FIXED INCOME ACTIVE RETURNS

We study active returns (ie, "alpha") of institutional fixed income (FI) managers across several types of mandates: US Aggregate Core and CorePlus; Global Aggregate; and Global Treasury from January 2002 until December 2011.

Did the unprecedented volatility of the past five years affect the ability of FI managers to generate positive active returns? If so, what are some of the lessons learned for fixed income investors? Our findings are outlined below.

- Managers' active returns and information ratios declined sharply from the 2002-06 "quiet" period to the 2007-11 "volatile" period. The intuition that higher risk translates into higher returns was not confirmed in the empirical data.
- Surprisingly, despite their narrower universe, Global Treasury managers exhibited a higher diversity of alpha sources as well as more persistent performance than the other three groups of managers. Our analysis does not confirm the conventional wisdom that a broader investment opportunity set in terms of investment constraints (in the case of Core versus CorePlus mandates) or asset classes (in the case of Global Aggregate versus Global Treasury mandates) results in higher information ratios.
- A persistent credit overweight contributed significantly to active returns of most managers and resulted in a significant underperformance during the crisis.
- While managers aggressively reduced their credit exposure in Q2 08 and Q3 08 they did not reallocate significantly when the spread market recovered in 2009. We find that the elevated cost of transactions at the time did not justify this.
- In the volatile 2007-11 period, many actively managed US Aggregate mandates, especially those that exhibited high active risk, exhibited much lower sensitivity to Treasury rates than the index. This reduced the defensive properties that plan sponsors typically expect from their fixed-income allocations.
- Given the limited diversity of alpha sources, the prospect for diversifying manager selection risk through mandate fragmentation across managers looks small. Plan sponsors may prefer to control risk through guidelines or other diversification methods.
- We find that alpha dispersion across managers increased during the volatile period, highlighting the value, in this context, of diversifying manager selection.
- While many aspects of realized performances conformed to the intuition of risk budgeting models, the instability of inputs (skill, active risk and correlations) produced a large discrepancy between expected and realized performance.

Albert Desclée
+44 (0)20 7773 3382
albert.desclee@barclays.com

Anando Maitra
+44 (0)20 3134 0091
anando.maitra@barclays.com

Bruce Phelps
+1 212 526 9205
bruce.phelps@barclays.com

Simon Polbennikov
+44 (0)20 3134 0752
simon.polbennikov@barclays.com

www.barclays.com

Introduction

Institutional fixed income managers seek to outperform bond indices under constraints specified in their investment guidelines. We analyse realised active returns and active risk and discuss performance, both before and after the 2008 credit crunch, across different manager types.

Following up on our earlier article[1], we examine manager monthly returns (before fees), as reported by eVestment Alliance, from January 2002 to December 2011. While our sample includes many major institutional asset managers, it is relatively small given our desire for a long time series and the fact that eVestment Alliance publishes only one set of returns per investment firm and benchmark type[2]. Figure 1 summarises the dataset.

Figure 1: Overview of manager universe dataset

Mandate benchmark and type	Number of managers
Barclays US Aggregate; Core	78
Barclays US Aggregate; CorePlus	35
Barclays Global Aggregate Index; USD unhedged	19
Global Treasury (Citi or JP ndices); USD unhedged	35

Source: eVestment Alliance, Barclays Research

To better understand active returns it is helpful to build a framework for portfolio construction. Assuming portfolio managers allocate their risk budget "optimally" across their active views, a risk budgeting framework helps us answer questions such as: What features of the market environment would tend to favour or detract from manager performance? What type of link should we expect between active returns ("alpha") and active risk? What difference, if any, should we expect to observe between a Core (index bonds only) domestic manager and a CorePlus (can hold non-index bonds) manager; or between a Global Aggregate manager and a Global Treasury manager? If manager performance differs from what is expected, can we use our framework to help identify the source of the discrepancy?

We illustrate our risk budgeting model in the context of a US Aggregate manager, showing how the portfolio's expected performance depends on the manager's ability to generate positive returns at the strategy level and the manager's risk allocation across active views, given correlations between the manager's various strategies and typical funding and exposure constraints.

For each group of managers, we measure the ***diversity*** of their alpha sources, i.e., how many distinct factors drove their active returns. We also measure cross-sectional manager alpha ***dispersion*** which captures how differently various managers positioned their portfolios to the various drivers of alpha. For example, alpha diversity would be very low if all managers use duration timing as their only source of alpha. However, if some managers are long duration while others are short, then their cross-sectional alpha dispersion would be very high. We investigate whether mandates with broader benchmark and investment guidelines tend to offer increased alpha diversity. We also measure alpha dispersion and attempt to explain it using factors representative of the simple strategies in our risk budgeting framework.

[1] "*Fixed Income Active Returns: Characteristics, Constraints and Competition*", September 2006
[2] The benchmark is also self-reported by the manager. Only self-reported "active" managers are included in our dataset.

We also discuss and contrast manager persistence of active risk and active return across various time periods and for different mandates. Observing a **persistence** of realised alpha and information ratio would be an indication of skill.

The exceptional volatility of credit spreads in 2008 and 2009 provided managers with an exceptional opportunity to demonstrate skill by **timing their credit exposures**. However, to do so, managers would have needed to rebalance their portfolios when transaction costs were high. Since we cannot directly observe how fund allocations changed over time, we estimate exposures using regression analysis. We contrast indications of dynamic sector allocations with estimates of transaction costs per unit of active risk, and attempt to reconcile them within the skill-based risk budget framework.

Finally, we discuss how managers' alpha-seeking behaviour affects the defensive properties that plan sponsors generally desire from their fixed income allocations. As we will show, there has been a tendency for active managers to overweight spread products, which may alter the **properties of fixed income portfolios** expected by plan sponsors.

What should we expect from portfolio managers? A simple risk budgeting framework

What kind of performance can plan sponsors expect from active bond managers? To answer this we represent the active investment process as a combination of various trading strategies. Each strategy, in turn, is characterised by its own information ratio which embodies the manager's investment skill. A strategy's expected outperformance is the product of its information ratio and active risk measured by the strategy's isolated tracking error volatility (ie, α = IR × TEV). The expected information ratio can vary across strategies depending on a subjective assessment of a reasonable (fixed) level of skill for each strategy. For example, many would argue that it is more difficult to demonstrate skill at duration timing than at security selection.

To estimate a strategy's isolated tracking error volatility we perturb a typical portfolio structure to reflect the maximum underweight and overweight permitted by typical investment guidelines, and then measure the corresponding isolated active risk. Figure 2 presents the isolated TEVs for an unlevered US Aggregate Core manager who uses a simple set of active strategies.

Figure 2: Example strategies for a hypothetical US Aggregate core mandate

Active strategy/constraints	Assumed IR	Isolated TEV (bp/y)	Expected Alpha (bp/y)
Duration +/-1y	0.35	95	33
Credit sector 50% over/underweight vs Treasuries	0.35	77	27
MBS sector 100% over/underweight vs Treasuries	0.35	59	20
Credit security selection (concentration on 40 names)	0.55	27	14

Note: Isolated TEV estimated from 60 months of history up to Nov 2011.
Source: Barclays Research

For example, many Core managers must be within ±1y in duration of the Aggregate Index. Figure 2 shows that a portfolio that takes this limit position has an isolated active risk of 95bp/y. A 50% increase in the portfolio allocation to corporate credit,[3] funded with Treasuries, produces an active risk of 77bp/y, while a doubling of the portfolio's allocation to

[3] For example, suppose the Credit portion of the US Aggregate is 20% of the Aggregate's market value, then a 50% overweight would be a portfolio with a 30% total market value allocation to Credit.

MBS, also funded with Treasuries, produces an active risk of 59bp/y. To incorporate issuer-specific credit strategies, we estimate the effect of concentrating the portfolio in 40 names while conforming to the quality and duration profile of the Credit portion of the Aggregate. Since credit represents only 20% of the Aggregate's market value, the level of isolated active risk from security selection is a modest 27bp/y.

For each strategy in isolation, we multiply the strategy's assumed IR by its level of anticipated active risk to estimate its expected outperformance. For example, the duration strategy, with an assumed annualised IR of 0.35 and active risk of 95bp/y, has an expected active return of 33bp/y. The higher the IR, the more skilful the manager is in translating active risk into active return.

Of course, this is an *expected* active return. Actual active returns may not equal expected returns, because either the assumed IR and/or active risk was different than what was subsequently realised. For example, if a strategy enters an unanticipated period of low volatility, then even a skilful manager would have difficulty generating active returns that match expectations. Assuming that individual strategies don't interact with each other, one can sum up individual outperformance contributions to obtain an expected portfolio outperformance target.[4]

To examine the impact of investment guidelines on active portfolio returns, we take into account estimated correlations among strategy payoffs. Figure 3 shows that for low levels of target outperformance, the annualised portfolio IR is substantially higher than any standalone strategy IR. For example, the portfolio IR for a 25bp/y active return target is 0.69, which is greater than the highest strategy IR (ie, 0.55 for the standalone issuer selection strategy).

Figure 3: Example portfolio expected active returns – hypothetical US Aggregate mandate

Target active return (bp/y)	25	50	75	100	125	150
Portfolio TEV (bp/y)	36	87	143	203	268	336
Portfolio Annualised IR	0.69	0.57	0.52	0.49	0.47	0.45
Source of active return (bp/y)						
Duration (unconstrained)	4	14	23	42	67	92 (=2.5y Dur)
Sector over/underweight	7	22	38	44	44	44
Credit security selection	14	14	14	14	14	14
Source of active return (as a % of portfolio active return)						
Duration	16%	27%	31%	42%	53%	61%
Sector over/underweight	27%	45%	50%	44%	35%	29%
Credit security selection	56%	28%	19%	14%	11%	9%

Source: Barclays Research

Note that the portfolio's IR declines as the target alpha increases because the manager must rely more extensively on lower IR but easily scalable strategies to increase outperformance. Indeed, risk allocation to the higher IR security selection strategy is quickly capped by funding constraints[5], leaving the duration strategy as the only way to increase performance. In aggressive portfolios (see right-most column of Figure 3), security selection accounts for

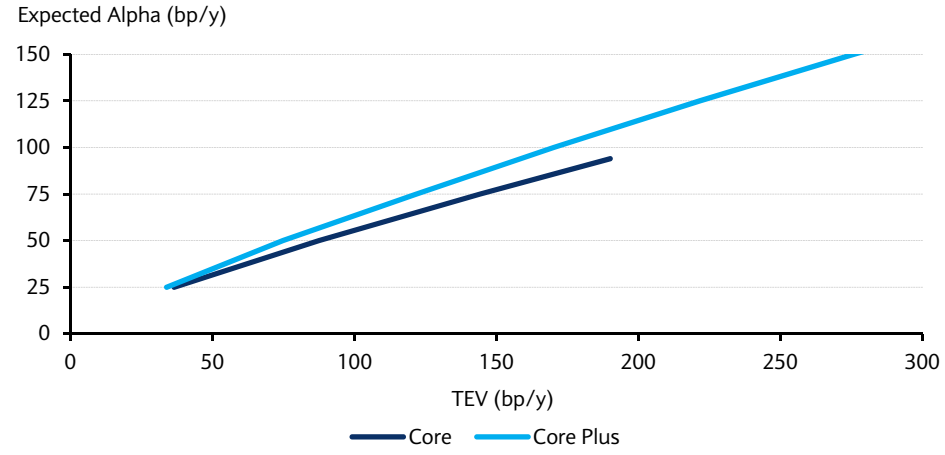
[4] This, however, may not be realistic as active strategies may crowd-out each other, with the effect that a strategy's IR obtained in a portfolio context is lower than in isolation. For example, when attempting to overweight both MBS and credit, a Core manager may be constrained by the amount of Treasuries that can be used to fund these overweights. So two different active views may compete for the same funding resource.

[5] To avoid a portfolio's IR from declining as the target alpha increases, the portfolio manager could use leverage to increase exposure to the optimal mix of strategies. However, for most institutional fixed-income managers, leverage is not permitted. Consequently, achieving high alpha targets may require utilization of inferior IR strategies.

only 9% of the expected alpha. Instead, the duration timing strategy dominates, assuming that the manager can implement a 2.5y net duration exposure versus the benchmark. In fact, as we move from conservative to more aggressive performance targets, the main driver of performance changes from credit selection to macro credit allocation, and then to duration timing.

Whether the portfolio's realised IR matches the expected IR depends not only on the stability of the individual strategy IRs and active risk, but also on the stability of the assumed correlations across the different strategies. If strategy correlations turn out to be much higher than anticipated, then the portfolio's realised IR would likely be lower than expected. Given the potential instability of strategy IRs, active risk and correlations, a portfolio's realised IR is unlikely to always match the expected portfolio IR. Nevertheless, over time, (our data cover 10 years), we would expect a skilful manager to demonstrate a positive realised IR, with periods of higher realised active risk associated with greater positive *ex post* active returns.[6]

Figure 4: Expected alpha and TEV (ie, Risk Budget) for hypothetical Core and CorePlus US Aggregate managers



Note: The Core manager net duration exposure is capped at 1y.
Source: Barclays Research

Figure 4 contrasts Core and CorePlus Aggregate mandates and plots the relationship between expected alpha and TEV (ie, risk) budget. The slope of this relationship is the portfolio IR. For very low risk portfolios, both Core and CorePlus mandates exhibit similar IRs since both can rely heavily on the most efficient security selection strategies. For higher-risk portfolios, to earn greater expected returns the Core mandate quickly becomes less efficient than CorePlus. In fact, in our example, the net duration exposure is capped at one year and there are no longer any feasible portfolios beyond 94bp/y of expected alpha. However, a manager that can operate in a broader universe (ie, including HY, EM, FX, TIPS strategies), might achieve both higher efficiency (shown in Figure 4 as a steeper performance/active risk relationship) and higher possible performance. In other words, a manager with less correlated strategies should have a higher portfolio IR than a manager with more correlated strategies.

[6] An unstable portfolio realized IR does not, by itself, invalidate the risk budgeting framework. Given the available information, the risk budgeting framework is a way to assemble ex ante optimal portfolios.

While our framework relies on a simplified set of active strategies, it helps sponsors compare the performance implications of various mandate design alternatives for a given manager at a particular point in time. According to our risk budgeting framework, sponsors should expect that, for a given skilled manager:

1. Managers' active returns are an increasing function of tracking error risk;
2. Managers' IR is a decreasing function of active returns;
3. Assuming identical skill and risk budget, managers with a broader set of strategies should produce higher IRs than managers with more constrained mandates; and
4. If strategy correlations increase, manager active returns and IRs will decline for a given realised level of active risk.

We now examine the realised active returns of institutional FI managers with different and time-varying levels of skill.

Fixed income managers: active returns

Figure 5 includes both Barclays index return data as well as manager performance data from eVestment Alliance. For a given benchmark, Figure 5 presents the average manager active return and average tracking error volatility (TEV) for January 2002 until December 2011, and for two sub-periods: a "quiet" period from 2002 to 2006, and a "volatile" period from 2007 to 2011.

For the entire period, the US Aggregate Index had a monthly average total return of 47.5bp with a standard deviation of 106.8bp. The 78 US Aggregate Core managers had an average monthly alpha of 2.4bp and average TEV of 42.4bp.[7] These managers produced an average annualised IR of 0.3, ranging from -1.0 to 1.3. In contrast, the 35 CorePlus managers earned a higher average alpha of 5.3bp but with a much greater TEV of 78.4bp, generating an average IR of 0.3.

For the 10-year period, average IRs and ranges of IR are similar for all four manager universes. CorePlus Aggregate managers generally exhibited higher TEV than Core managers, but their average IR was not superior. Global managers delivered marginally higher IR than domestic managers (0.4 versus 0.3), with Global Treasury managers having higher alpha and TEV than Global Aggregate managers.

The standard deviation of monthly Aggregate total returns was 103.9bp in the volatile period compared to 110.2bp in the quiet one. However, the two sub-periods were strikingly different in terms of monthly excess return volatility as the volatile period was over three times more volatile (74.3bp) than the quiet one (23.1bp). The substantial increase in excess return volatility was associated with different average manager performances.

[7] Figure 4 suggests that for an annualised TEV of 147bp (corresponding, approximately, to a monthly TEV of 42.4bp), the expected annual alpha would be approximately 75bp (or 6.3bp/m).

Figure 5: Descriptive statistics of FI manager performance across universes and time windows

		Global Aggregate Managers (USD Unhedged)	Global Treasury Managers (USD Unhedged)	US Aggregate Managers (Core)	US Aggregate Managers (CorePlus)
	Number of managers	19	35	78	35
Jan 2002 - Dec 2011	Index Avg TR (bp/m)	59.4	65.5	47.5	
	Index Stdev TR (bp/m)	181.7	213.3	106.8	
	Index Avg ER (bp/m)	-0.4	NA	2.2	
	Index Stdev ER (bp/m)	36.9	NA	54.9	
	Average Alpha (bp/m)	5.7	9.7	2.4	5.3
	Average TEV (bp/m)	51.9	73.7	42.4	78.4
	Average Annualised IR	**0.4**	**0.4**	**0.3**	**0.3**
	Range of IRs	[0.0 - 1.1]	[-0.5 - 1.5]	[-1.0 - 1.3]	[-0.4 - 1.1]
Jan 2002 - Dec 2006	Index Avg TR (bp/m)	64.5	69.1	41.8	
	Index Stdev TR (bp/m)	164.0	200.9	110.2	
	Index Avg ER (bp/m)	3.7	NA	5.5	
	Index Stdev ER (bp/m)	12.7	NA	23.1	
	Average Alpha (bp/m)	8.7	14.5	2.6	7.8
	Average TEV (bp/m)	32.2	53.2	19.9	39.7
	Average Annualised IR	**0.8**	**0.8**	**0.5**	**0.8**
	Range of IRs	[0.2 - 1.5]	[-0.3 - 2.3]	[-0.6 - 3.1]	[-0.2 - 1.9]
Jan 2007 - Dec 2011	Index Avg TR (bp/m)	54.3	62.0	53.1	
	Index Stdev TR (bp/m)	199.2	226.7	103.9	
	Index Avg ER (bp/m)	-4.5	NA	-1.1	
	Index Stdev ER (bp/m)	50.6	NA	74.3	
	Average Alpha (bp/m)	3.0	4.9	2.2	2.8
	Average TEV (bp/m)	64.8	88.3	55.4	101.9
	Average Annualised IR	**0.2**	**0.2**	**0.3**	**0.1**
	Range of IRs	[-0.6 - 1.4]	[-0.6 - 1.8]	[-1.9 - 1.4]	[-0.8 - 1.2]

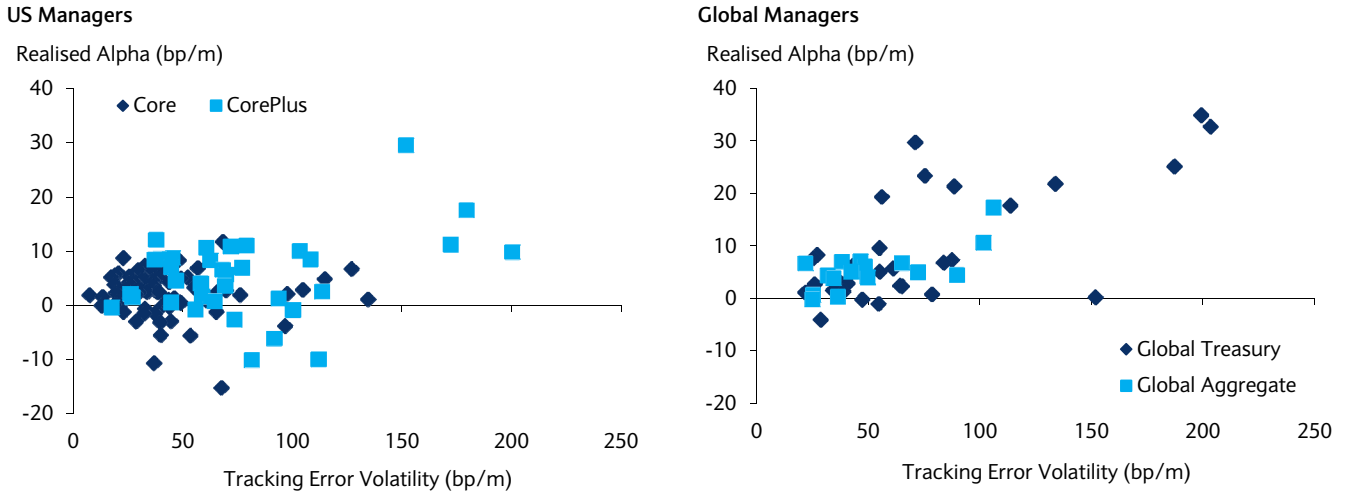
Note: Average Tracking Error Volatility (TEV) equals the average of all managers realised TEVs for a given universe and time window. This is not the TEV of the "average manager". The average annualised IR is calculated similarly.
Source: eVestment Alliance, Barclays Research

The 2002-06 quiet period conforms to the performance pattern expected by our risk budgeting framework: CorePlus managers not only had higher TEV but also higher IR (average TEV of 39.7bp/m and annualised average IR of 0.8) than Core managers (19.9bp/m and 0.5). Surprisingly, however, Global Treasury managers appeared to be a generally more aggressive bunch, with higher TEV than Global Aggregate managers. Why? First, the Global Treasury Index total return volatility was higher than that of the Global Aggregate as the Aggregate's spread exposure was negatively correlated with Treasury returns and reduced total return volatility. Second, the wider breadth of strategies available to Global Aggregate managers offered greater scope for reducing total active risk via diversification. Finally, Global Aggregate mandates were relatively new (the Global Aggregate Index was launched in 1999) so sponsor guidelines or manager choices may have been more prudent than Global Treasury mandates. However, none of this explains why Global Aggregate managers failed to deliver higher IR than Global Treasury managers.

The 2007-11 volatile period experienced unprecedented levels of active risk. Average realised tracking errors increased for all four manager universes, while in three out of four universes realised alpha decreased by more than half. As a consequence, IRs decreased markedly. In contrast to the quiet period, CorePlus managers produced on average lower IR than Core managers, while the global managers' IR was in between. CorePlus managers were not able to exploit the advantage of a broader set of strategies during the volatile period in part because many "core-plus" strategies became highly correlated with core strategies and with each other.

Figures 5 also highlights inconsistencies with the risk budgeting framework when we look at performance across managers. Normally, plan sponsors may be willing to tolerate higher TEV in return for higher alpha. However, for Core and CorePlus managers there was no obvious relationship between TEV and active return (see Figure 6). While there appeared to be a positive relationship for global managers during the volatile period, it was not statistically different from zero. In summary, for all four manager universes, the relationship between active risk and return was positive and significant in the quiet period, but was not significant in the volatile period.

Figure 6: Relationship between realised active risk and return (2002-11)



Note: Slope coefficients for Core managers: -0.01 (entire period), 0.07** (quiet period) and -0.04 (volatile period); for CorePlus managers: 0.06*, 0.08* and 0.06*; for Global Treasury managers: 0.15**, 0.47** and 0.02; and for Global Aggregate Managers: 0.11**, 0.38** and 0.01. *Significant at 95%; **Significant at 99%.
Source: Barclays Research

In the context of risk budgeting, the following results are unexpected.

1. The performance of all manager groups declined in the second period. For example, for Global Aggregate managers, despite an increase in active risk from 32.2bp/month to 64.8bp/m, active returns fell from 8.7bp/m to 3.0bp/m. There was a similar pattern for the three other manager groups.

   Why the IR deterioration in the volatile period? For skilful managers, a more volatile environment should provide an opportunity to shine. The risk budgeting framework suggests the following possible explanations.

- A drop in the effective number of independent strategies[8] in the second period as strategies became more correlated than in the first period, causing the diversification across active positions to be less than anticipated. Figure 7 shows the change in asset class correlations between the two periods. Excess returns, in particular credit and collateralised, became more positively correlated with each other (but more negatively correlated with a Treasury duration extension strategy). For example, the correlation between a long credit and a long MBS position increased from 21% to 54%[9].

Figure 7: Correlations of naïve active strategies in the volatile period (2007-2011, upper shaded triangle) and the quiet period (2002-2006, lower triangle)

	US Tsy Duration Extension	IG Corp Excess Return	CMBS Excess Return	MBS Excess Return	HY Corp Excess Return	EM Excess Return
US Tsy Duration Extension		-0.50	-0.48	-0.42	-0.58	-0.43
IG Corp Excess Return	*-0.27*		0.67	0.54	0.89	0.83
CMBS Excess Return	*0.20*	*0.51*		0.60	0.80	0.68
MBS Excess Return	*0.22*	*0.21*	*0.44*		0.65	0.62
HY Corp Excess Return	*-0.53*	*0.83*	*0.36*	*0.11*		0.90
EM Excess Return	*-0.26*	*0.67*	*0.50*	*0.25*	*0.66*	

Source: Barclays Research

While an increase in strategy correlations would explain an increase in realised active risk and a decline in IRs, it would not explain a decline in active returns.

- Managers experienced a collective deterioration in realised strategy IR. Since IR translates TEV into active returns, and given the sharp increase in TEV and decline in active returns, this implies either a dramatic deterioration in skill, or obstacles to strategy implementation. Did skill decline as markets became more volatile? Or, did operational constraints such as illiquidity prevent managers from exercising their skill via dynamic portfolio rebalancings? We investigate this possibility in later sections.

2. Over the entire period, the average IR for Global Treasury managers, despite a narrower benchmark universe, were at least as large as the average IR for both Global and US Aggregate managers. This is somewhat surprising. Indeed, the broader opportunity set embedded in Aggregate mandates is supposed to allow managers to provide a superior IR through the exercise of skill in a variety of imperfectly correlated strategies.

   However, as we will see below, Treasury managers consistently had exposures to non-Treasury asset class returns. So perhaps the benchmark for Treasury managers is poorly specified and their active returns and risks are incorrect? Also, given their more limited benchmark, perhaps Treasury managers were not as vulnerable to less stable and illiquid spread product strategies.

[8] If we assume n active strategies with equal information ratios of IRi and an average pair-wise correlation ρ, we can calculate the IR of the optimal combination of strategies as:

$$IR_{optimal} = IR_i * \sqrt{n/(1+(n-1)*\rho)}$$

where

$$n/(1+(n-1)*\rho)$$

can be interpreted as the effective number of independent strategies.

[9] Note that such correlation analysis is incomplete as it relates to static strategies. In fact, dynamic strategies include both timing signal and market performance. Strategy correlation is therefore function of signal correlation as well as asset correlation. For a discussion on signal and asset correlation, see *Horizon Diversification: Reducing Risk in a Portfolio of Active Strategies*, Barclays Research, 2009

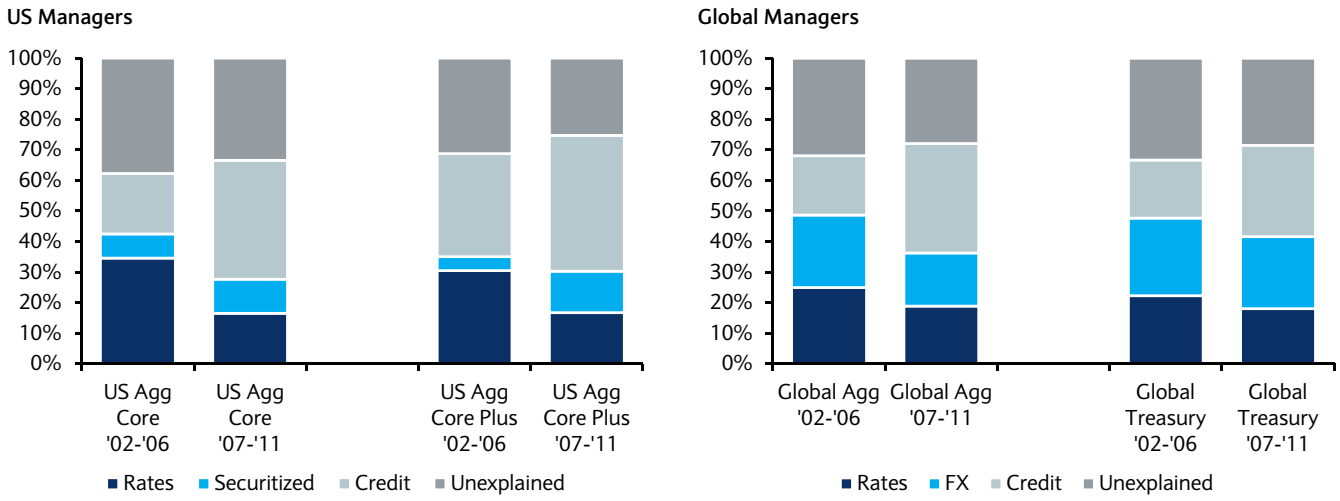
Similarly, the risk budgeting framework would expect CorePlus managers to generate better IRs than Core managers. However, this was the case only in the quiet period when the average IR of CorePlus managers was 0.8 as opposed to 0.5 for Core managers. This result flows from the assumed lower correlations of the CorePlus strategies with other Core strategies. If this assumption turned out to be incorrect during the volatile period (eg, CMBS and Credit became highly correlated), then it is not surprising that the realised CorePlus IR was lower than that of Core.

We now take a closer look at the characteristics of manager active returns: What were the major systematic drivers of active returns?; Was there diversity in active returns across managers?; and Did managers demonstrate persistence in their active returns?

Systematic drivers of FI active returns

Without access to portfolio constituents, we must rely on regression analysis to identify common systematic factors that drove individual manager active returns. We consider five factors for US Aggregate managers[10] and seven factors for Global managers[11]. For each manager, we regress monthly realised alphas against relevant systematic factors over an 18-month time window. We calculate the variance contributed by each systematic factor, and then aggregate by factor group: Rates and Credit for US managers and Rates, Credit and FX for Global managers[12]. Figure 8 shows the share of alpha variance explained on average, across managers and over time (averages in each of our two periods).

Figure 8: Share of monthly alpha variance explained by market factors



Note: Average over time and across managers of rolling 18-month regressions. The share of alpha variance = (estimated factor beta×factor return)^2/alpha^2.
Source: Barclays Research

[10] For US Aggregate managers, we regress monthly active returns of individual fund managers on five market factors using a rolling 18-month time window: Rates Return (total return minus excess return of US Aggregate Index, minus return of 3-month T-bills); Rates Slope (long the 1-3y and short the 7-10y US Aggregate Index rate returns; Securitised (excess returns of a US MBS+ABS+CMBS composite index over duration-matched Treasuries); Credit (excess returns of the US Credit Index over duration-matched Treasuries); and Financial (excess returns of the US Financial Index minus the excess returns of the spread duration-matched US Non-Financial Corporate Index).

[11] For global managers, the seven variables are: USD Duration (rates return of the US Aggregate Index); EUR Duration (returns of the Euro Treasury ex Peripherals index, hedged into USD, less 3-month US T-bills returns); JPY Duration (returns of the JPY Treasury Index, hedged into USD, less 3-month US T-bills returns); Global Credit (excess returns of the Global Credit index); Global Fin – Non-Fin (Global Financial excess returns less the Global Non-Financials excess returns); FX EUR and JPY wrt the USD.

[12] The aggregation takes into account the correlation across factors, eg, the global rates risk contribution takes into account correlations between USD, EUR and JPY rate factors.

Over 60% of active returns can be explained by exposures to common market factors (over 70% when considering only the volatile period). For all mandates, credit factors explained a larger share of active returns in the volatile period than in the quiet period. For US managers (Panel A) in both periods, CorePlus managers had a significantly larger proportion of credit exposure than Core managers, particularly so during the quiet period. Also, in the quiet period, rates and credit factors were roughly balanced, but in the volatile period, credit factors became nearly three times as important as rate factors.

Interestingly, the credit factor explained a significant portion of active returns for Global Treasury managers. There are two explanations for this finding: First, several Global Treasury managers in our sample operate under guidelines that allow them to hold credit as out-of-benchmark investments.[13] Second, there may have been interrelationships between credit and various rates and FX market performances, especially more recently as European sovereign spreads became positively correlated with credit spreads[14]. In both periods and for both Global Aggregate and Global Treasury universes our rates and FX factors contributed nearly equally to explaining active returns.

It is no surprise that macro credit positioning explains a large share of active returns in 2007-11. But were both "aggressive" (ie, high TEV) as well as "defensive" (ie, low TEV) managers equally reliant on macro positioning? In fact, one could argue that if investment processes were truly scalable, active returns should be explained similarly for both high and low TEV managers. However, this is not the case. Not only do macro exposures better explain the active returns of aggressive managers but, as we will show, aggressive managers also tended to be long credit during the crisis, with implications for the mandate's risk properties delivered to plan sponsors.

Figure 9 shows regression results averaged over time and manager, as previously, but this time also sorted by quartile of realised TEV. In all manager groups and for both periods, active returns are better explained by market factors for the highest TEV quartile than the lowest TEV quartile, and, in almost all cases, credit factors drive this increase in explanatory power. The exception is for US Aggregate managers in the quiet period when rates exposure, not credit, explained a larger share of alpha of aggressive managers, confirming the intuition of the risk budgeting model[15].

[13] Factsheets of flagship Global Treasury funds run by managers in our sample indicate that many are allowed to invest in credit.
[14] The spread correlation between the Euro Corporate and the Euro Treasury indices was 55% in the volatile period.
[15] The risk budgeting example presented in Figure 3 shows that the risk allocation to rates strategies increases to become dominant as an Aggregate manager targets higher alpha.

Figure 9: Share of manager active returns explained by market factors, sorted by manager TEV

US managers

	US Agg Core '02-'06	US Agg Core '07-'11	US Agg Core+ '02-'06	US Agg Core+ '07-'11
Most Conservative Managers (Bottom Quartile of Realised TEV)				
Rates	28%	16%	20%	18%
Credit	24%	48%	33%	52%
Unexplained	48%	35%	47%	31%
Most Aggressive Managers (Top Quartile of Realised TEV)				
Rates	41%	17%	39%	10%
Credit	28%	56%	33%	65%
Unexplained	31%	27%	27%	24%
Difference in unexplained alpha	18%	8%	20%	6%

Global managers

	Global Tsy '02-'06	Global Tsy '07-'11	Global Agg '02-'06	Global Agg '07-'11
Most Conservative Managers (Bottom Quartile of Realised TEV)				
Rates	23%	23%	26%	18%
Credit	21%	28%	16%	27%
FX	15%	16%	28%	21%
Unexplained	40%	33%	30%	35%
Most Aggressive Managers (Top Quartile of Realised TEV)				
Rates	15%	17%	24%	22%
Credit	25%	38%	29%	51%
FX	33%	25%	22%	7%
Unexplained	28%	20%	26%	20%
Difference in unexplained alpha	13%	13%	4%	15%

Note: Average over time and over managers of rolling 18-month regressions sorted into top and bottom quartiles of realised TEV.
Source: Barclays Research

FI manager alpha diversity and alpha dispersion

We have shown that FI manager active returns were driven by several underlying factors. However, how similar were institutional FI managers' active returns? In other words, did manager alphas differ because they were exposed to different alpha drivers in a given month, or because managers had different exposure to the same alpha drivers? This is an important question for plan sponsors who might consider hiring more than one manager for a given mandate.[16]

Diversity can be quantified by decomposing the pair-wise correlations between individual manager monthly active returns using principal component analysis (PCA). If all active returns are driven by a single common factor, then the first principal component will explain the entire correlation structure . At the other extreme, if managers' active returns are uncorrelated, then each principal component will explain exactly 1/n (n being the number of fund managers) of the correlation structure. We perform PCA for each of the four manager universes using data from January 2002 to December 2011, and repeat the analysis for the two sub-periods.

Figure 10 shows for each universe the average share of active return correlations explained by the first seven PCs.[17] Strikingly, the first principal component explains a very significant share of correlations (between 27% and 63%) in all universes and all-time windows considered. This finding suggests that for a given mandate, the major factors driving manager alpha were the same across managers, and that the alpha dispersion across managers was largely due to managers loading differently on these alpha drivers.

[16] We recognise that the set of active managers considered in this analysis may only represent a relatively small fraction of fixed income asset under management. Other groups of investors with different time scales and objectives (eg, insurance, pension, official institutions) may have experienced different performances. Nevertheless, institutional asset managers' focus on active portfolio management and performance relative to a benchmark index, as opposed to peer group, should in theory produce a broad diversity of outcomes.

[17] The PC analysis must be adjusted to account for differences in sample size across the various manager samples. Indeed, fewer principal components are required to explain the correlation structure of a narrow sample of managers than for a large universe. So we draw the same number of funds from all universes, and perform PCA on this selection. These random draws and corresponding analysis are repeated 50,000 times.

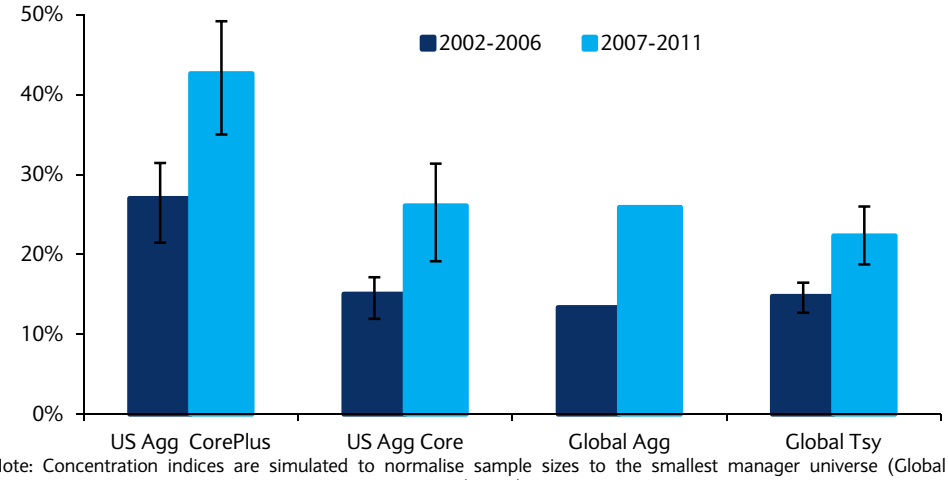
For each universe, we can summarise the PCA findings using a concentration index called the Herfindahl Index (HI)[18] which can range from 1/n (high diversity, assuming a universe of n managers) to 1 (no diversity). The higher the HI value, the smaller the set of factors that drive active returns. For three manager populations, we repeat the PCA multiple times to match the smallest (Global Aggregate) sample size of our four universes, and report the HI value for each draw. So, our re-sampling analysis provides a distribution of concentration indices for each universe. Figure 11 reports the mean, 10th and 90th percentiles.

Figure 10: Principal component analysis of manager active returns

					Quiet period				Volatile period			
	2002 – 2011				2002 - 2006				2007 – 2011			
P.C.	US Agg CorePlus	US Agg Core	Global Agg	Global Tsy	US Agg CorePlus	US Agg Core	Global Agg	Global Tsy	US Agg CorePlus	US Agg Core	Global Agg	Global Tsy
1	60%	42%	42%	38%	48%	29%	27%	31%	63%	46%	48%	43%
2	11%	14%	10%	10%	15%	17%	16%	13%	12%	15%	10%	12%
3	7%	10%	7%	9%	10%	12%	11%	10%	7%	10%	8%	9%
4	5%	7%	7%	7%	6%	9%	8%	8%	5%	7%	7%	7%
5	4%	6%	7%	6%	5%	7%	7%	7%	3%	5%	6%	6%
6	3%	5%	5%	5%	4%	6%	6%	6%	3%	4%	5%	5%
7	3%	4%	5%	4%	3%	5%	5%	5%	2%	3%	4%	4%

Source: Barclays Research

Figure 11: Herfindahl Index (HI) of manager active returns: Average, 10th percentile and 90th percentile of re-sampled indices



Note: Concentration indices are simulated to normalise sample sizes to the smallest manager universe (Global Aggregate). The chart shows the average as well as the 10th & 90th percentiles of the distribution of simulated indices.
Source: Barclays Research

[18] In this analysis, the Herfindahl Index (HI) is defined as is the sum of squares of the share variance explained by individual principal components and can be written as,

$$HI = \sum_{n} R_i^2$$

were R_i is the proportion of variance explained by each principal component.

Figure 11 indicates that the diversity of alpha drivers was much greater in 2002-06 than subsequently. For example, the Global Aggregate concentration index was 13% in 2002-06 and increased to 26% in 2007-11[19]. This is consistent with a common shock to spread markets during the volatile period that affected the active returns of the entire industry.

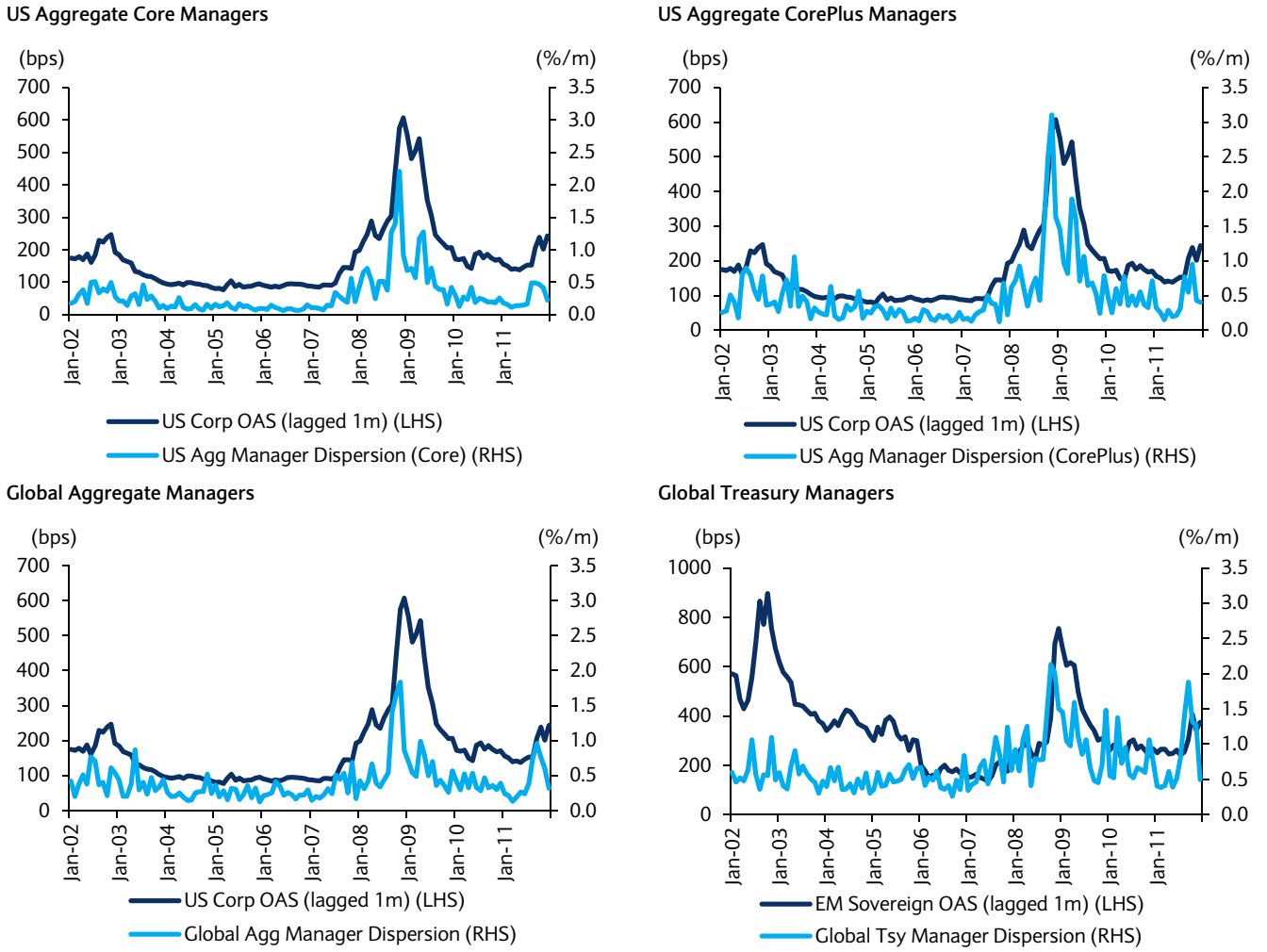
For US CorePlus managers, alpha drivers were significantly more concentrated compared to those for Core managers in both periods. Global Aggregate manager alphas also seem less diversified than Global Treasury manager alphas during the volatile period. Surprisingly, alpha drivers for Global Treasury managers were the most diverse among the four manager universes in the volatile period, and only marginally less diversified than those for Global Aggregate managers in the quiet period. This result is at odds with the expectation that a broader benchmark should give managers a greater diversity of strategies and, therefore, a greater diversity of active returns. One possible explanation is that the 2008-09 shock to spread markets and the liquidity squeeze made all spread-related strategies (including peripheral Treasury markets) very similar to each other. But other explanations are possible as well, including a preference for persistent long spread positioning by Aggregate managers who concentrate on generating outperformance on a long horizon rather than month-after-month, given the less liquid nature of spread assets. Or, perhaps maintaining a broad balance of active risk sources across various strategies is just easier in global rates and FX markets, where strategies are more liquid with more stable risk properties than in spread markets.

The alpha diversity analysis indicates that US managers, especially CorePlus managers formed a less diverse population than global managers, and that diversity declined in the volatile period. However, this analysis does not convey information about the magnitude of alpha ***dispersion*** across managers. In fact, it is possible to have low diversity and high dispersion of active returns. For example, if all managers use the same active strategy, say duration timing, and some are long while others are short, diversity of alpha drivers is very poor while alpha dispersion across managers is high. So, poor diversity and low dispersion together indicate that various managers exploit a common alpha source and are positioned similarly.

We measure alpha dispersion by examining the monthly time series of cross-sectional standard deviations of active returns for each manager universe (Figure 12). Alpha dispersion shot up during the credit crunch and mirrored the movement in credit spreads. Previous episodes of elevated alpha dispersion, such as during the credit bear market of 2002-03, were of a much smaller magnitude than what was observed in 2008-09.

[19] We prefer to base the analysis on correlations rather than covariances to ensure that results are not influenced by differences in active risk across managers.

Figure 12: Dispersion of manager alpha (monthly cross-sectional standard deviation of manager alpha), 2002-2011



Source: Barclays Research

Regressing alpha dispersion on various factors, Figure 13 shows that three variables, relating to the performance of major active strategies, explain dispersion well in both quiet and volatile periods:

- The absolute value of US Treasury returns which represents the reward of correct duration timing. If active managers engage in duration timing and do not all position in the same magnitude or the same direction, one should see higher alpha dispersion when rates markets have higher absolute returns;
- The absolute value of the Corporate Index excess returns (over duration and curve-matched Treasuries) which proxies the reward for correct spread market positioning; and
- The level of credit spreads which is closely associated with the level of idiosyncratic as well as systematic spread volatility. If active managers are engaging in security selection as well as macro allocation to spread products, then there should be greater alpha dispersion when spreads are high reflecting differences in security-selection returns among managers.

Interestingly, corporate excess returns are significant in explaining Global Treasury manager alpha dispersion. Indeed, this might reflect positioning in euro sovereign markets, or out-of-benchmark allocations to spread markets which are often allowed in Treasury mandate guidelines.

Figure 13: Explaining manager alpha dispersion

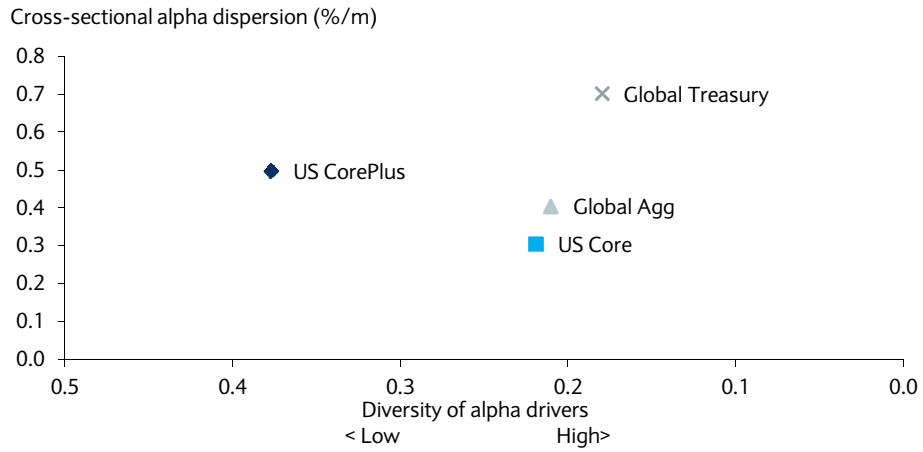
	US Agg Core		US Agg CorePlus		Global Agg		Global Treasury	
	Beta	t-Stat	Beta	t-Stat	Beta	T-Stat	Beta	T-Stat
2002-2006								
|Tsy Return|	8%	9.0	18%	7.2	4%	2.6	7%	1.9
|Corp ER|	8%	6.5	14%	4.1	12%	4.9	15%	4.0
Corp OAS	11%	7.3	9%	2.1	7%	2.9		
|FX EURUSD|					5%	8.2		
R^2	88%		70%		73%		27%	
2007-2011								
|Tsy Return|	10%	3.3	14%	3.4	12%	5.0	16%	4.2
|Corp ER|	8%	4.4	11%	4.0	16%	9.4	19%	6.6
Corp OAS	16%	6.5	25%	6.8	7%	3.4	8%	2.4
R^2	80%		80%		83%		72%	

Note: Results of multivariate regressions where we explain cross-sectional standard deviation of manager alpha with up to four market variables.
Source: Barclays Research

These results regarding diversity of alpha sources and manager alpha dispersion have implications for plan sponsors. Greater alpha source diversity should encourage sponsors to fragment mandates across multiple managers as alpha source differences across managers can deliver, in aggregate, a more stable alpha. In that respect, our finding that CorePlus alpha sources are less diverse than Core or global alpha sources is somewhat disturbing. Does this mean that sponsors should select fewer managers to run CorePlus mandates than for global or Core mandates? This seems counter-intuitive. Indeed, the case for manager diversification is more tenable when alpha diversity *and* manager alpha dispersion are both taken into account.

Figure 14 juxtaposes diversity and dispersion. Plan sponsors are most justified allocating across several Global Treasury managers as they provide the broadest diversity of alpha drivers and the largest cross-sectional dispersion of manager performance. Domestic CorePlus managers are next in terms of alpha dispersion, but they rely on a much more concentrated set of alpha drivers. This may suggest that, rather than manager diversification, a plan sponsor should use other techniques to stabilise alpha and risk, and improve overall portfolio IR. These could include risk limits that are robust to changes in credit market conditions (eg, expressing the maximum net exposure to spread products in units of DTS rather than market value overweight or spread duration contribution), and complementing typical CorePlus strategies with uncorrelated strategies (eg, systematic alpha strategies based on liquid asset classes).

Figure 14: Alpha source diversity and manager alpha dispersion by mandate universe



Source: Barclays Research

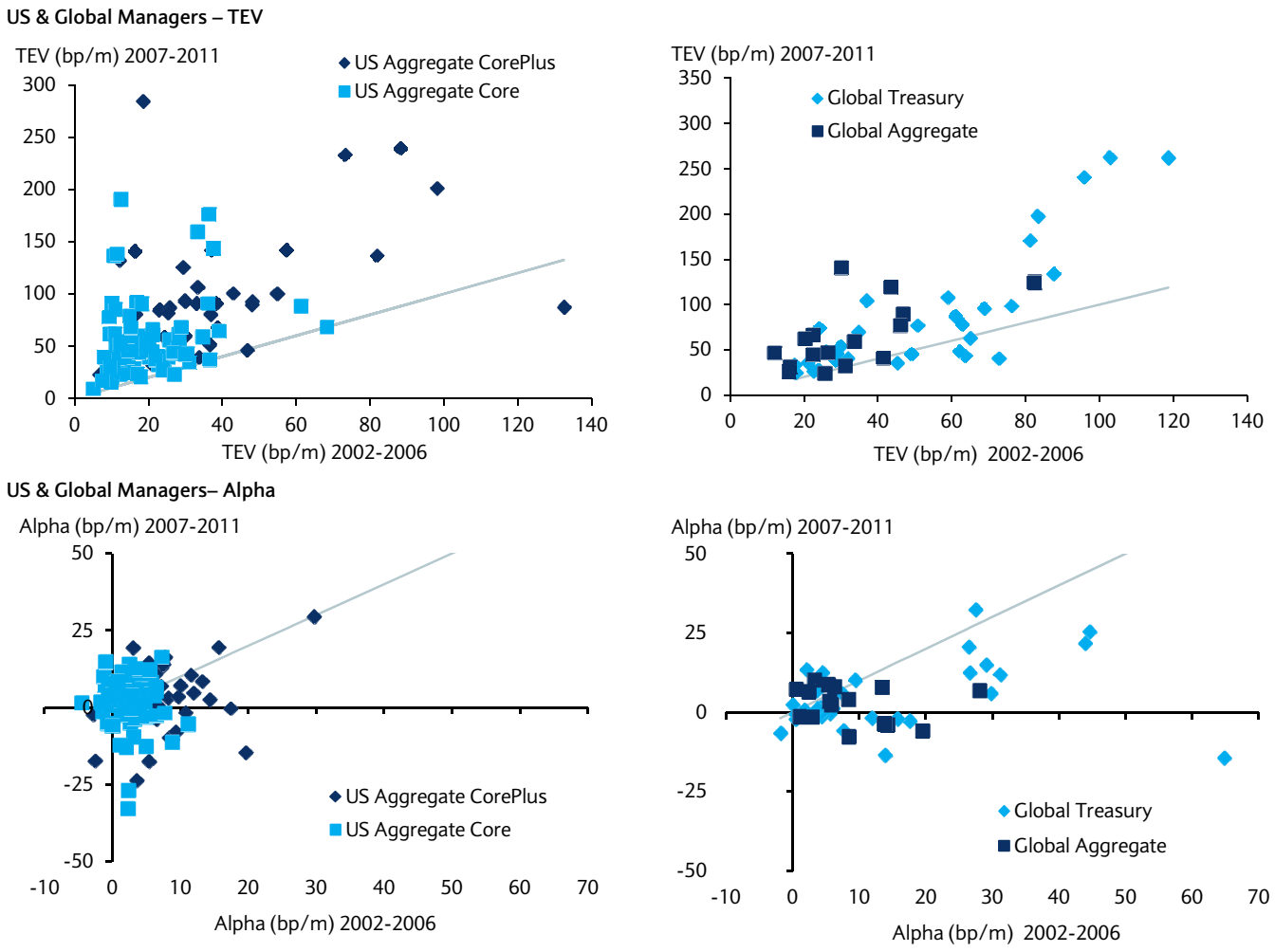
Persistence in FI manager performance

While some institutional mandates have a risk (TEV) budget expressed in basis points of *ex ante* TEV, plan sponsors typically give managers exposure or position limits (eg, duration within ±1.0y of the benchmark) that are constant over time. A manager's *ex ante* TEV may therefore fluctuate as the risk of a given exposure changes. For example, if spread volatility increases, a manager will experience an increase in TEV even though the over/underweight to spread markets is unchanged. So it would not be surprising to see manager TEV increase in the volatile period. However, if the manager has skill, and if skill is independent of the volatility of the market environment, we should expect active return to increase and IR to remain relatively constant.

Figure 15 (panel A) shows how managers' TEV and alpha changed from the first period to the second. The observations do not fall along the 45° line, indicating a change in manager performance between the two periods. As expected, realised TEV in the volatile period was substantially higher than in the quiet period. In addition, for all four manager types there was a distinct positive relationship between a manager's TEV in the first period and the manager's TEV in the second. Persistence of TEV was expected for managers operating under exposure or position limit constraints.

Figure 15 (panel B) indicates a very different pattern regarding alpha persistence. Except for Global Treasury there was little positive relationship between a manager's alpha in the first and second periods. We summarise these findings in Figure 16, which displays linear and rank correlations (less sensitive to outliers) of manager TEV and alpha across the two periods.

Figure 15: Persistence of manager active risk and active return



Source: eVestment Alliance, Barclays Research

Figure 16: Performance persistence - correlations of manager TEV and alpha between 2002-2006 and 2007-2011

	Average active return	Active risk	Information ratio
Global Aggregate			
Correlations	-22%	63%**	-35%
Rank Correlations	-34%	59%**	-41%*
Global Treasury			
Correlations	32%*	83%**	32%*
Rank Correlations	33%*	80%**	42%**
US Aggregate (Core)			
Correlations	-6%	25%*	-3%
Rank Correlations	-1%	30%**	-2%
US Aggregate (Core Plus)			
Correlations	32%*	40%**	13%
Rank Correlations	20%	41%**	9%

Note: Average correlations (across managers) of manager performance metrics between the periods Jan 2002-Dec 2006 and Jan 2007 – Dec 2011. *Significant at 95%; **Significant at 99%.
Source: Barclays Research

Global Treasury managers were most able to retain an ability not only to generate alpha but also to maintain relative manager skill across the two periods. The three other manager types did not exhibit significant alpha or skill persistence as the mix of drivers of active returns became unbalanced (as shown by the dominance of credit-related factors in Figure 8). Aggregate (both US and Global) managers who relied heavily on credit allocation strategies suffered from those strategies during the volatile period. We can point to various elements of the poor performance of heavy credit overweight strategies: credit excess return volatility was not stable, and hence difficult to anticipate (Figure 5); correlations between active spread strategies increased (Figure 7); and manager alpha diversity deteriorated (Figure 11), all suggesting difficult challenges to the active management process. These factors would reduce manager realised skill even if they were actively re-balancing in an optimal manner. In the crisis, however, managers may have held sub-optimal positions in spread assets on which they may even have had a negative view. These sub-optimal positions would have crowded out better strategies. High transaction costs or behavioural effects may have resulted in keeping such positions.

These observations suggest that we should differentiate between strategies suitable to be handled in the simple active risk budgeting framework (which assumes frequent rebalancing and predictability of risk parameters), and strategies that might be better handled in a longer horizon portfolio management framework. The better and more stable performance of Global Treasury managers can be explained by the attributes of the particular active strategies available to them: predictable risk; liquidity; and more stable correlations across available strategies.

The next section investigates whether managers were indeed unable or unwilling to rebalance, and the role that heightened transaction costs may have played.

Timing macro credit exposure and liquidity

In hindsight, a manager would have wished to have been short credit in 2007 and 2008, and long in 2009.[20] So, did active managers change their macro credit positioning through these years and, if not, what was the reason?

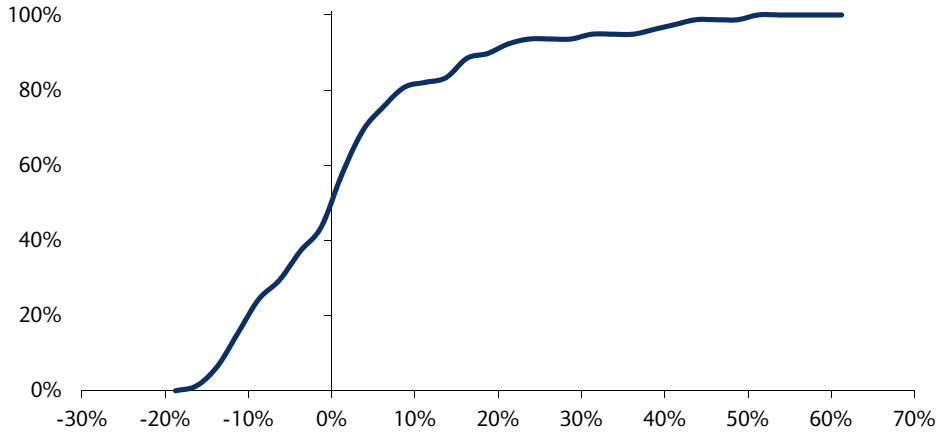
We estimate credit factor exposures between December 2007 and December 2009 by regressing monthly alphas of US Core managers on excess returns of the Corporate Index and rates returns of the Aggregate Index in 12 month rolling windows.[21] Regression betas provide estimates of credit exposures, indicating average overweight or underweight of a manager to corporate excess returns in the period. If the manager maintains a similar credit positioning relative to the benchmark from one period to the next, we should expect similar credit betas for both periods.

Figure 17 shows the distribution of estimated manager alpha exposures to corporate excess returns as of December 2007. It indicates that about half of managers were underweight credit while the others were overweight. Interestingly, some of them were quite aggressively overweight (by 40% or more), while the most extreme underweight was -16%.

[20] Excess returns of the US Corporate Index were -5.2% in 2007, -19.9% in 2008 and +22.8% in 2009

[21] Rates return is included as a control variable in the regression. Credit excess returns and benchmark rate returns are typically negatively correlated. Controlling for rate exposure ensures that credit exposure is not overestimated for mandates that are net short duration and is not underestimated for mandates that are net long duration.

Figure 17: Cumulative distribution of net exposures to corporate excess returns for US Aggregate managers, as of December 2007

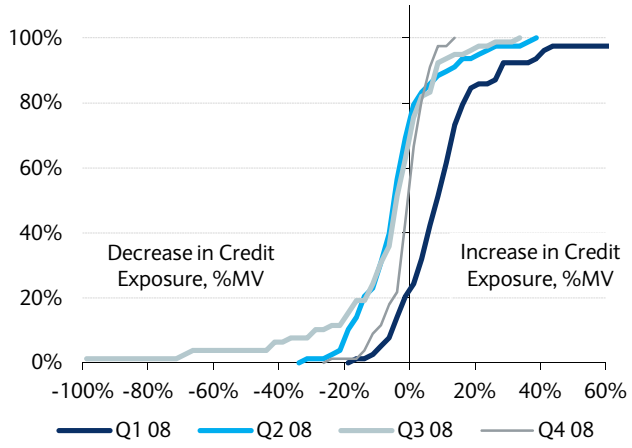


Source: Barclays Research

Figure 18 shows distributions of **changes** in credit exposure across individual managers over quarterly intervals. In the first three quarters of 2008 there were significant changes in credit exposure in our universe of core managers. In other periods, portfolio exposures to credit were more stable. Between Q4 07 and Q1 08, about 80% of Core managers increased credit exposure. For many managers the size of the increase was quite significant: about 50% of managers increased their credit exposure by more than 10%. As the crisis unfolded (Q2 08 and Q3 08) managers aggressively reduced their credit exposures. About 70% of the managers decreased their credit exposure in Q2 08, with more than 23% of managers decreasing exposures by more than 10%. Similarly, 63% of managers decreased their credit exposures in Q3 08, and 24% by more than 10%.

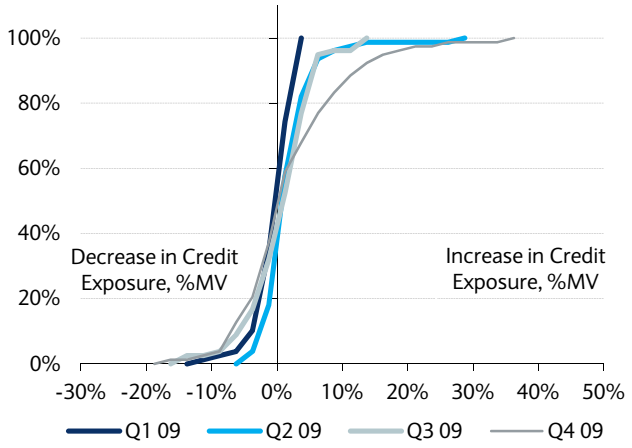
Figure 18: Distribution of changes in exposure to corporate excess returns across US Aggregate Core managers over quarterly intervals

A: Changes in US Aggregate Manager's Exposure in 2008



Source: Barclays Research

B: Changes in US Aggregate Manager's Exposure in 2009



Source: Barclays Research

In contrast, when corporate markets began to recover (Q1 09), changes in exposures to corporate excess returns were relatively small. Very few managers increased exposures by more than 10%. Figure 19 summarises the data in Figures 18A and 18B.

Figure 19: Distribution of changes in exposure to corporate excess returns across US Aggregate Core Managers over quarterly intervals

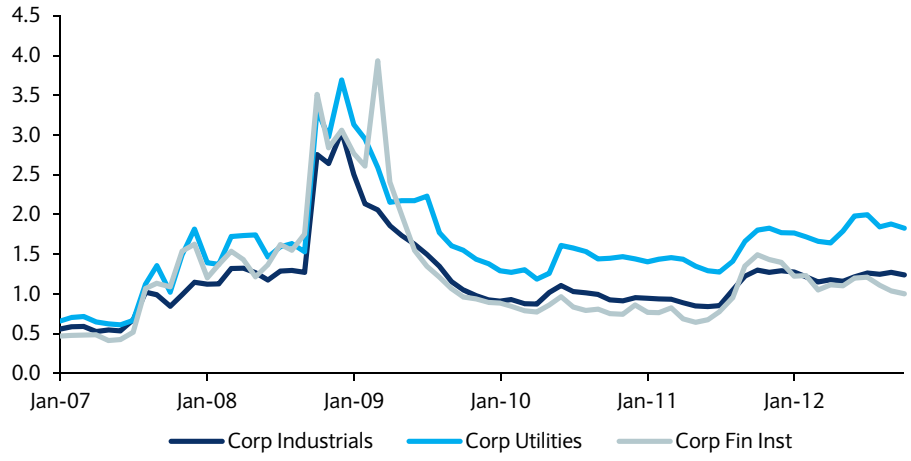
Period	US Corp Index Excess Return (%/q)	Decrease more than 10%	Decrease 0-10%	Increase 0-10%	Increase more than 10%
Q1 08	-4.87	3%	18%	31%	49%
Q2 08	1.58	23%	46%	19%	12%
Q3 08	-10.27	24%	38%	29%	8%
Q4 08	-5.63	9%	35%	54%	3%
Q1 09	-0.21	1%	33%	65%	0%
Q2 09	13.61	0%	18%	78%	4%
Q3 09	5.56	3%	30%	64%	4%
Q4 09	3.07	3%	35%	46 %	17%

Source: Barclays Research

One possible explanation for the small magnitude of credit rebalancing as the crisis receded could be related to the high volatility of credit and its high correlation with other spread strategies driven by the binary nature of the macroeconomic recovery outcome. If a manager used risk budgeting to construct portfolios, and assumed a high active risk (based on 2008 experience) and a very high correlation across spread strategies, an optimal decision could have been not to increase credit exposure very aggressively as the credit market was turning.

Alternatively, some investors have argued that the relatively muted increase in credit exposure was due to high transaction costs, saying that portfolio managers would certainly have increased credit exposure if only transaction costs had been lower. Indeed, Figure 20 shows that the liquidity cost score (LCS)[22], a measure of round-trip transaction costs, across all sectors of the US Corporate Index peaked in Q4 08 and Q1 09.

Figure 20: Liquidity cost scores (LCS) of US corporate sectors



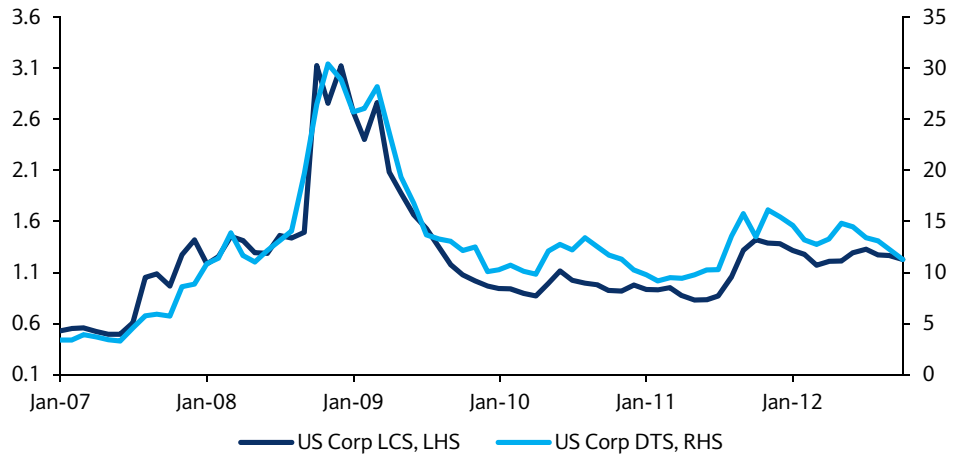
Source: Barclays Research

[22] See *Introducing LCS, Liquidity Cost Scores for US Credit Bonds*, S. Dastidar and B. Phelps, Barclays Research, 2009

However, transaction costs should not be evaluated in isolation, but, instead, against potential active returns. In fact, the period of high transaction costs was not out of proportion with the level of active risk and, hence, alpha potential (assuming undiminished skill). So, if transaction costs per unit of active risk did not change significantly in corporate bond markets, it would have been justified to keep actively timing credit exposure and re-position portfolios accordingly.

Exposure to credit spreads for a portfolio of corporate bonds can be measured as duration times spread (DTS). Figure 21 shows the evolution of LCS and DTS exposures of the US Corporate Index. Liquidity cost and spread exposure have very similar time dynamics.

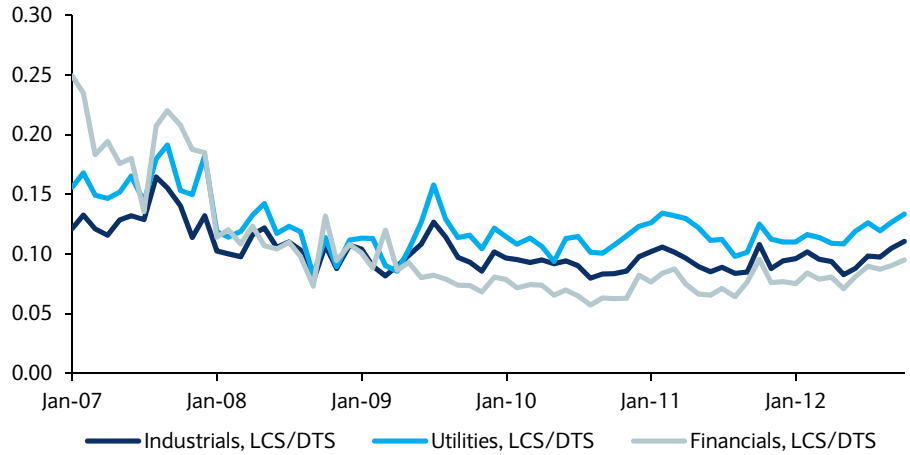
Figure 21: LCS and DTS exposure of the US Corporate index



Source: Barclays Research

This confirms our earlier intuition that while buying credit bonds became more expensive in Q4 08 and QI 09, the cost per unit of active risk (ie, alpha potential) remained roughly unchanged.[23] Figure 22 shows dynamics of average LCS per unit of DTS for industrial, utilities, and financial sectors of the US Corporate Index. The highest transaction cost per unit of spread risk exposure was, in fact, observed in 2007, and then declined as corporate spreads increased in the beginning of 2008. Despite (small) spikes in transaction costs per unit of DTS in October 2008 and June 2009, the level of LCS per DTS remained stable.

Figure 22: LCS per unit of DTS



Source: Barclays Research

[23] This ignores spread carry, which made overweighting corporate bonds even more attractive and cost efficient.

Transaction costs can be taken into account within our risk budgeting framework, although a few specifics of the credit sector need to be addressed. First, underweighting corporate bonds relative to the benchmark is a "transaction cost free" exercise for the manager, since the index is priced at Bid. This means that there are no transaction costs when reducing a portfolio's credit exposure. Increasing credit exposure, on the other hand, can have a significant and immediate performance drag from transaction costs as bonds enter the portfolio at Ask. To justify a manager's rebalancing decision to increase credit exposure, the expected alpha must exceed the drag from transaction costs. This can make managers reluctant to increase credit exposure when liquidity is poor.[24]

A second consideration relates to spread carry. When underweighting credit a manager suffers the opportunity cost of foregone spread carry. On the other hand, overweighting credit earns spread carry which can help offset transaction costs.

For a manager considering a credit rebalancing decision, LCS per unit of DTS can be related to the notion of "break-even skill" which can be derived from the *Fundamental Law of Active Management*[25] after adjusting for spread carry. In this case, we define break-even skill as the skill (correlation between manager forecast and subsequent market movement) that compensates for portfolio rebalancing transaction costs. It can also be seen as a measure of conviction in an active view. Break-even skill is different for decisions to increase or decrease credit exposure because of the abovementioned asymmetry in transaction costs and spread carry. If we assume that a corporate portfolio is rebalanced quarterly and that proportional spread volatility remains stable at 15%/m, the expected active return over a three-month horizon can be calculated as:

1. Active Ret = Skill x DTS x 0.15 x sqrt(3),

The skill of the portfolio manager must be high enough for the expected active return to cover transaction costs net of spread carry when increasing credit exposure, and lost spread carry when decreasing credit exposure (0.25 x annual spread for an assumed quarterly horizon).

2. BE Skill Increasing Credit Exposure = [LCS – 0.25 x Spread]/[0.15 x DTS x sqrt(3)]

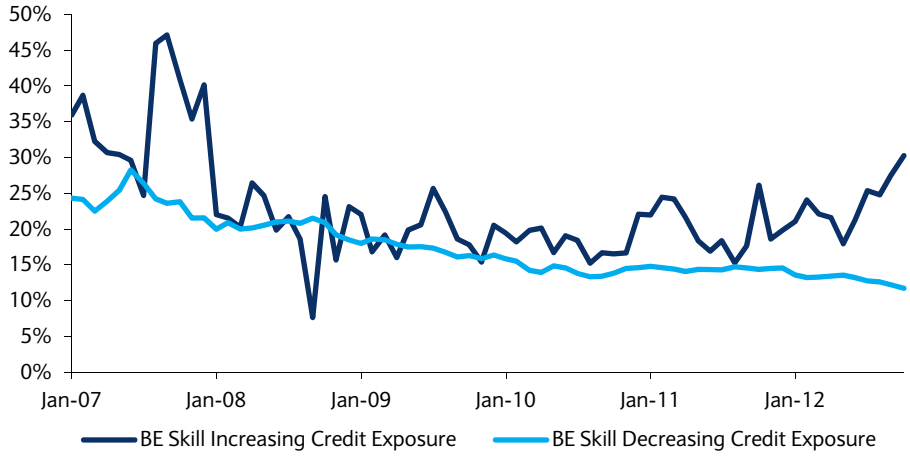
3. BE Skill Decreasing Credit Exposure = 0.25 x Spread/[0.15 x DTS x sqrt(3)]

As shown in equations (2) & (3), when increasing credit exposure break-even skill is a linear function of LCS and spread carry, both per unit of DTS, as long as proportional spread volatility remains stable. When decreasing credit exposure, break-even skill becomes a function of spread carry per unit of DTS.

Figure 23 plots break-even skill for increasing and decreasing credit exposure positions under the assumption of a constant proportional spread volatility of 15%/m. First, note that the break-even skill for implementing a bearish view is considerably less volatile than the break-even skill for implementing a bullish view. This is because the credit volatility and carry are both linear functions of spread, so that lost carry per unit of risk, which equals break-even skill, is a smooth function. On the other hand, break-even skill for increasing credit exposure is quite volatile – it fluctuated between 15% and 25% in 2009 - when credit liquidity is itself volatile.

[24] Decrease or increase in credit exposure will eventually be unwound, however, so that both views ultimately incur the full LCS cost.
[25] R. Grinold and R. Kahn, *Active Portfolio Management*, McGraw Hill, 1999

Figure 23: Manager break-even skill for macro credit timing



Note: Break-even skill is calculated under the assumption of quarterly rebalancing
Source: Barclays Research

Second, the dynamics of break-even skill imply that the decision to rebalance the portfolio would have been generally harder in 2007 than in subsequent years. The break-even skill for implementing a bullish view was on average 20% from 2008 onwards. Overall, this analysis suggests that high transaction costs cannot readily explain the relatively small incremental changes in managers' credit exposure in 2009. Other aspects of liquidity such as lack of market depth and risk of market impact, or even behavioural considerations, may have to be considered for explaining manager reluctance to increase credit exposure as the market recovered.

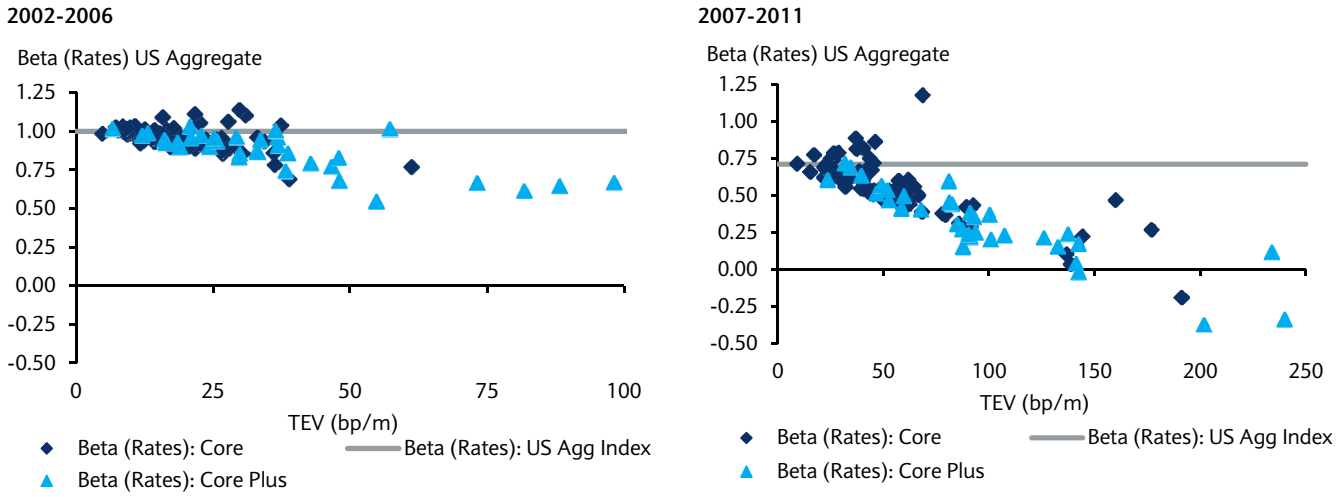
How active returns can affect FI allocation properties

The tendency for managers to overweight spread products may alter the nature of fixed income total returns expected by plan sponsors. Plan sponsors typically have an allocation to fixed income for its defensive nature: the ability to rally in times of economic slowdown, when riskier assets perform poorly. If bond managers generally take active exposures that largely negate the defensive profile of a bond mandate, then this may be counter to the plan sponsor's strategic objectives and could increase the sponsor's overall risk.

We assess this risk in US Aggregate mandates by estimating the beta of total returns with respect to the performance of a Treasury (ie, "rates") portfolio matching the benchmark. Specifically, the rates return is the performance of a Treasury portfolio constructed at the beginning of every month to match the key rate duration profile of the index.

Figure 24 shows that a manager's rates beta was related to the manager's active risk. Aggressive, high TEV managers tended to exhibit lower rates betas than defensive, low TEV ones. Figure 24 plots the relationship between TEV and rates beta for both the quiet and volatile periods. In both cases, rates sensitivity decreased as TEV increased, but this was much more pronounced in the second period. Interestingly, the rates beta of the benchmark index itself was 0.68 in the second period, significantly less than one, as the negative correlation between large excess returns of spread markets and Treasury returns reduced empirical rates sensitivity to much less than indicated by analytical Treasury duration. But, in that volatile period, relatively few managers, and only one CorePlus manager, delivered a rates beta greater than the rates beta of the benchmark. In fact several managers produced performances that had nearly no relationship with Treasury duration.

Figure 24: Interest rates betas of actively managed US Aggregate mandates



Source: Barclays Research

What was the effect of a reduced rates beta on a diversified allocation? Let us take the example of a US Aggregate mandate delivering only half of the index rates beta in 2007-2011, ie, 0.34 instead of 0.68[26]. A diversified portfolio investing 20% in equities and 80% in this "low rates beta" bond portfolio would have exhibited a higher maximum drawdown (13.6% versus 10.7%) and longer recovery time (23 months instead of 16) than if the fixed income allocation was identical to the US Aggregate Index.

[26] We construct such hypothetical portfolio by reweighting the rates return and excess returns of the US Aggregate Index such that, for the 2006-2011 period, it shows the same volatility as the published index and half its empirical duration. The rates return multiplier was 82% and the excess return multiplier 151%.

Analyst Certification

We, Albert Desclée, Anando Maitra, Bruce Phelps and Simon Polbennikov, hereby certify (1) that the views expressed in this research report accurately reflect our personal views about any or all of the subject securities or issuers referred to in this research report and (2) no part of our compensation was, is or will be directly or indirectly related to the specific recommendations or views expressed in this research report.

Important Disclosures:

Barclays Research is a part of the Corporate and Investment Banking division of Barclays Bank PLC and its affiliates (collectively and each individually, "Barclays"). For current important disclosures regarding companies that are the subject of this research report, please send a written request to: Barclays Research Compliance, 745 Seventh Avenue, 17th Floor, New York, NY 10019 or refer to http://publicresearch.barcap.com or call 212-526-1072.

Barclays Capital Inc. and/or one of its affiliates does and seeks to do business with companies covered in its research reports. As a result, investors should be aware that Barclays may have a conflict of interest that could affect the objectivity of this report. Barclays Capital Inc. and/or one of its affiliates regularly trades, generally deals as principal and generally provides liquidity (as market maker or otherwise) in the debt securities that are the subject of this research report (and related derivatives thereof). Barclays trading desks may have either a long and / or short position in such securities and / or derivative instruments, which may pose a conflict with the interests of investing customers. Where permitted and subject to appropriate information barrier restrictions, Barclays fixed income research analyst(s) regularly interact with its trading desk personnel to determine current prices of fixed income securities. Barclays fixed income research analyst(s) receive compensation based on various factors including, but not limited to, the quality of their work, the overall performance of the firm (including the profitability of the investment banking department), the profitability and revenues of the Fixed Income, Currencies and Commodities Division ("FICC") and the outstanding principal amount and trading value of, the profitability of, and the potential interest of the firms investing clients in research with respect to, the asset class covered by the analyst. To the extent that any historical pricing information was obtained from Barclays trading desks, the firm makes no representation that it is accurate or complete. All levels, prices and spreads are historical and do not represent current market levels, prices or spreads, some or all of which may have changed since the publication of this document. The Corporate and Investment Banking division of Barclays produces a variety of research products including, but not limited to, fundamental analysis, equity-linked analysis, quantitative analysis, and trade ideas. Recommendations contained in one type of research product may differ from recommendations contained in other types of research products, whether as a result of differing time horizons, methodologies, or otherwise. In order to access Barclays Statement regarding Research Dissemination Policies and Procedures, please refer to https://live.barcap.com/publiccp/RSR/nyfipubs/disclaimer/disclaimer-research-dissemination.html.

Disclaimer

This publication has been prepared by the Corporate and Investment Banking division of Barclays Bank PLC and/or one or more of its affiliates (collectively and each individually, "Barclays"). It has been issued by one or more Barclays legal entities within its Corporate and Investment Banking division as provided below. It is provided to our clients for information purposes only, and Barclays makes no express or implied warranties, and expressly disclaims all warranties of merchantability or fitness for a particular purpose or use with respect to any data included in this publication. Barclays will not treat unauthorized recipients of this report as its clients. Prices shown are indicative and Barclays is not offering to buy or sell or soliciting offers to buy or sell any financial instrument.

Without limiting any of the foregoing and to the extent permitted by law, in no event shall Barclays, nor any affiliate, nor any of their respective officers, directors, partners, or employees have any liability for (a) any special, punitive, indirect, or consequential damages; or (b) any lost profits, lost revenue, loss of anticipated savings or loss of opportunity or other financial loss, even if notified of the possibility of such damages, arising from any use of this publication or its contents.

Other than disclosures relating to Barclays, the information contained in this publication has been obtained from sources that Barclays Research believes to be reliable, but Barclays does not represent or warrant that it is accurate or complete. Barclays is not responsible for, and makes no warranties whatsoever as to, the content of any third-party web site accessed via a hyperlink in this publication and such information is not incorporated by reference.

The views in this publication are those of the author(s) and are subject to change, and Barclays has no obligation to update its opinions or the information in this publication. The analyst recommendations in this publication reflect solely and exclusively those of the author(s), and such opinions were prepared independently of any other interests, including those of Barclays and/or its affiliates. This publication does not constitute personal investment advice or take into account the individual financial circumstances or objectives of the clients who receive it. The securities discussed herein may not be suitable for all investors. Barclays recommends that investors independently evaluate each issuer, security or instrument discussed herein and consult any independent advisors they believe necessary. The value of and income from any investment may fluctuate from day to day as a result of changes in relevant economic markets (including changes in market liquidity). The information herein is not intended to predict actual results, which may differ substantially from those reflected. Past performance is not necessarily indicative of future results.

This communication is being made available in the UK and Europe primarily to persons who are investment professionals as that term is defined in Article 19 of the Financial Services and Markets Act 2000 (Financial Promotion Order) 2005. It is directed at, and therefore should only be relied upon by, persons who have professional experience in matters relating to investments. The investments to which it relates are available only to such persons and will be entered into only with such persons. Barclays Bank PLC is authorised and regulated by the Financial Services Authority ("FSA") and a member of the London Stock Exchange.

The Corporate and Investment Banking division of Barclays undertakes U.S. securities business in the name of its wholly owned subsidiary Barclays Capital Inc., a FINRA and SIPC member. Barclays Capital Inc., a U.S. registered broker/dealer, is distributing this material in the United States and, in connection therewith accepts responsibility for its contents. Any U.S. person wishing to effect a transaction in any security discussed herein should do so only by contacting a representative of Barclays Capital Inc. in the U.S. at 745 Seventh Avenue, New York, New York 10019.

Non-U.S. persons should contact and execute transactions through a Barclays Bank PLC branch or affiliate in their home jurisdiction unless local regulations permit otherwise.

Barclays Bank PLC, Paris Branch (registered in France under Paris RCS number 381 066 281) is regulated by the Autorité des marchés financiers and the Autorité de contrôle prudentiel. Registered office 34/36 Avenue de Friedland 75008 Paris.

This material is distributed in Canada by Barclays Capital Canada Inc., a registered investment dealer and member of IIROC (www.iiroc.ca).

Subject to the conditions of this publication as set out above, Absa Capital, the Investment Banking Division of Absa Bank Limited, an authorised financial services provider (Registration No.: 1986/004794/06. Registered Credit Provider Reg No NCRCP7), is distributing this material in South Africa. Absa Bank Limited is regulated by the South African Reserve Bank. This publication is not, nor is it intended to be, advice as defined and/or contemplated in the (South African) Financial Advisory and Intermediary Services Act, 37 of 2002, or any other financial, investment, trading, tax, legal, accounting, retirement, actuarial or other professional advice or service whatsoever. Any South African person or entity wishing to effect a transaction in any security discussed herein should do so only by contacting a representative of Absa Capital in South Africa, 15 Alice Lane, Sandton, Johannesburg, Gauteng 2196. Absa Capital is an affiliate of

Barclays.
In Japan, foreign exchange research reports are prepared and distributed by Barclays Bank PLC Tokyo Branch. Other research reports are distributed to institutional investors in Japan by Barclays Securities Japan Limited. Barclays Securities Japan Limited is a joint-stock company incorporated in Japan with registered office of 6-10-1 Roppongi, Minato-ku, Tokyo 106-6131, Japan. It is a subsidiary of Barclays Bank PLC and a registered financial instruments firm regulated by the Financial Services Agency of Japan. Registered Number: Kanto Zaimukyokucho (kinsho) No. 143.
Barclays Bank PLC, Hong Kong Branch is distributing this material in Hong Kong as an authorised institution regulated by the Hong Kong Monetary Authority. Registered Office: 41/F, Cheung Kong Center, 2 Queen's Road Central, Hong Kong.
This material is issued in Taiwan by Barclays Capital Securities Taiwan Limited. This material on securities not traded in Taiwan is not to be construed as 'recommendation' in Taiwan. Barclays Capital Securities Taiwan Limited does not accept orders from clients to trade in such securities. This material may not be distributed to the public media or used by the public media without prior written consent of Barclays.
This material is distributed in South Korea by Barclays Capital Securities Limited, Seoul Branch.
All equity research material is distributed in India by Barclays Securities (India) Private Limited (SEBI Registration No: INB/INF 231292732 (NSE), INB/INF 011292738 (BSE), Registered Office: 208 | Ceejay House | Dr. Annie Besant Road | Shivsagar Estate | Worli | Mumbai - 400 018 | India, Phone: + 91 22 67196363). Other research reports are distributed in India by Barclays Bank PLC, India Branch.
Barclays Bank PLC Frankfurt Branch distributes this material in Germany under the supervision of Bundesanstalt für Finanzdienstleistungsaufsicht (BaFin).
This material is distributed in Malaysia by Barclays Capital Markets Malaysia Sdn Bhd.
This material is distributed in Brazil by Banco Barclays S.A.
This material is distributed in Mexico by Barclays Bank Mexico, S.A.
Barclays Bank PLC in the Dubai International Financial Centre (Registered No. 0060) is regulated by the Dubai Financial Services Authority (DFSA). Principal place of business in the Dubai International Financial Centre: The Gate Village, Building 4, Level 4, PO Box 506504, Dubai, United Arab Emirates. Barclays Bank PLC-DIFC Branch, may only undertake the financial services activities that fall within the scope of its existing DFSA licence. Related financial products or services are only available to Professional Clients, as defined by the Dubai Financial Services Authority.
Barclays Bank PLC in the UAE is regulated by the Central Bank of the UAE and is licensed to conduct business activities as a branch of a commercial bank incorporated outside the UAE in Dubai (Licence No.: 13/1844/2008, Registered Office: Building No. 6, Burj Dubai Business Hub, Sheikh Zayed Road, Dubai City) and Abu Dhabi (Licence No.: 13/952/2008, Registered Office: Al Jazira Towers, Hamdan Street, PO Box 2734, Abu Dhabi).
Barclays Bank PLC in the Qatar Financial Centre (Registered No. 00018) is authorised by the Qatar Financial Centre Regulatory Authority (QFCRA). Barclays Bank PLC-QFC Branch may only undertake the regulated activities that fall within the scope of its existing QFCRA licence. Principal place of business in Qatar: Qatar Financial Centre, Office 1002, 10th Floor, QFC Tower, Diplomatic Area, West Bay, PO Box 15891, Doha, Qatar. Related financial products or services are only available to Business Customers as defined by the Qatar Financial Centre Regulatory Authority.
This material is distributed in the UAE (including the Dubai International Financial Centre) and Qatar by Barclays Bank PLC.
This material is distributed in Saudi Arabia by Barclays Saudi Arabia ('BSA'). It is not the intention of the publication to be used or deemed as recommendation, option or advice for any action (s) that may take place in future. Barclays Saudi Arabia is a Closed Joint Stock Company, (CMA License No. 09141-37). Registered office Al Faisaliah Tower, Level 18, Riyadh 11311, Kingdom of Saudi Arabia. Authorised and regulated by the Capital Market Authority, Commercial Registration Number: 1010283024.
This material is distributed in Russia by OOO Barclays Capital, affiliated company of Barclays Bank PLC, registered and regulated in Russia by the FSFM. Broker License #177-11850-100000; Dealer License #177-11855-010000. Registered address in Russia: 125047 Moscow, 1st Tverskaya-Yamskaya str. 21.
This material is distributed in Singapore by the Singapore branch of Barclays Bank PLC, a bank licensed in Singapore by the Monetary Authority of Singapore. For matters in connection with this report, recipients in Singapore may contact the Singapore branch of Barclays Bank PLC, whose registered address is One Raffles Quay Level 28, South Tower, Singapore 048583.
Barclays Bank PLC, Australia Branch (ARBN 062 449 585, AFSL 246617) is distributing this material in Australia. It is directed at 'wholesale clients' as defined by Australian Corporations Act 2001.
IRS Circular 230 Prepared Materials Disclaimer: Barclays does not provide tax advice and nothing contained herein should be construed to be tax advice. Please be advised that any discussion of U.S. tax matters contained herein (including any attachments) (i) is not intended or written to be used, and cannot be used, by you for the purpose of avoiding U.S. tax-related penalties; and (ii) was written to support the promotion or marketing of the transactions or other matters addressed herein. Accordingly, you should seek advice based on your particular circumstances from an independent tax advisor.