post-Covid occupancy and the huge rise in mortgage rates? In venture capital, allocators need a clear view on how the shrinking universe of tech unicorns (>$1B value private companies) with a recent doubling in the population of VC firms will affect VC returns going forward. With technology innovations, regulatory changes and financial market evolution, each year presents us with new investment strategies within each asset class to evaluate.

The aim of most investors is to grow assets, but with a defensive portfolio that minimises the loss of value in bad times. There is no better way to achieve this, in our opinion, than to make the best use of the broadest array of asset classes. Multi-asset class diversification is the greatest source of comfort against increasingly unpredictable financial markets.

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