

CAPITAL GENERATION PARTNERS

First Principles Diversification

February 2013

Capital Generation Partners LLP is a private investment advisory firm which creates bespoke portfolios for ultra high-net-worth clients. The principals of Capital Generation Partners have worked together for a number of years, advising a family office on portfolio management. They established themselves independently in 2006 and the team has now grown to combine specialist and generalist knowledge across all asset classes. Capital Generation Partners does not have commission ties with any managers and it remains entirely independent so that it can focus on finding the outperforming managers in every asset class from the most crowded to the most obscure.

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First Principles Diversification

First Principles Diversification looks at the traditional methods of diversifying a portfolio and concludes that many of the asset classes that have become fashionable as diversifiers are actually highly correlated, not only with the core portfolio, but also with each other. This goes some way to explaining the catastrophic impact of 2008 on apparently diversified portfolios. The paper then takes a step back to examine the building blocks of asset allocation and demonstrates that, at the fundamental level, there are only three asset classes: debt, equity and cash. It follows from this that alternatives are not, in themselves, an asset class and that hedge funds, applied thoughtlessly to a portfolio, cannot diversify that portfolio and may serve to add to risk concentrations. By contrast, alternative investments which are understood from the bottom up, with a deep appreciation of the underlying assets and strategies concerned, can bring powerful diversification to a portfolio and hence reduce risk. Capital Generation Partners argues in this paper that investors have to understand this basic principle before they can construct the optimal portfolio which captures growth on the upside and protects on the downside by making sophisticated use of all asset classes.

Preface for 2013

This paper provides an update on First Principles Diversification – Capital Generation Partners’ research into techniques for portfolio diversification. The original document, published in 2012, constructed a new approach to portfolio diversification based on a new classification of asset classes. First Principles argued that there are only three asset classes – cash, debt and equity – and two axes of investment style that can be applied to these three asset classes – discretionary vs systematic and directional vs arbitrage. Applying the four approaches (both ends of the two investment axes) to each of the three asset classes produces 12 individual strategies and it is only by diversifying across these 12 strategies that diversification can properly be achieved.

The paper demonstrated that a First Principles portfolio would achieve higher returns and lower volatility than a traditional 60:40 equities:bonds portfolio and would also achieve higher returns and lower volatility than an “enhanced” portfolio – a portfolio comprising equities, bonds and some widely accepted diversifiers such as private equity, real estate and hedge funds.

For the new edition of First Principles, Capital Generation Partners used some new indices to represent the 12 strategies – these were better proxies for the strategies than the original indices used and therefore allowed for more accurate numbers to be produced. The new edition also uses the latest data - returns and volatility to September 2012 instead of September 2010.

The new numbers show that First Principles diversification would, over the period January 2004 - September 2012 have again produced similar returns to the 60:40 portfolio and the enhanced portfolio at much lower volatility.

Finally, the new research examined the discretionary/systematic axis versus the directional/arbitrage axis and found that diversifying along the directional/arbitrage axis was a more powerful force for diversification than the discretionary/systematic axis. Both have diversification value but the discretionary/systematic axis is less powerful. This accords with the observable convergence between systematic strategies and the mainstream discretionary strategies – in other words, much active management is not very different to systematic management. Going further, the research identified the two strategies of the universe of 12 which are least correlated with the other strategies in the universe.

What follows is a detailed examination of the thinking and process behind First Principles and an assessment of the new data produced for 2013.

Executive Summary

1 There are only three asset classes:

- The economy is based on the trading of assets – objects of desire and value to mankind.
- Assets in themselves, however, cannot produce a yield unless they have a layer of management. The economy is therefore based on assets combined with management to generate yield – and corporate entities are the providers of this layer of management.
- Corporate entities are able to issue securities based on the yield they generate through their management of these assets: companies issue equities which allow investors an ownership share in the underlying assets of the firm; governments and companies can also issue bonds which allow investors to lend to the entity concerned.
- Thus owning or lending via equity or debt represent two of the fundamental asset classes.
- The third asset class is cash (more precisely, cash and fungible commodities) because cash can be exploited for yield at any time.
- These three asset classes – cash, equity and debt – are at the core of First Principles Diversification.

2 Within each asset class there are two ways to divide the investment strategy:

- Directional vs arbitrage – an investment is predicated on the overall direction of an asset's value (directional – eg long only funds) or it is predicated on the relative fluctuations between two assets (arbitrage – eg market neutral equity funds).
- Discretionary vs systematic – an investment is based fundamentally upon human judgement (discretionary – eg active funds) or an investment is rules-based (systematic – eg an index tracker).
- This gives us two axes of investment style with four styles altogether (discretionary, systematic, directional, arbitrage) - applying these four styles to the three asset classes gives a total universe of twelve strategies to employ.

3 Evenly allocating across these twelve strategies (First Principles Diversification) is a much stronger way to diversify than previous diversification models

- We have constructed a First Principles Diversification portfolio simply by allocating equally across all twelve strategies using investable indices and funds with long run data sets.
- This has been compared to two alternative diversification models: the traditional 60:40 equity:bond strategy (the benchmark portfolio) and the more recent modern diversified portfolio which has an allocation to 'alternatives' – namely private equity, real assets and hedge funds (the

enhanced benchmark portfolio).

- The latter form of portfolio is today common among endowments and pension funds although they rarely allocate more than about 20% to these alternatives.
- Using the same data sets for each portfolio, the First Principles Diversification portfolio achieves similar returns and significantly lower volatility (4.7% annualised returns, 5.0% volatility) compared to either the benchmark portfolio (4.8% annualised returns, 11.7% volatility) or the enhanced benchmark portfolio (5.3% annualised returns, 12.3% volatility).
- These results have been achieved without the use of portfolio optimisation and without applying any manager selection.
- Monte Carlo simulations of these portfolios tell the same story – First Principles Diversification significantly reduces volatility while providing similar returns.

4 The reason for this is that the enhanced benchmark portfolio is in fact strongly concentrated in just one of our twelve strategies.

- Portfolios which employ this approach tend to invest in private equity, real assets and hedge funds as diversifiers to the other asset classes.
- Our quadrants demonstrate that private equity and real assets in fact employ the same underlying strategy as the assets they are intended to diversify away from, namely long equities. A typical enhanced benchmark portfolio could well have almost 60% of its investments in the directional, discretionary equities quadrant (assuming a 40% allocation to equities and an 8% allocation to private equity and real estate).
- The effect is magnified further by allocations to hedge funds if these are not diversified across strategy; long/short hedge funds for example occupy the same quadrant as the other directional, discretionary equities outlined above.
- Unsurprisingly, concentrated investment approaches result in higher volatility.

5 By contrast, the investments that are traditionally described as ‘hedge funds’ are scattered across the strategies and are thus not strongly correlated with each other.

- Hedge funds appear in almost every strategy we have identified – because they invest across the range of asset classes and employ a range of investment styles.
- As a result, the various hedge fund approaches display little correlation with each other.
- Because of this diversity, they should not be thought of as an asset class and not as an automatic diversifier – their diversification properties depend upon the underlying assets and investment styles employed and these vary hugely from fund to fund.

6 Diversification requires full use of both ends of the two investment style axes – but the directional/arbitrage axis is more powerful as a diversifier than the discretionary/systematic axis .

- Analysis of the four strategies (directional, arbitrage, discretionary and systematic) shows greater dispersion between the directional and arbitrage portfolios than between the discretionary and systematic portfolios.

- A heat map correlation chart also showed that in the cash and equity asset classes, systematic arbitrage strategies were least correlated with the rest of the asset class and for debt, directional discretionary strategies were least correlated. Since many investment portfolios today are particularly overweight directional equity (due to the inclusion of private equity and real assets) it is important for investors to incorporate cash arbitrage strategies as diversifiers.

7 Our conclusions are several:

- Firstly, that the investments usually known as 'alternatives' are actually poor diversifiers for most portfolios because they are invested in the same underlying assets and because they employ the same strategies as each other – namely directional bets on equity stakes of one sort or another.
- Secondly, that hedge funds should not be seen as an asset class in themselves. Hedge funds can be found across each of the three asset classes we have identified and employing any combination of the strategies we have discussed. Making a small allocation to 'hedge funds' in the hope that this mysterious asset class will diversify any portfolio is a mistake. Instead, sophisticated investors need to understand the positioning of each individual hedge fund by understanding its strategy and underlying asset base – and thus gain a true understanding of its ability (or otherwise) to diversify portfolios.
- Thirdly that there are some particular strategies which are powerful diversifiers and which are more useful in dampening volatility in a portfolio than some of the more traditional diversifiers such as private equity and real estate.

Taken together, these points lead us to restate our underlying argument: A portfolio constructed by reference to the twelve strategies we have outlined – employing investments across all investment strategies and asset classes – will achieve similar returns at lower volatility than portfolios which rely on 'alternatives' – private equity, real assets and a small allocation to hedge funds – as diversifiers.

Why diversification matters

Since Harry Markowitz first formalised the principles of modern portfolio theory in the 1950s¹, investors have sought to capitalise on what they perceived to be the only free lunch available – diversification between asset classes. This theory prompted investors to add equities to investment portfolios which had previously been dominated by bonds. Adjusting allocations between bonds and equities has formed the mainstay of diversification policies since then, with varying geographies, market capitalisations and industries or sectors helping to improve the risk adjusted returns of portfolios. The '60:40' allocation model for equities and bonds remains very entrenched in the thinking of investors and is often considered as a passive benchmark.

The theory of diversified portfolios evolved still further with the advent of more easily investable 'alternatives' such as real estate, hedge funds and private equity and in recent years these asset classes have come to be seen as core diversifiers in a sophisticated portfolio. But even in sophisticated portfolios, investors are unlikely to allocate more than fifteen or 20 per cent in total to these 'alternative strategies'.

How successful is this diversification strategy? Are 'alternatives' a good diversifier? In this paper we examine, from first principles, the whole investment landscape and attempt to formulate a coherent view on what constitutes effective diversification.

To do something 'from first principles' means doing it without assuming any given rules or prior knowledge. It means that the 'accepted wisdom' is not automatically accepted and that even the most basic of definitions is questioned and re-examined. With this in mind, some of what follows may appear very basic, but we feel it is necessary to start right at the beginning, without pre-conceptions, in order to build a solid, rational foundation.

The beginning

The economy of the world originated with the creation of the first asset – the moment when the first primitive human being got hold of an object which was desired by his peers. Perhaps this was a simple spear for hunting, or an animal hide for warmth, but it was the creation of an asset of some sort and, due to its desirability and utility, it had intrinsic value.

Today, the world is filled with assets – tangible assets such as aircraft, power stations, communications networks, chemical plants, roads, office buildings, houses, factories, farms; and intangible assets such as software, music catalogues or other valuable information. Cash and fungible commodities are also assets. A barrel of oil or a bar of gold can be redeemed for cash at any point in time.

To obtain a yield from an asset the asset must be managed in some way: a piece of land produces a yield only if it is farmed; a refinery produces gasoline only when there are people to operate the machines. In short, assets by themselves are essentially yieldless unless a layer of management is introduced. Even cash only has a yield if it is put on deposit.

¹ Markowitz, H.M. 'Portfolio Selection'. The Journal of Finance 7 (1) pp77-91 (1952) and Markowitz, H.M. 'Portfolio Selection: Efficient Diversification of Investments'. John Wiley & Sons (1959) reprinted by Yale University Press (1970) ISBN 978-0300013726.

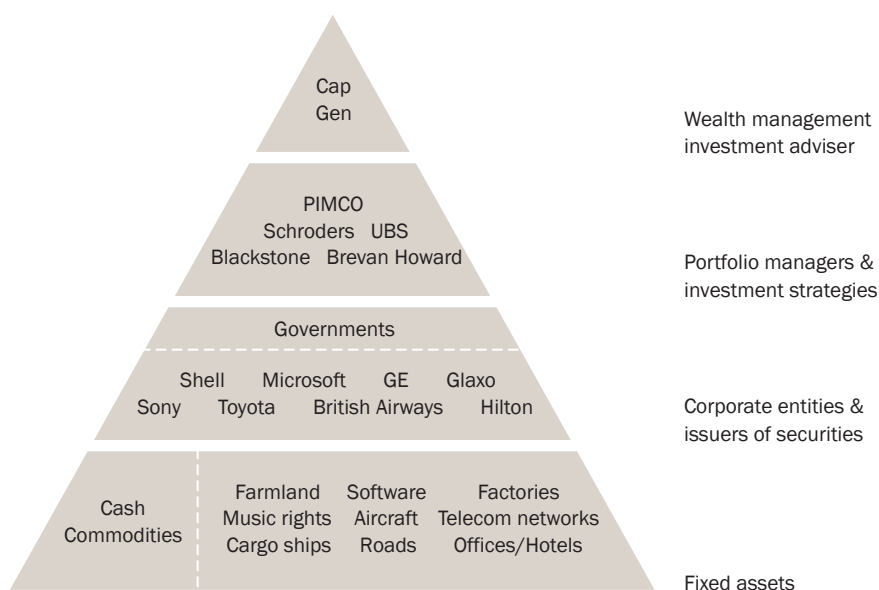
The combination of assets with management produces a corporate structure. There are essentially two ways of investing in corporate structures – either through lending to the company (debt) or through owning a piece of it (equity).

Stocks and bonds are *securities* which have been created to represent these notions of lending and owning. They exist purely to enable a legal framework of ownership and credit. These securities are one step removed from the actual fixed assets which are part of the corporate structure. By purchasing equity or debt, the fixed assets underlying the business often become secondary to the investor's place in the financial capital structure and the quality of the company's management. But it is important to realise that the fundamental investment activities here are *owning and lending*.

Of course there are myriad securities in hundreds of thousands of corporate structures, with varied characteristics and attributes. Deciding which securities to own and the strategy for holding them is the job of a fund manager. A fund is a collection of securities which are managed in accordance with a particular investment strategy.

Thus our picture of the investment world looks something like this:

Figure 1
Investments have many different levels of complexity - the higher their place in the pyramid, the greater the level of active management that is involved.



This diagram is not meant to illustrate a hierarchy, but rather levels of investment complexity, or degrees of separation from the underlying fixed assets.

Governments of course are also issuers of debt – the underlying assets in this case being the corporate taxes (and personal income taxes) of the companies and citizens of the governed country. Thus we have included governments in the above diagram in the second level as a type of 'corporate' structure with the power to issue securities.

Investment portfolios

To analyse an investment portfolio it is necessary to describe:

1. *What* securities or funds the portfolio invests in
2. *How* the securities are traded / managed (the investment strategy)

As we have discussed above, we believe all securities can be fundamentally ascribed to one of the following three asset classes:

- Cash (including fungible commodities such as gold, oil or sugar)
- Debt (any financial credit contract which pays a fixed or floating coupon)
- Equity (ownership of a company or asset / management structure)

Of course there are also various hybrid securities such as convertible bonds, warrants, options, CDOs and other derivatives. But ultimately, all of these instruments can be broken down into combinations of debt and/or equity.

Investment strategies can be split into two dimensions:

- Directional or Arbitrage
- Discretionary or Systematic

Directional strategies are those that seek to generate returns through taking a specific directional view based on fundamental analysis. For example an equity fund that buys stocks it thinks are underpriced and holds them until they reach fair value would be an example of a directional strategy. 'Value' investing might be another way of describing this, although a fund which specifically sets out to short overpriced securities would also be described as directional – the defining characteristic is that a clear view on the price direction is taken on fundamental grounds.

An arbitrage strategy on the other hand is one which seeks to take advantage of relative prices in some way. Taking the view that technology stocks are likely to fare better in the current economic downturn than other sectors and hence initiating a long / short pair trade in the NASDAQ/S&P 500 is an example of a relative value (arbitrage) investment strategy. It does not matter whether the markets move up or down, only the relative difference is of concern to the arbitrage trader.

Discretionary/Systematic describes how a strategy is implemented. A discretionary strategy is one where humans consciously think about and then perform the actual investments. An analyst may spend days on bottom up research of a company's fundamentals and, based on experience and market knowledge, recommend a trade based on a conviction that he or she feels is appropriate.

A systematic strategy however takes a rules-based approach to investing. At one end of the spectrum this may mean a complete trading system to screen, structure and perhaps even execute a trade automatically, based on algorithmic processing of input data. Or it may simply reflect a set of rules, such as to invest in an index or basket of securities according to a pre-defined list of criteria. Thus investing in an index-linked fund is a systematic investment, since the securities owned have been prescribed by the index criteria. Statistical arbitrage is another example of a systematic strategy.

The following charts show how different trading styles and methodologies fit into our 'investing framework'. We have created three matrices – one for each of the core asset classes (cash, equity and debt). Each matrix is divided into directional/arbitrage strategies and also into discretionary/systematic strategies. This results in three matrices each of which is divided into four quadrants. The resulting twelve quadrants each represent a different investment strategy. We believe that looking at portfolio allocations from this perspective provides insights into the balance of a portfolio which are not readily visible from more traditional asset allocation perspectives.

Figure 2

Diagram showing
different investment/trading
strategies for cash and commodities

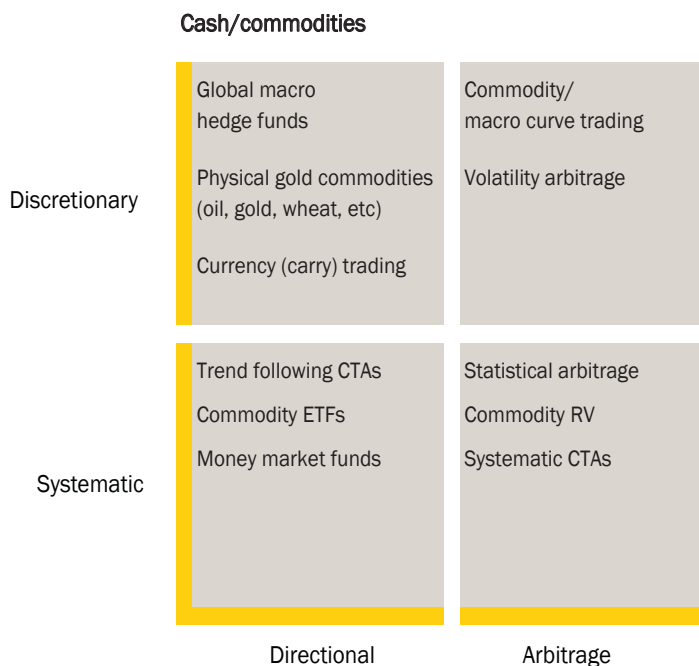


Figure 3

Diagram showing
different strategies for
investing/trading equities

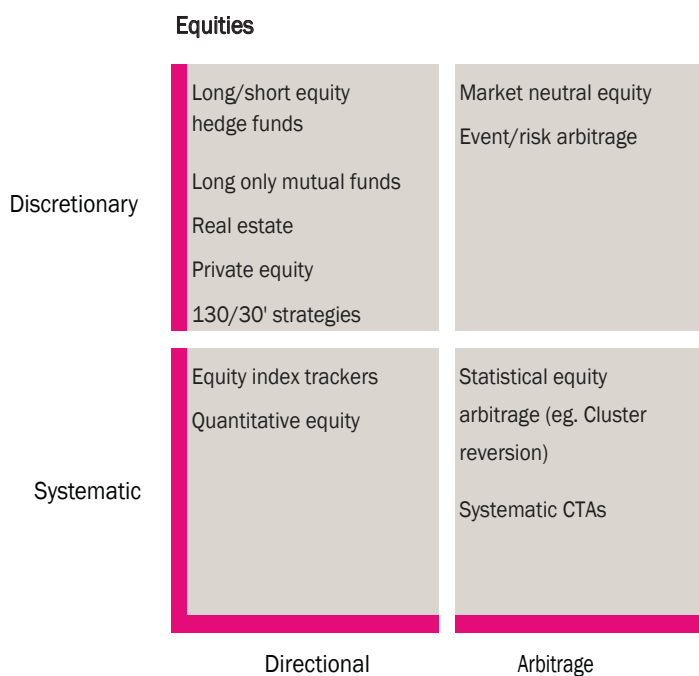
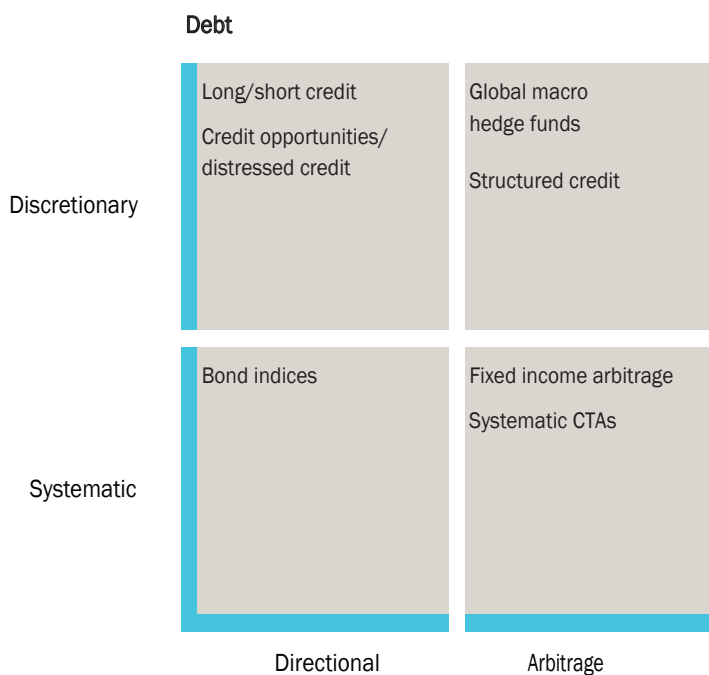


Figure 4

Diagram showing
different strategies for
investing/trading debt



Firstly let's look at cash and commodities. Money market funds and commodity ETFs are examples of directional investments which are not discretionary – they are invested according to criteria in a (very simple) systematic fashion. Trend-following CTAs might also use directional systematic strategies, though in this case the systems would be much more complex. So in Figure 2, we have entered trend-following CTAs, commodity ETFs and money market funds in the lower left quadrant.

Other types of fund strategy and instruments in the cash / commodity space are filled in elsewhere in the matrix. Some types of fund strategy might appear in more than one quadrant and some strategies are not mutually exclusive, eg some global macro hedge funds might also pursue curve-trading strategies.

Figure 3 shows an interesting dispersion among equity strategies. Long only mutual funds and equity index trackers are both directional equity investments. However, mutual funds have been placed in the discretionary quadrant as fund managers are free to choose which stocks they over and underweight whereas index trackers are constructed according to weighting / allocation rules and so are systematic in nature. What we can see is that many asset classes which are traditionally thought of as being alternative and adding diversification to traditional portfolios all happen to be found in the equity matrix in the discretionary/directional quadrant. Both private equity and real estate feature in the upper left quadrant of the equity diagram, alongside long/short equity hedge funds and long only mutual funds. In essence, all of these strategies – though traditionally seen as diverse – employ the same fundamental approach to the same sorts of assets.

The diagram for debt investments is shown in Figure 4. Bond indices, be they high yield, investment grade or sovereign, are directional systematic investments and so feature in the lower left quadrant.

We believe that these three diagrams provide a starting point to a new way of looking at investment strategies. It seems clear, to us at least, that the risks inherent in certain types of investment, for example the equity markets, must *depend to some extent on the strategy employed* in investing in them and hence a portfolio that is constructed with the intention of diversifying risks *should diversify across strategy as well as asset class*.

These three charts represent, from our first principles perspective, the fundamental ways in which we believe investments can be described. An investor can own something (equity), he can lend to something (debt) or he can hold investments of pure value (cash / commodities). Investment strategies can be either absolute (directional) or relative (arbitrage). And these strategies may be implemented on a discretionary basis or systematically, according to rules or criteria. We think that this is a useful way to classify all investments.

Of course, within each strategy and for each asset class there are further levels of differentiation which will affect the behaviour of the investment. For instance, investments can vary by geography, by the extent of liquidity provided, by underlying commercial sector, by the amount of leverage applied, and by time scale – and all of these features have their own, idiosyncratic effects on the way the investment will behave. However, these characteristics

can all be laid on top of the schema we have created – they add a further layer of intricacy to, but do not fundamentally alter, the relationships set out above.

Asset allocation using First Principles Diversification

So far we have merely attempted to describe the investment universe from first principles. By looking at the fundamental building blocks of the economy (fixed assets) and seeing how securities and funds are derived from the corporate structures and governments which own and utilise these fixed assets, we have constructed a system which splits different types of investments into categories which we believe offers a more fundamental diversification than the currently accepted notion of ‘alternative investments’.

Let’s now construct a model portfolio to see how such diversification might work in practice. Because we are trying to work from a first principles approach and not take for granted any of the accepted wisdom of portfolio construction, we will start by constructing a portfolio equally weighted between the three asset class buckets we have been considering: cash/commodities, equity and debt:

Asset class	Allocation
Cash	33.3%
Equities	33.3%
Debt	33.3%

Again, with no further sophistication in our allocation mechanism, we will equally weight all of the four quadrants within each of the asset classes:

Cash	Directional	Discretionary	8.33%
Cash	Arbitrage	Discretionary	8.33%
Cash	Directional	Systematic	8.33%
Cash	Arbitrage	Systematic	8.33%
Equities	Directional	Discretionary	8.33%
Equities	Arbitrage	Discretionary	8.33%
Equities	Directional	Systematic	8.33%
Equities	Arbitrage	Systematic	8.33%
Debt	Directional	Discretionary	8.33%
Debt	Arbitrage	Discretionary	8.33%
Debt	Directional	Systematic	8.33%
Debt	Arbitrage	Systematic	8.33%
			100%

In order to see how such a portfolio might have performed, we need to adopt time series of returns that represent the twelve strategy allocations above. Of course there are many possibilities to choose from, many more than twelve, and so there will inevitably be some discretion and subjectivity introduced in this part of the process. Where possible however we have tried to choose

broad and investable market indices/funds to represent the strategies as closely as possible. In the cases where more than one index is used for a particular strategy allocation, we have equally split the sub-allocations. We have used January 2004 to September 2012 as our time period – there is reasonably good coverage of many strategies over this period. We have used monthly returns data and, wherever possible, have used total return, investable indices. The following table shows the selections made for each of the twelve strategy combinations:

		Investment	Bloomberg ticker	
Cash				
Directional	Discretionary	Discretionary thematic macro hedge funds	HFRXDT Index	8.33%
Arbitrage	Discretionary	Active trading macro hedge funds	HFRXTRAD Index	8.33%
Directional	Systematic	S&P GS Commodity Index TR	SPGSCITR Index	4.17%
		Commodity hedge funds	HFRXCOM Index	4.17%
Arbitrage	Systematic	Commodity trading advisors	BARCCTA Index	8.33%
Equities				
Directional	Discretionary	Fundamental growth hedge funds	HFRXEHG Index	2.08%
		Fundamental value hedge funds	HFRXEHV Index	2.08%
		CapGen Private Equity Index		2.08%
		Capgen Real Asset Index		2.08%
Arbitrage	Discretionary	Merger arbitrage funds	HFRXMA Index	8.33%
Directional	Systematic	Quantitative directional hedge funds	HFRXQD Index	4.17%
		Equity index (MSCI World)	GDDUWI Index	4.17%
Arbitrage	Systematic	Market neutral hedge funds	HFRXEMN Index	8.33%
Debt				
Directional	Discretionary	Pimco total return bond fund	PIMTRAI ID Equity	8.33%
Arbitrage	Discretionary	Credit arbitrage hedge funds	HFRXCRED Index	8.33%
Directional	Systematic	Bond index (BarCap GlobalAgg)	LEGATRUU Index	8.33%
Arbitrage	Systematic	Relative value arbitrage hedge funds	HFRXRVA Index	8.33%
				100%

So our First Principles Diversification portfolio looks like this:

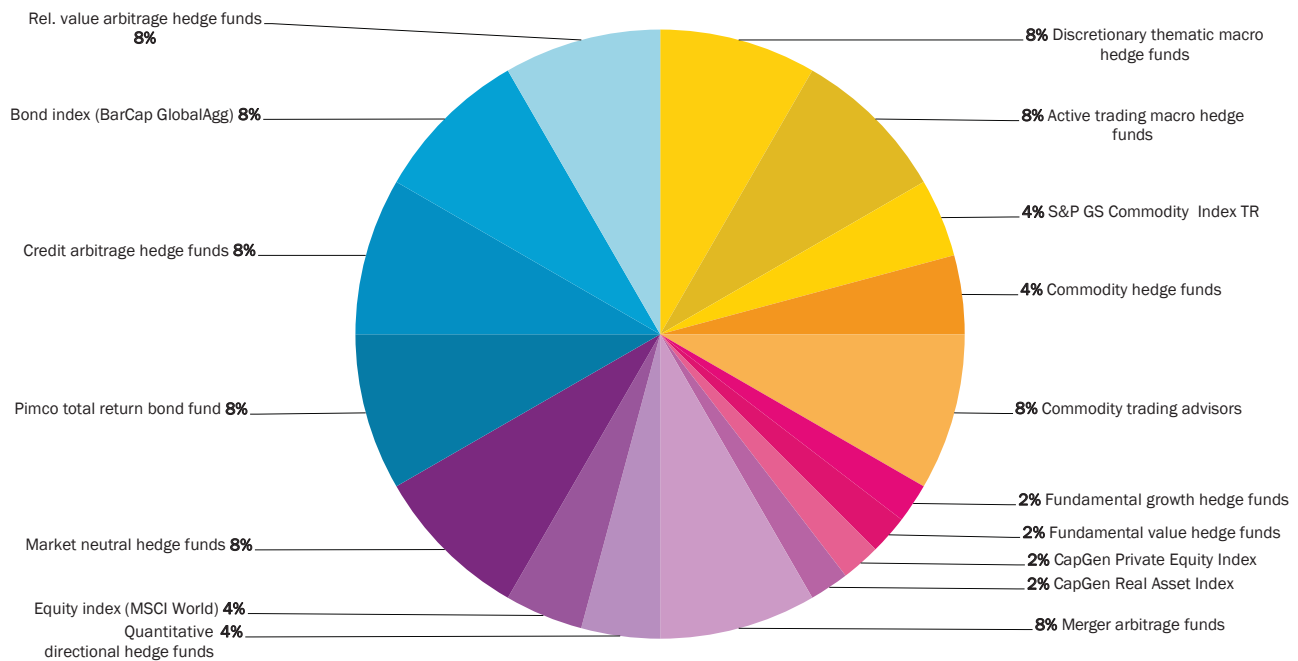


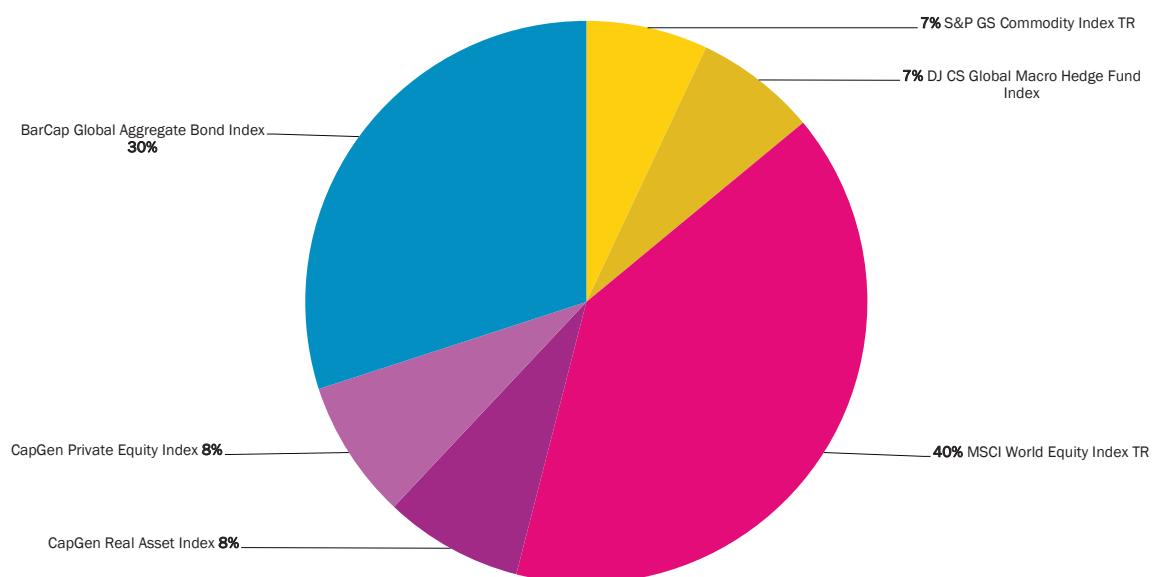
Figure 5
Pie chart showing
allocations to various
strategies according to
our 'First Principles
Diversification' approach

Yellow segments are cash/commodities, pink segments are equity strategies and blue segments are debt related strategies. We have arrived at this portfolio purely through allocating equally to our three asset classes of cash/commodities, equity and debt and then further (equally) allocating to sub-strategies. One of the features of our notion of 'First Principles Diversification' is that it is diversification across strategy which should be seen as a significant source of value-add here as opposed to any additional value deriving from manager selection. In other words, we argue that our notion of 'First Principles Diversification' provides the almost cost-free diversification premium Harry Markowitz was describing. This can be described as the only free lunch in investing, as mentioned in our first paragraph, because it can be achieved by diversification across strategy alone, without refinements to the asset allocation or to manager selection.

This portfolio certainly looks very different to the more traditional equity and bonds focussed portfolios. But importantly, it also looks different to the modern institutional ‘diversified’ portfolios, as constructed perhaps by endowments, pension schemes or charities which might look something more like this:

	Investment	Bloomberg ticker	
Commodities	S&P GS Commodity Index TR	SPGSCITR Index	7%
Hedge funds	DJ CS Global Macro Hedge Fund Index	HEDGGLMA Index	7%
Equities	MSCI World Equity Index TR	GDDUWI Index	40%
Real Assets	CapGen Real Asset Index		8%
Private Equity	CapGen Private Equity Index		8%
Bonds	BarCap Global Aggregate Bond Index		30%
			100%

Figure 6
Pie chart showing the approximate allocations that might typically be found in a diversified institutional portfolio which we call the enhanced benchmark portfolio.



This portfolio has a 40% allocation to equities (via the MSCI World in this case), a 30% allocation to fixed income (as before we will use the BarCap Global Aggregate to represent this portion), 8% each to private equity and real estate and 7% each to commodities and hedge funds (for which we have chosen global macro hedge funds to provide an absolute source of alpha). Although we acknowledge that far from all institutional portfolios will resemble the one above, particularly in the current macro environment when many portfolios are holding relatively large cash reserves, we shall use the above portfolio to represent an 'enhanced benchmark portfolio' to which we can compare the First Principles Diversification portfolio described previously.

As another point of comparison we have also looked at the traditional 60:40 mix of equities and bonds which we shall refer to as the 60:40 benchmark portfolio.

	Investment	Bloomberg ticker	
 Equities	MSCI World Equity Index TR	GDDUWI Index	60%
 Bonds	BarCap Global Aggregate Bond Index	LEGATRUU Index	40%
			100%

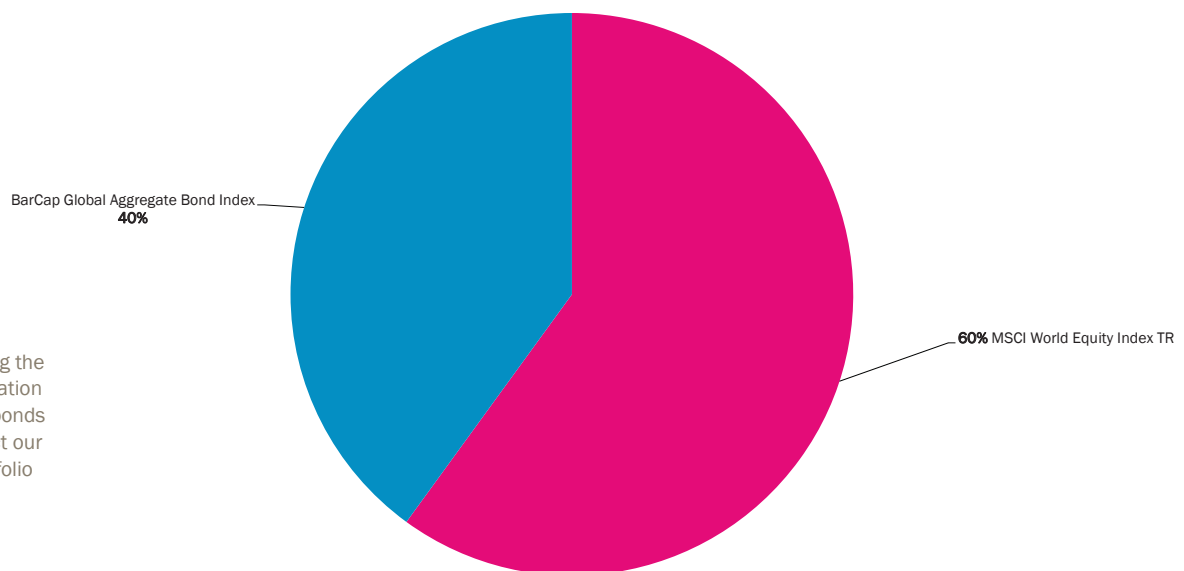


Figure 7
Pie chart showing the 60:40 split allocation to equities and bonds used to construct our benchmark portfolio

So how would our First Principles Diversification portfolio have performed over the period to September 2012? The chart below shows the performance of each of the constituents and the thick black line is the portfolio itself (we have assumed monthly rebalancing for the purposes of this illustration):

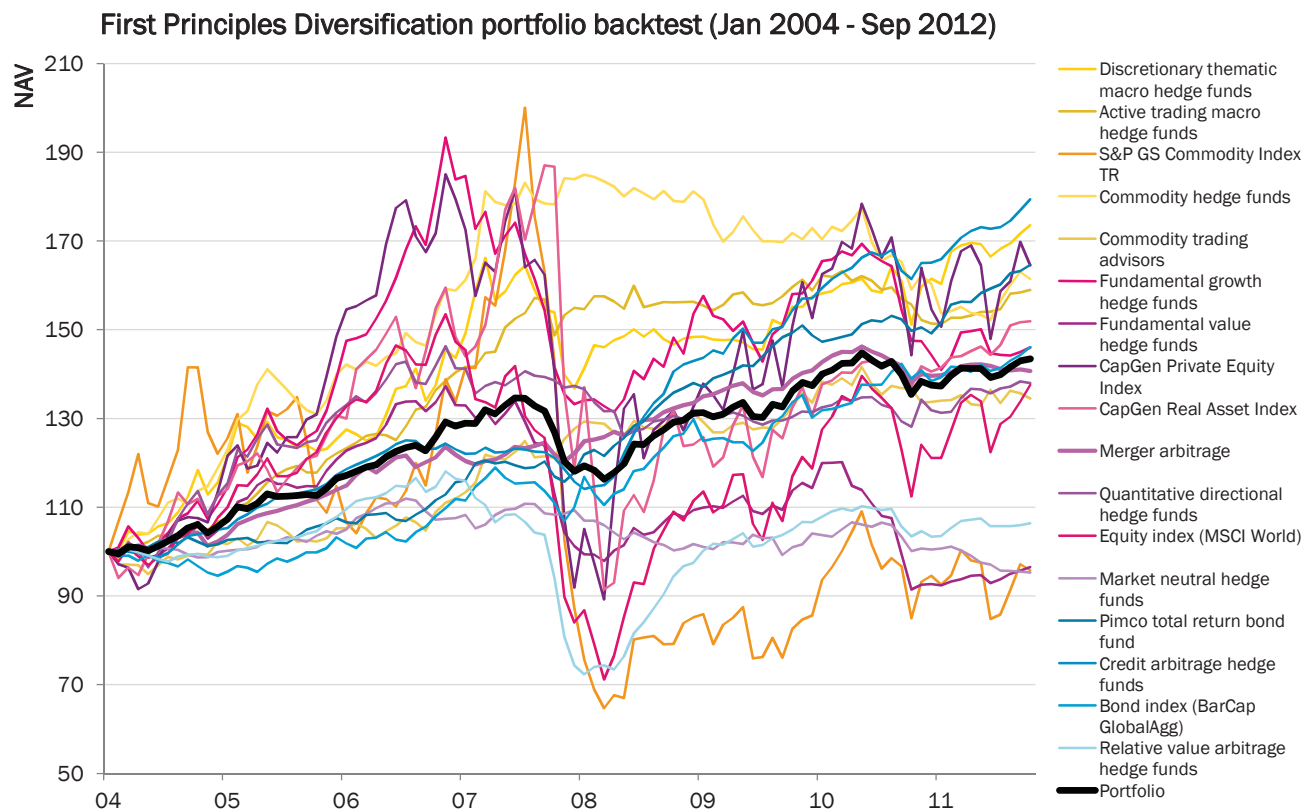


Figure 8
The NAV of the First Principles Diversification portfolio from January 2004 to September 2012 (thick black line) and the NAVs of its constituent time series

First Principles Diversification portfolio

Annualised return	4.7%
Volatility	5.0%
Maximum drawdown	-12.2%

The First Principles Diversification portfolio for the main part delivered low volatility returns. The 'enhanced benchmark portfolio' as depicted in Figure 6 performed as follows:

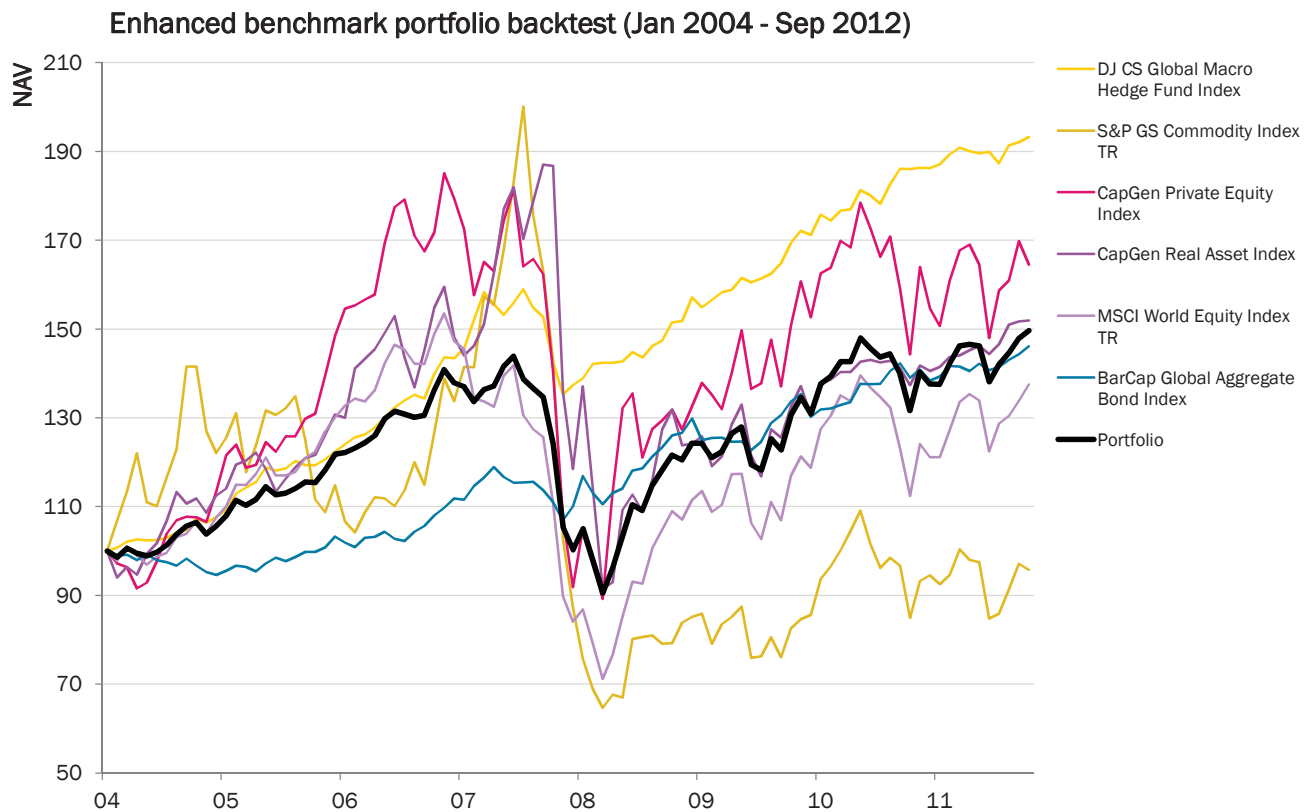


Figure 9
The NAV of the enhanced benchmark portfolio' from January 2004 to September 2012 (thick black line) and the NAVs of its constituent time series

Enhanced benchmark portfolio

Annualised return	5.3%
Volatility	12.3%
Maximum drawdown	-30.3%

Annualised returns were very slightly higher than those achieved by the First Principles Diversification portfolio; however the volatility and maximum drawdown were significantly higher.

The '60 : 40 benchmark' displayed similar volatility and drawdown characteristics.

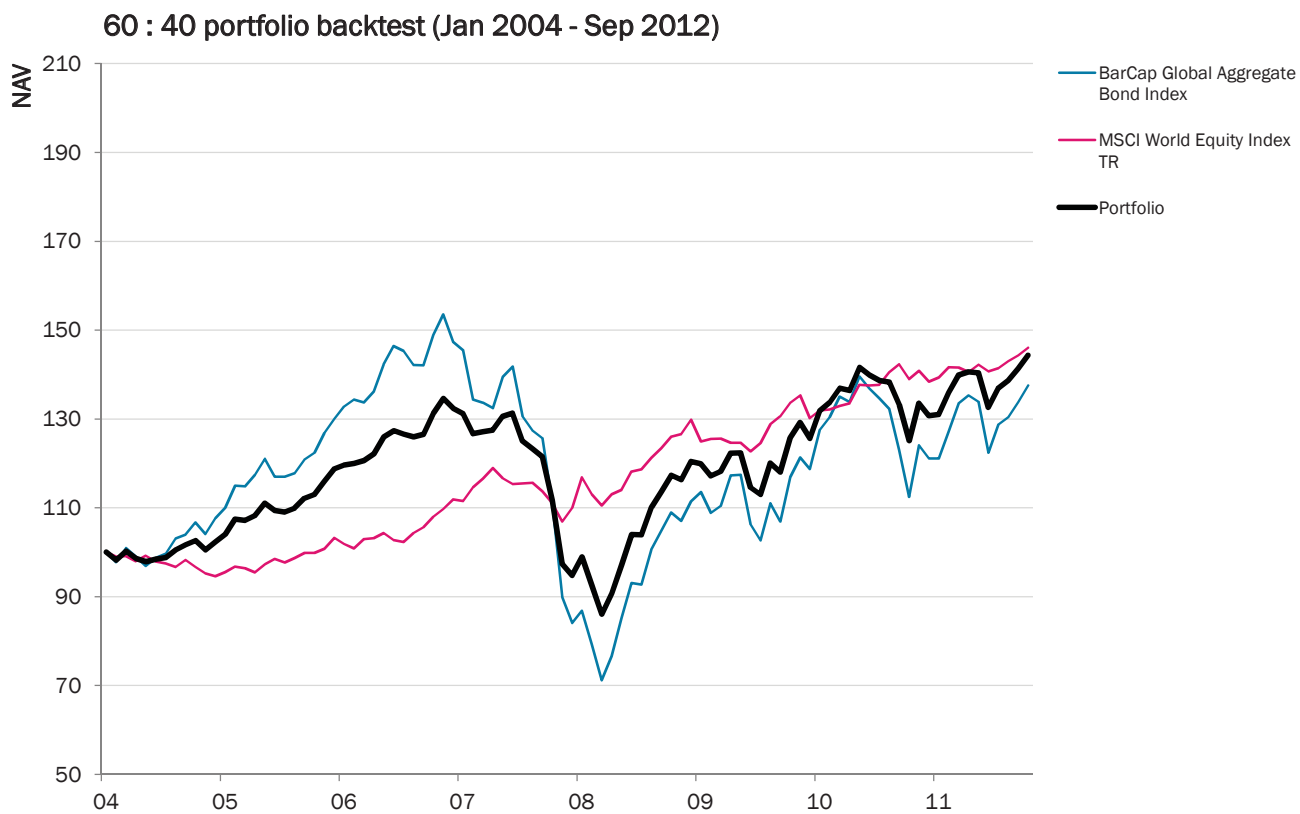


Figure 10
The NAV of the 60:40 benchmark Portfolio from January 2004 to September 2012 (thick black line) and the NAVs of its constituent time series

60 : 40 benchmark portfolio

Annualised return	4.8%
Volatility	3.4%
Maximum drawdown	-27.8%

As well as just calculating straight backtests for these portfolios, we also ran Monte Carlo simulations for them. The aim here was to see the variation that might have been expected based on the time series and allocations used. Resampling 10,000 portfolios for each of the portfolio allocations enables us to create a scatter plot showing the risk and return for each of these Monte Carlo portfolios:

Monte Carlo portfolio performance comparison Jan 2004 - Sep 2012

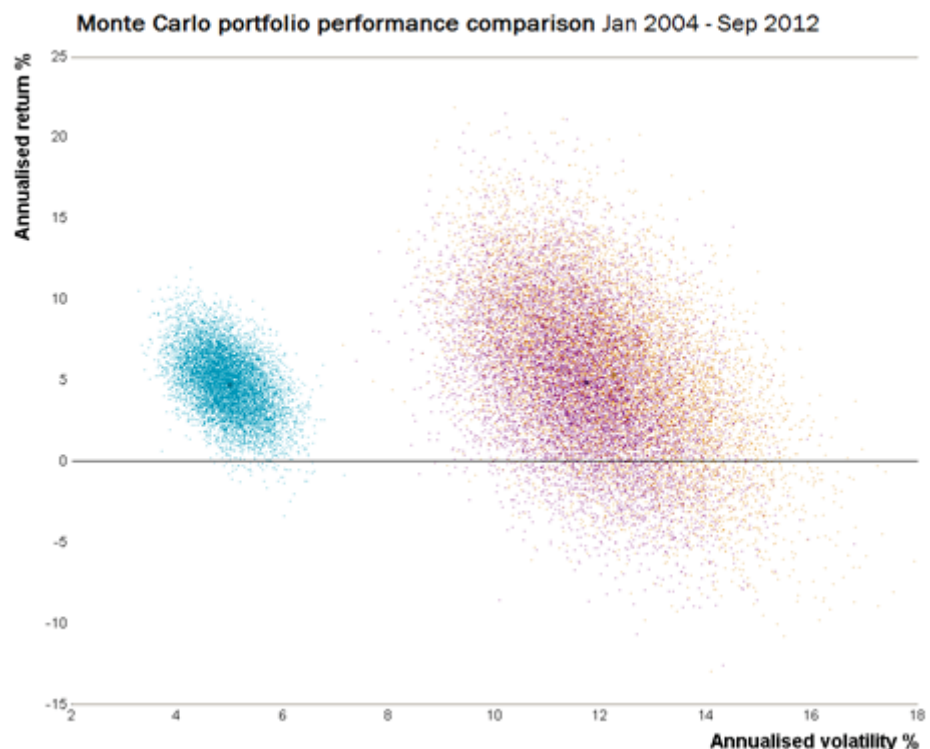
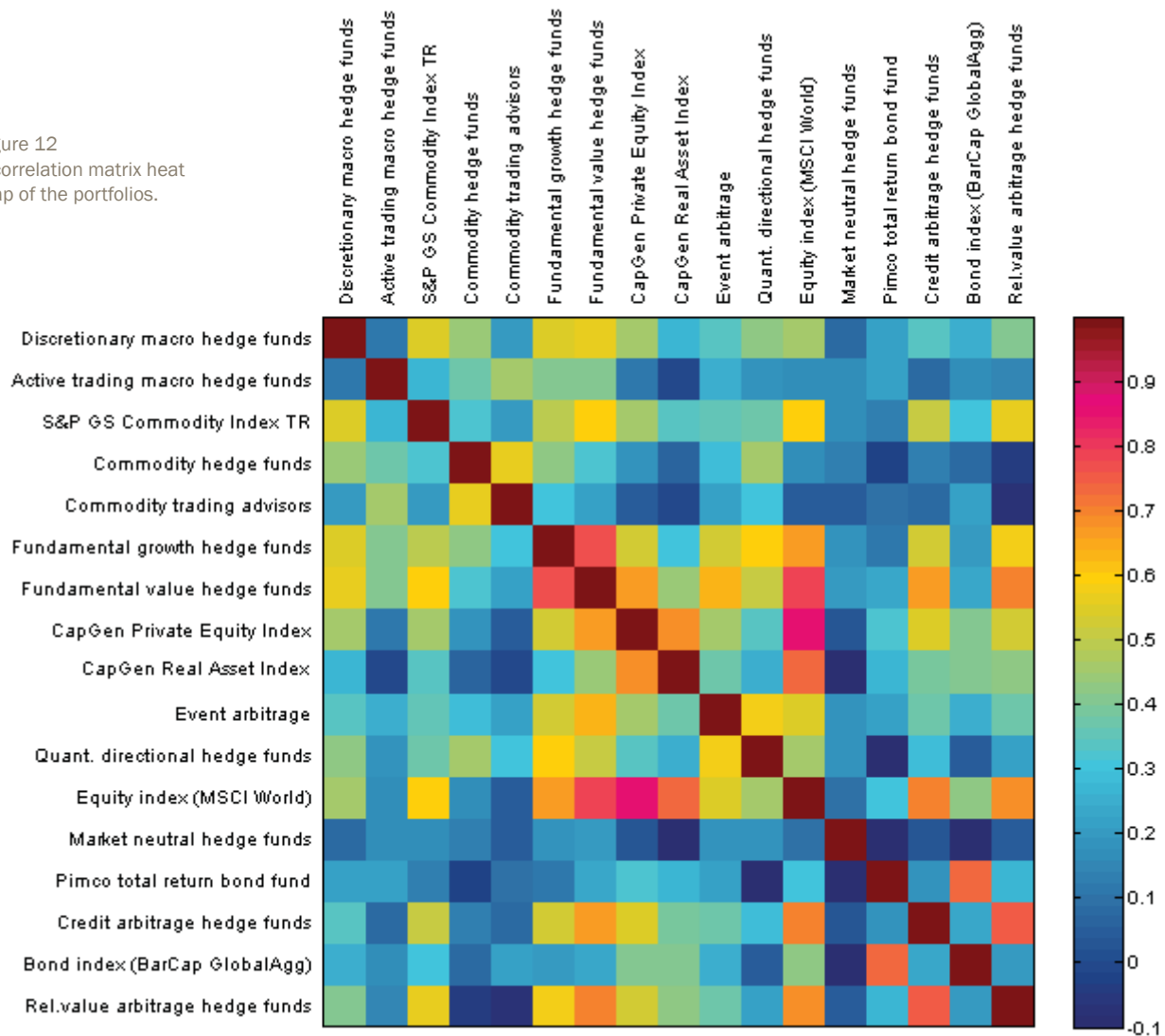


Figure 11
A scatter diagram showing the risk / returns of 30,000 resampled Monte Carlo portfolios, 10,000 for each of the three portfolio allocations we have been considering. The larger and darker dots in the centres of the portfolio clusters are the actual (not resampled) backtest portfolios

The orange dots show each of the 10,000 resampled enhanced benchmark portfolios, the purple dots show the 60:40 benchmark portfolios and the blue dots show the resampled First Principles Diversification portfolios. The larger dots are the actual backtest portfolios described above.

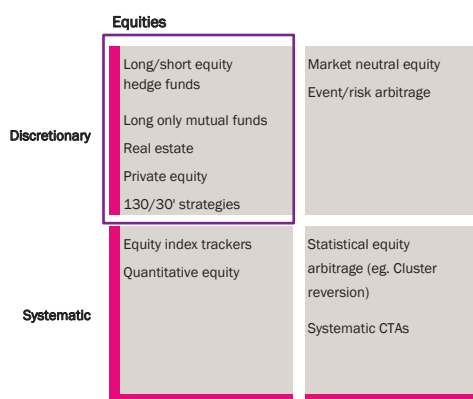
So why is the portfolio based on First Principles Diversification able to outperform the benchmark and enhanced benchmark portfolios so convincingly? To understand this we need to examine correlations between the investments in the portfolios. The chart below shows a correlation heat map for all of the time series we have been using in the portfolios:

Figure 12
A correlation matrix heat map of the portfolios.



The cluster of orange and red in the middle of the heat map shows that the MSCI World in particular is highly correlated with equity long /short hedge funds, real estate and private equity. In fact all four of these time series exhibit high pair-wise correlations.

What is particularly striking about the 'enhanced benchmark' portfolio above is that 56% of it (40% equities, 8% private equity and the 8% allocation to real estate) comes from the directional side of the equity diagram (figure 3):



	Investment	Bloomberg ticker	
Commodities	S&P GS Commodity Index TR	SPGSCITR Index	7%
Hedge funds	DJ CS Global Macro Hedge Fund Index	HEDGGLMA Index	7%
Equities	MSCI World Equity Index TR	GDDUWI Index	40%
Real Assets	CapGen Real Asset Index		8%
Private Equity	CapGen Private Equity Index		8%
Bonds	BarCap Global Aggregate Bond Index		30%
			100%

We believe that this concentration in what we have termed 'directional equity' is the source of significant risk in modern portfolios. We do not subscribe to the view that private equity and real estate are good diversifiers in traditional portfolios: they are both ways of owning things and hence they are both susceptible to the same forces that exist on owned assets (eg. cost of borrowing, inflation etc). Rather we feel that the common assumption that real estate and private equity are good 'alternatives' to the traditional bond / equity mix is a fundamental misconception.

'Alternative strategies'

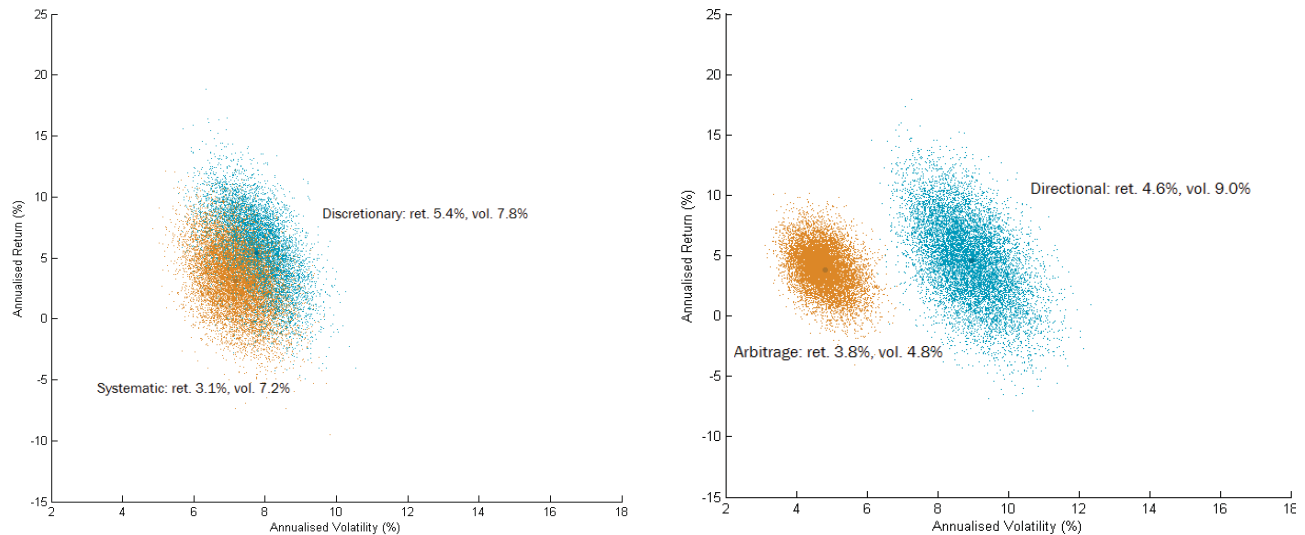
It will not have escaped the reader that our First Principles Diversification portfolio has a significant proportion of what are traditionally termed 'Alternative strategies'. As we discussed earlier, we believe that true diversification stems from diversifying across strategies as well as the underlying assets and therefore it is inevitable that active investment strategies must be included alongside passive ones.

A common perception that we encounter regularly is that 'alternative strategies', such as hedge funds or private equity funds, are a different asset class to equities or bonds and that they should sit alongside them in an investment portfolio. We feel quite strongly that this perception is incorrect. Hedge funds are not an asset class. At the broadest level, hedge funds trade all asset classes (equities, bonds and commodities) using different methodologies to long only or passive investment funds. The fact that they use different trading methodologies does not somehow make them a different asset class any more than funds which happen to use a long only methodology are in themselves an asset class.

Diversifiers

Additional research carried out for the 2013 edition of First Principles also revealed some further richness around the two strategy axes. To examine the strategies further we reviewed the First Principles Diversification portfolio through four different prisms. Rather than creating one portfolio comprising equal weightings for each of the twelve strategies we created four different portfolios – one for each end of the directional/arbitrage strategy axis and one for each end of the discretionary/systematic axis. Each portfolio was constructed from six of the twelve overall strategies, in the case of the discretionary portfolio, eliminating all the systematic strategies and vice versa and in the case of the directional portfolio eliminating all the arbitrage strategies and vice versa. If an individual strategy combination was calculated using more than one underlying index it was given the same weight in the portfolio as a strategy with a single underlying index.

We then compared these four portfolios to see which of the two axes was more powerful in driving diversification. As the chart below shows, the directional and arbitrage strategies show greater dispersion from each other than the discretionary and systematic strategies. Although the discretionary/systematic axis does have diversification value and should always be incorporated in a diversified portfolio, the diversification power is not as strong as the power of the directional/arbitrage axis. This makes sense when one considers that discretionary judgement will have been used when formulating systems for use in systematic strategies.



This finding is also reflected in the increasing convergence of the performance of many active managers towards each other and towards passive strategies. There is undoubtedly still value in active management for the top decile managers but the average manager typically does not diverge greatly from the passive equivalent and therefore the diversification impact is deadened. Secondly, the correlations between all 12 strategies were examined and there were two strategies which were clearly less correlated with the rest than the others .

	CASH/Dir/Dis	CASH/Dir/Sys	CASH/Arb/Dis	CASH/Arb/Sys	EQUITY/Dir/Dis	EQUITY/Dir/Sys	EQUITY/Arb/Dis	EQUITY/Arb/Sys	DEBT/Dir/Dis	DEBT/Dir/Sys	DEBT/Arb/Dis	DEBT/Arb/Sys
CASH/Dir/Dis	1	0.6	0.12	0.21	0.55	0.5	0.56	0.08	0.23	0.26	0.34	0.41
CASH/Dir/Sys	0.6	1	0.33	0.32	0.57	0.61	0.75	0.18	0.11	0.29	0.49	0.5
CASH/Arb/Dis	0.12	0.33	1	0.45	0.23	0.2	0.38	0.17	0.21	0.17	0.08	0.15
CASH/Arb/Sys	0.21	0.32	0.45	1	0.13	0.14	0.26	0.05	0.09	0.23	0.09	-0.07
EQUITY/Dir/Dis	0.55	0.57	0.23	0.13	1	0.91	0.7	0.1	0.31	0.4	0.63	0.65
EQUITY/Dir/Sys	0.5	0.61	0.2	0.14	0.91	1	0.73	0.15	0.21	0.36	0.65	0.62
EQUITY/Arb/Dis	0.56	0.75	0.38	0.26	0.7	0.73	1	0.24	0.16	0.23	0.63	0.57
EQUITY/Arb/Sys	0.08	0.18	0.17	0.05	0.1	0.15	0.24	1	-0.25	-0.16	0.03	0.04
DEBT/Dir/Dis	0.23	0.11	0.21	0.09	0.31	0.21	0.16	-0.25	1	0.73	0.19	0.27
DEBT/Dir/Sys	0.26	0.29	0.17	0.23	0.4	0.36	0.23	-0.16	0.73	1	0.22	0.2
DEBT/Arb/Dis	0.34	0.49	0.08	0.09	0.63	0.65	0.63	0.03	0.19	0.22	1	0.74
DEBT/Arb/Sys	0.41	0.5	0.15	-0.07	0.65	0.62	0.57	0.04	0.27	0.2	0.74	1

As can be seen from the correlation matrix, arbitrage systematic strategies are least correlated with other strategies in the equity and cash asset classes and directional discretionary strategies are least correlated in the debt asset class.

As we have outlined above, enhanced benchmark portfolios are particularly overweight equity directional strategies. The increasing use of private equity and real estate in portfolios has left many investors unwittingly over-exposed to one strategy.

The correlation matrix above shows that cash arbitrage strategies are important diversifiers for equity directional strategies and it follows that investors with enhanced benchmark portfolios should consider incorporating cash arbitrage strategies in their allocations.

There are, therefore, a number conclusions to draw from our work on First Principles Diversification. Firstly, we argue that current allocations frequently fail to take account of the underlying assets and strategies embedded within each investment and that as a result, what appears to be diversified is actually closely correlated. The secular shift to private equity and real estate as a diversifier in traditional portfolios is a prime example of this mistake.

Secondly, we argue that, if we approach hedge fund investments in this more considered way, we will discover that hedge funds are not an asset class. It follows that adding hedge funds to a portfolio without paying due regard to the underlying assets and strategies used will not, by itself, achieve effective diversification. Wise investors should seek to crack open the term 'hedge fund' and to understand the individual strategies and underlying assets that sit within the hedge fund bucket. Once the individual strategies have been understood as distinctive and discrete approaches to investing, the investor can start to diversify by reallocating according to this new understanding.

Thirdly, investors should pay particular attention to the directional/arbitrage axis and specifically to including systematic arbitrage equity and cash strategies and directional discretionary debt strategies in their portfolios as these appear to be particularly uncorrelated with other elements of a First Principles portfolio.

Appendix – Indices used in the portfolio backtests

HFRX Macro: Discretionary Thematic Index – Ticker: HFRXDT Index

Constructed by Hedge Fund Research Inc, this index tracks the performance of hedge funds that engage in strategies that employ an investment process most heavily influenced by top down analysis of macroeconomic variables. The managers can invest across all markets and instruments, and typically employ spread trades. Portfolio positions often contain contrarian or volatility focussed components.

S&P GSCI Total Return Index – Ticker: SPGSCITR Index

A standard total return commodity price index that takes into account the cost of carry (roll) in owning commodities.

HFRX Macro: Commodity Index – Ticker: HFRXCOM Index

Constructed by Hedge Fund Research Inc, this index tracks the performance of hedge funds that have investment processes based on mathematical, algorithmic and technical models; individuals have little or no influence over the portfolio positioning. The covered strategies typically would expect to have greater than 35% of portfolio in dedicated commodity exposure over a given market cycle.

HFRX Macro: Active Trading Index – Ticker: HFRXTRAD Index

Constructed by Hedge Fund Research Inc, this index tracks the performance of hedge funds that have strategies which utilise active trading methods. The strategies are characterised with high frequency position turnover or leverage. Their investment process is based on systematic, quantitative evaluation of macroeconomic variables in which the portfolio positioning is predicated on convergence differentials between markets.

Barclay CTA Index – Ticker: BARCCTA Index

An index of commodity trading advisers, the Barclay CTA index is unweighted and includes only hedge funds with at least four years' track record. To avoid survivorship bias the performance used for the index starts with the fifth year only. The index is rebalanced annually.

HFRX Equity Hedge: Fundamental Value Index – Ticker: HFRXEHV Index

Constructed by Hedge Fund Research Inc, this index tracks the performance of hedge funds that have investment processes which identify securities of companies which are determined by the manager to be undervalued compared to a relevant benchmark. Their strategies typically focus on equities with high cash flows but trade at discounted valuation multiples; often this is due to limited anticipated growth prospects.

HFRX Equity Hedge: Fundamental Growth Index – Ticker: HFRXEHG Index

Constructed by Hedge Fund Research Inc, this index tracks the performance of hedge funds that have investment processes which identify securities of companies that are determined by the manager to have prospects for earnings growth and capital appreciation exceeding those of the broader equity market.

HFRX Equity Hedge: Quantitative Directional Index – Ticker: HFRXQD Index

Constructed by Hedge Fund Research Inc, this index tracks the performance of hedge funds that employ sophisticated quantitative (factor-based and statistical arbitrage/trading) strategies. Statistical arbitrage/trading strategies aim to exploit new information that has not been fully or accurately discounted into current security prices. These strategies typically maintain varying levels of net long and short equity market exposure over various market cycles.

CapGen Private Equity Index

A monthly time-series derived from the following market indices: the LPX Composite Listed Private Equity Total Return Index (Ticker: LPXCMPTTR Index) which is a diversified and global index of all major listed private equity companies; and the Preqin – Private Equity Quarterly Index which is calculated from the cash flows and valuations experienced by investors in private equity funds.

CapGen Real Asset Index

A monthly time-series derived from the following market indices: S&P Developed Property Index (Ticker: SREITTR Index) an index which covers property REIT companies in developed markets; and the IPD Global Annual Property Index (Ticker: IPDGLAR Index) a gross property index which reports market rebalanced returns of the 24 most mature real estate markets.

MSCI World (Total Return) – Ticker: GDDUWI Index

The MSCI World TR is a standard, global equity index that includes the effects of reinvesting dividends.

HFRX Event Driven: Merger Arbitrage – Ticker: HFRXMA Index

Constructed by Hedge Fund Research Inc, this index tracks the performance of hedge funds that focus on opportunities in equity and equity related instruments of companies that are currently engaged in a corporate transaction. Portfolio positions are frequently presented in cross-border, collared and international transactions incorporating multiple geographic regulatory institutions.

HFRX Equity Market Neutral Index – Ticker: HFRXEMN Index

Constructed by Hedge Fund Research Inc, this index tracks the performance of hedge funds that engage in equity trading strategies where portfolios are constructed to be neutral in either beta or dollar terms to a particular equity benchmark. Net market exposure of market neutral funds is typically less than 10% long or short.

Pimco Total Return Bond Fund – Ticker: PIMTRAI ID Equity

US focussed, investment grade bond fund.

Barclays Capital Global Aggregate Total Return Index – Ticker: LEGATRUU Index

The BarCap Global Aggregate TR bond index is a very broad index of all types of fixed income instruments including sovereign, investment grade corporate and high yield across developed and emerging markets.

HFRX Event Driven: Credit Arbitrage Index – Ticker: HFRXCRED Index

Constructed by Hedge Fund Research Inc, this index tracks the performance of hedge funds that employ an investment process to isolate anticipated idiosyncratic developments in corporate fixed income securities. Positions are structured with little or no broad credit market exposure.

HFRX Relative Value Arbitrage Index – Ticker: HFRXRVA Index

Constructed by Hedge Fund Research Inc, this index tracks the performance of hedge funds that employ fundamental and quantitative techniques to determine opportunities by identifying attractive risk-adjusted spreads between instruments due to pricing discrepancies.

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