What are the global mega trends? What do they mean for your equity portfolios?

Paul Spence, Global Head Portfolio Eng and Bill Barbour, Director and Investment Specialist, Deutsche Asset Management

---

ABSTRACT

What is the affect on portfolio construction when portfolios are constructed with respect to commonly held benchmarks rather than on using a total return / total risk objective function?

This paper looks at the affect of different risk constraints when constructing an equity portfolio using a number of underlying, actively managed portfolios. By approaching portfolio construction from the more traditional perspective of total volatility we will be able to address the confusion that often arises when considering how to best use "specialist" investment strategies within well diversified portfolios. This paper will outline a current "specialist" investment approach that is looking to profit from one of the mega trends affecting global equity markets – Global Agribusiness. We will demonstrate how this investment theme can be applied to an investor's portfolio.

INTRODUCTION

Specialist investment strategies or "mega-trends" are increasingly becoming more important as many investors are recognising that some of the major forces that are playing out on the world arena are creating new economic opportunities which in turn generate new investment opportunities.

Traditional portfolio construction which uses commonly held benchmarks tends to ignore many of these global forces or "mega trends" and as such many portfolios are providing a sub-optimal solution for investors whom wish to capture such "mega trends" in their portfolios.

What are the Mega Trends?

Defining these "mega trends" involves looking at some of the major macro forces playing out on the global arena and analysing their effect and potential opportunity for investors. It is now commonly recognised that the world population will increase form 6.4 billion to 9.5 billion by 2050 (UNO, Center for Public Affairs Research 2004), and with this increase in population a number of new investment opportunities are arising. The arenas in which new investment opportunities are arising include, but are not limited to, the agricultural sector and in particular those sectors focused on "food production" and "bio-fuels". The growing importance of the agricultural sector on world financial markets has resulted in Merrill Lynch coining a new investment term "Agflation" in April 2007(Merrill Lynch Investment Strategy/Global; "Global Agriculture & Agflation"; 27th April 2007). As Merrill Lynch point out Agflation has begun as a result of food prices rising which is in turn putting upward pressure on producer and consumer inflation. Such a trend has emerged as the currents have begun to change in the world of the global food business. That is,

given the constraints on food supply, the changing demand for food, and the entrance of the energy business as mass consumers of food products, consumers are now seeing food prices rapidly putting upward pressure on overall inflation. The concern is not the typical cyclical rise that we see in inflation, but a secular price rise that we have seen in the global agricultural business that is likely to be more long-lived.

In addition we are witnessing developing countries expand and develop and seeing rising income levels particularly in the lower-middle income levels. As 3 billion people world wide see their income levels rise by US$1,000 per annum(CIA: The World Factbook 2006 & Income Group Classification: World Bank, 2006) their consumption patterns also change creating economic and investment opportunities, in a similar fashion to the effect of the baby boomer generation on economic and investment opportunities. Whilst Agflation may be bad for the consumer it is a good news story for the food companies as many of these companies will be able to pass along the higher input costs to the consumer. Such dynamics are shifting the investment opportunity set in the agricultural sector and presenting new opportunities for astute investors.

Other “mega trends” include the hotly debated Climate Change issue. While many social and science commentators continue to debate the rights and wrongs of the science, a number of astute financial market participants have witnessed a distinct shift in the perception of climate change that has put the issue of man-made greenhouse gases (GHG’s) into the domain of risk management. As a result, what matters to investors, is the response of financial markets, sectors and companies to climate change-related reactions. As a result of this shift in perception it is anticipated, and in some markets is well underway, that governments will focus on pushing for behavioural change, through mitigation and adaptation policies. These policies will have macro effects, such as the impact on consumption growth, even if climate change does not. In addition environmental regulation has scope to increase costs or drive new product opportunities, reduce or increase the size of existing markets, create new markets or at the extreme, render some markets or products obsolete. This indicates that, for sectors and companies, risk may emerge from a number of directions and climate change has the potential to move the price of equity risk. As such climate change is a growing portfolio issue that investors need to be taking into account in their equity strategies.

“Agflation” and Climate Change represent only a couple of examples of “Mega Trends” that are changing the economic landscape and the investment opportunities and risks. Such Mega Trends need to be incorporated into investor’s portfolios in order for investors to truly benefit and profit from such issues and also in order for investors to truly mitigate the risks posed by such mega trends. However, conventional portfolio construction tends to view such investment opportunities as “specialist” investment approaches and tends to result in a sub-optimal solution for investors from both a return and total risk perspective when incorporating them into portfolios.

Portfolio construction implications

In order to find a more “optimal” solution for investors it is first necessary to take a step back in the history of portfolio construction methodology. If one dares to venture back into the literature of the foundations of portfolio construction (Markowitz, 1952, 1959), the modern day portfolio manager, fund of funds manager, or asset consultant may be surprised to see no references made to concepts like tracking error and Sharpe ratio. Yet in today’s market, concepts such as tracking error and Sharpe ratios dominate the way that investors seek to put “diversified” portfolios together.

Tracking error was born out of the idea of passive portfolio management – the belief that active management does not work. Passive managers focussed their investment processes on tracking their nominated benchmark as closely as possible. Any deviation from the benchmark return was deemed to be problematic and an indication that there was excessive tracking error in the system that needed to be identified and neutralised.

As active portfolio management became the norm and investment managers needed to better define their processes and identify their sources of value add and value detraction, concepts like tracking error, active return, and information ratio became popular. This has been especially true in the last twenty years as computing power has increased exponentially, allowing large scale risk analyses and quantitative portfolio construction methods to be run from a portfolio manager's desktop computer.

As with many mathematical and statistical modelling techniques the advent of almost unlimited computing power has meant that often times the underlying theories of how these modelling techniques work are lost, existing only in textbooks and not necessarily in the heads of those who use the sophisticated software.

The problem here is that portfolio construction is, in general terms, a goal maximisation problem. It is important for investors to understand this point, yet it is clear that this is not always the case. There are fundamental differences associated with the many ways portfolios can be constructed, for example, are we trying to maximise a Sharpe ratio or information ratio or are we trying to minimise the probability of a shortfall? Yet we witness a market today that is largely focused only on building portfolios that seek to maximise a Sharpe ratio.

In this paper we wish to highlight the differences associated with managing to a total rather than active return objective. Related to this we will look at how best to include non-traditional asset classes into the portfolio construction problem. Specifically we look at including an Agri-Business based product into a balanced portfolio structure.

THE INCREASE IN "SPECIALIST" OR NON-TRADITIONAL ASSET CLASSES

As we witness the change in the economic landscape and the shift of power from the West to the East, it is increasingly evident to many market participants that many of our traditional approaches to investment management may infact be lagging such trends, and as a result providing a sub-optimal investment solution (This is supported by the continued number of offerings to Australian investors that build their global equity portfolios around the MSCI World Index Benchmark).

Many investors have sought in the past to minimise the effect of this by adding to the core investment holdings, "satellite" investment offerings, and with the prevailing school of thought on portfolio construction, ensuring that these satellite options are constrained to small allocation levels such as 5-10%.

If we believe that the world is truly "flat" and globalised and we recognise that many traditional investment offerings have not yet moved to this school of thought then we need to ask the question as to whether a "satellite" investment is really the answer to achieving an efficient portfolio.

To do this Deutsche Asset Management has created the construction of a multi-manager portfolio structure from the viewpoints of:

1. Maximising the Information Ratio
2. Maximising the Sharpe Ratio
3. Maximising an objective function that places a constraint on the total risk of the optimal portfolio whilst maximising the Information Ratio

MULTI-MANAGER ALLOCATION

Consider the following allocation problem. We want to allocate global equity assets amongst a number of managers, as we accept the main argument behind multi-manager portfolios, one of diversification and specialisation. That is diversification aims at reducing the risk for a given alpha level and arises from a diversification of signals. Different managers create different forecasts and hence perform better. Specialisation in its purest form only exists if each specialist has a different benchmark reflecting a personalised special skill, appropriate to that specialist, in their particular universe.

The research located four traditional managers and one satellite, or specialist manager. In this scenario the specialist manager is managing an Agri-business portfolio. Assume that the benchmark portfolio is the MSCI World ex-Australia portfolio, unhedged.

We make the following expected return distribution assumptions for the benchmark and investment products.

Benchmark	Total Return (%pa)	Total Risk (%pa)
MSCI World ex Australia	10%	15%

Core Portfolios	Total Return (%pa)	Total Risk (%pa)	Active Return (%pa)	Tracking Error (%pa)
Core 1	13%	15%	3%	3%
Core 2	9%	10%	-1%	4%
Core 3	14%	20%	4%	4%
Core 4	11%	12%	1%	2%

Satellite Portfolio	Total Return (%pa)	Total Risk (%pa)	Active Return (%pa)	Tracking Error (%pa)
Satellite 1	18%	15%	8%	5%

Source: Deutsche Asset Management

We also have the following correlation structures for total returns:

	Core 1	Core 2	Core 3	Core 4	Sat 1	Bench
Core 1	1.00	0.80	0.98	0.99	0.40	0.99
Core 2	0.80	1.00	0.50	0.50	0.00	0.80
Core 3	0.98	0.50	1.00	0.98	0.70	0.95
Core 4	0.99	0.50	0.98	1.00	0.50	0.90
Sat 1	0.40	0.00	0.70	0.50	1.00	0.40
Bench	0.99	0.80	0.95	0.90	0.40	1.00

For active returns:

	Core 1	Core 2	Core 3	Core 4	Sat 1
Core 1	1.0	0.1	0.0	0.5	-0.1
Core 2	0.1	1.0	0.0	0.2	-0.2
Core 3	0.0	0.0	1.0	0.0	0.0
Core 4	0.5	0.2	0.0	1.0	0.1
Sat 1	-0.1	-0.2	0.0	0.1	1.0

The following are the implied betas generated using the total risk statistics above:

Core 1	Core 2	Core 3	Core 4	Sat 1
1.0	0.5	1.3	0.7	0.4

PORTFOLIO CONSTRUCTION

We will now construct four different portfolios as follows:

1. Maximise Sharpe Ratio
2. Maximise Sharpe Ratio whilst constraining active portfolio tracking error = 3%pa.
3. Maximise Information Ratio
4. Maximise Information Ratio whilst constraining active portfolio total risk = benchmark total risk.

We construct these portfolios along the lines of Jorion (2003) and Muralidhar (2000). There are a number of theoretical justifications to considering controlling total risk when managing active portfolios. Jorion (2003) covers this topic in great detail. Active managers in general do not consider the total risk of their portfolios, being rewarded for taking active risk with the assumption that the two are not correlated. It can turn out that from a total risk perspective the portfolio bears too much risk when compared to the benchmark portfolio. Although an active return may be generated it may not be enough to compensate the investor for bearing this risk. The investor may have fared better from simply leveraging the benchmark return, with the leverage ratio being σ_P/σ_B, where σ_P is the managed portfolios total risk and σ_B is the total

risk of the benchmark portfolio. This topic is covered in Muralidhar (2000) whilst looking at the deficiencies of using the Sharpe ratio as a performance measure.

The results of the portfolio construction process are shown in the tables below.

Strategy 1: Maximise Sharpe Ratio

Manager Allocation	Exposures	Min	Max	E(totalReturn)	E(activeReturn)	E(totalVolatility)	E(activeVolatility)
Core 1	0.0%	0.0%	50.0%	13.0%	3.0%	15.0%	3.0%
Core 2	0.0%	0.0%	50.0%	9.0%	-1.0%	17.0%	4.0%
Core 3	0.0%	0.0%	50.0%	14.0%	4.0%	20.0%	4.0%
Core 4	50.0%	0.0%	50.0%	11.0%	1.0%	12.0%	2.0%
Satellite 1	50.0%	0.0%	50.0%	18.0%	8.0%	15.0%	5.0%
Total Exposure	100.0%	100%	100%				
Portfolio Return				14.5%	4.5%		
Portfolio Risk				11.7%	2.8%		
Portfolio Return/Vol Ratio				1.2	1.6		
Benchmark Return				10.0%	0.0%		
Benchmark Volatility				15.0%	0.0%		

Assumptions
maxSR

Strategy 2: Maximise Sharpe Ratio and Target 3%pa Tracking Error

Manager Allocation	Exposures	Min	Max	E(totalReturn)	E(activeReturn)	E(totalVolatility)	E(activeVolatility)
Core 1	0.0%	0.0%	50.0%	13.0%	3.0%	15.0%	3.0%
Core 2	0.0%	0.0%	50.0%	9.0%	-1.0%	17.0%	4.0%
Core 3	40.5%	0.0%	50.0%	14.0%	4.0%	20.0%	4.0%
Core 4	9.5%	0.0%	50.0%	11.0%	1.0%	12.0%	2.0%
Satellite 1	50.0%	0.0%	50.0%	18.0%	8.0%	15.0%	5.0%
Total Exposure	100.0%	100%	100%				
Portfolio Return				15.7%	5.7%		
Portfolio Risk				15.3%	3.0%		
Portfolio Return/Vol Ratio				1.0	1.9		
Benchmark Return				10.0%	0.0%		
Benchmark Volatility				15.0%	0.0%		

Assumptions
maxSR
Active Vol = 3.0%

Strategy 3: Maximise Information Ratio

Manager Allocation	Exposures	Min	Max	E(totalReturn)	E(activeReturn)	E(totalVolatility)	E(activeVolatility)
Core 1	39.7%	0.0%	50.0%	13.0%	3.0%	15.0%	3.0%
Core 2	0.0%	0.0%	50.0%	9.0%	-1.0%	17.0%	4.0%
Core 3	25.4%	0.0%	50.0%	14.0%	4.0%	20.0%	4.0%
Core 4	0.0%	0.0%	50.0%	11.0%	1.0%	12.0%	2.0%
Satellite 1	34.9%	0.0%	50.0%	18.0%	8.0%	15.0%	5.0%
Total Exposure	100.0%	100%	100%				
Portfolio Return				15.0%	5.0%		
Portfolio Risk				14.5%	2.3%		
Portfolio Return/Vol Ratio				1.0	2.2		
Benchmark Return				10.0%	0.0%		
Benchmark Volatility				15.0%	0.0%		

Assumptions
maxIR

Strategy 4: Maximise Information Ratio and Target Total Risk = Benchmark Risk

Manager Allocation	Exposures	Min	Max	E(totalReturn)	E(activeReturn)	E(totalVolatility)	E(activeVolatility)
Core 1	35.6%	0.0%	50.0%	13.0%	3.0%	15.0%	3.0%
Core 2	0.0%	0.0%	50.0%	9.0%	-1.0%	17.0%	4.0%
Core 3	32.4%	0.0%	50.0%	14.0%	4.0%	20.0%	4.0%
Core 4	0.0%	0.0%	50.0%	11.0%	1.0%	12.0%	2.0%
Satellite 1	32.0%	0.0%	50.0%	18.0%	8.0%	15.0%	5.0%
Total Exposure	100.0%	100%	100%				
Portfolio Return				14.9%	4.9%		
Portfolio Risk				15.0%	2.2%		
Portfolio Return/Vol Ratio				1.0	2.2		
Benchmark Return				10.0%	0.0%		
Benchmark Volatility				15.0%	0.0%		

Assumptions
maxIR
Port Vol = Bench Vol

The first thing to notice is that the allocations to strategies 1 and 2 differ greatly from those for strategies 3 and 4. This is because the “unconstrained” portfolios were already close to the constrained solutions.

Maximising the Sharpe Ratio (Strategy 1), minimising total risk and no consideration of tracking error, results in a lower than benchmark volatility and as expected the highest Sharpe ratio of 1.2. It also produces the lowest information ratio of 1.6. The allocation in this portfolio is evenly split between Core Manager 3 and the Satellite Manager. This is also understandable as these managers are lowly correlated and both have good total risk/return pay-offs.

The final allocation in Strategy 2 is very different from that of Strategy 1. Constraining the overall tracking error of the final portfolio makes the optimisation algorithm hunt after managers with relatively high tracking errors and good diversification of total return. As a result Core Manager 3 is included in this mix.

When maximising the information ratio of the overall strategy (Strategy 3) we find that the constraint on total risk to be not too onerous. This is primarily because the unconstrained solution is very close to the constrained one. As reported in Jorion (2003) we are better of using Strategy 4 as the investor is being correctly rewarded for the total risk being taken, at least in terms of the benchmark being compared to.

The allocations in both Strategies 3 and 4 are very similar with the optimisation algorithm selecting those managers with the highest information ratios. The total risk constraint forces a re-allocation of assets amongst the same managers.

CONCLUSION:

When investors approach portfolio construction from the perspective of controlling total risk and in particular limiting total risk to that equal to the Benchmark risk, in this case the MSCI World Equity Index, and maximising Information ratio, we achieve a portfolio combination that is more aligned to an investor’s overall objectives. That is, we can be assured that we are controlling our overall portfolio risk level. When investors, focus only on diversification benefits among managers with high Information Ratios we find that such a strategy does not necessarily mitigate the inherent flaw in tracking-error optimisation, and may infact result in a sub-optimal portfolio.

Clearly defining the risk and return trade-offs in portfolio construction becomes increasingly important as a focus on only information ratio and tracking error ignores total portfolio risk. This inefficiency in portfolio construction is heightened when the efficiency of benchmarks is less, as such total risk is a more sensible constraint where the benchmark is relatively inefficient.

In the case of Global Equity investing, many investors now recognise the inefficiency of using the MSCI world index as a benchmark for determining global equity portfolio allocations, however whilst many investors recognise this inefficiency, only a handful of investment offerings available to investors are investing outside of the inefficient constraints of the MSCI World index. As such many investors are now building portfolios that may include a combination of MSCI constrained managers and "satellite" managers. Such a process becomes of increasing importance as we see the increased emergence of global "mega trends" that impact on the global opportunity set.

Increasingly many investment opportunities lie outside of the constrained benchmarks that are still prevalent not only in performance assessment of management expertise but also in the management of portfolios. Typically, such portfolios have been treated in the portfolio construction process as "satellite" options, as investors continue to build portfolios from a tracking error or relative risk and return perspective. However, it is clearly illustrated from the above analysis that such options may infact not be "satellite" options but part of a core holding when building portfolios from an information ratio and total risk perspective.