

FIXED INCOME ACTIVE RETURNS

Characteristics, Constraints and Competition

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The return on a long-only portfolio can be broken down into an underlying index return (“beta” component) and an active return (“alpha” component). Some years ago, plan sponsors began to separate their long-only manager returns into these two components to construct synthetic portfolios by combining the alpha from one or more managers with a beta portfolio constructed using derivatives. In recent years this activity has grown due to the development of new cashless derivative products (e.g., credit derivatives and replicating bond index swaps¹), which has dramatically improved the ability to earn a benchmark beta return at very little cost and effort. In addition, hedge funds with investments in alternative assets and more aggressive trading strategies prominently advertise an ability to earn higher active returns than those offered by traditional asset managers. As a result of these two trends, plan sponsors are expanding their search for greater active returns via synthetic portfolios.

This paper examines the competitive potential of synthetic fixed income (FI) portfolios. We first review the active return performance of traditional active USD Core FI institutional managers and find that these managers have demonstrated an ability to add value, yet their active returns are relatively low. Some Core FI managers argue that investment constraints hamper the magnitude of their active returns. We examine their claim by examining the outperformance potential of Core FI managers given a realistic set of long-only investment guidelines and market volatilities. We find that the potential of skillful Core FI managers to increase active returns is low. To boost active returns, managers have long asked their sponsors for expanded mandates (i.e., “CorePlus”). We examine the historical performance of these expanded mandates and find that while CorePlus FI managers have delivered greater active returns, their information ratios are, surprisingly, little different from Core managers. In other words, while CorePlus FI managers produce higher active returns, they do so by a proportional scaling of the active risk of Core FI managers.

Finally, we examine the new competition for traditional FI managers: synthetic FI portfolios. We construct several synthetic FI portfolios to evaluate their competitive potential to produce active returns for fixed income portfolio allocations. We find that synthetic FI portfolios have potential to boost FI information ratios, thereby increasing active returns without commensurate increases in active risk.

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¹ Replicating bond index swaps refer to RBISM basket swaps. For details, see, *Replicating Bond Index (RBISM) Baskets*, Barclays Capital, August 23, 2006.

Characteristics of long-only FI manager active returns

What has been the performance record of institutional core FI managers? We define performance as a manager's "active return," which is the difference between the portfolio return and the benchmark's return.² To outperform a benchmark, a manager will take "active risk," or ex-ante tracking error volatility. TEV is the risk that the manager's portfolio return may differ from that of the benchmark. As Grinold and Kahn explain, a manager's ability to translate active risk into active return is a measure of the manager's information ratio ($\alpha = IR \times TEV$).³ Grinold and Kahn further show that a manager's information ratio can be expressed as the product of the manager's skill and the square root of the breadth of the manager's strategy ($\alpha = skill \times \sqrt{breadth} \times TEV$). Skill is defined as the manager's ability to forecast outcomes correctly, while breadth refers to frequency with which the manager is able to exercise his skill by making independent active decisions.

Irrespective of the plan sponsor's tolerance for active risk, it is optimal for the sponsor to choose the manager (or portfolio of managers) with the highest IR and then scale the portfolio's active risk up and down to a desired expected active return. To achieve greater active returns the sponsor can ask this manager to take greater active risk—assuming the manager's information ratio is independent of the level of his ex ante active risk.⁴ Alternatively, the sponsor can leverage the manager's portfolio, but most plan sponsors rarely use leverage in such a direct fashion. For a high-IR manager, low levels of active return can be the result of bad luck, deliberate low levels of active risk taking, or the absence of opportunities to take higher levels of active risk.

We first examine the performance of Core FI (long-only) managers for 1Q91-1Q06. Using the **eVestment Alliance** database, we collected a sample of FI manager performance.⁵ These managers are self-described as active "core" managers, and their benchmark is the Barclays Capital Aggregate Index. Although we cannot be certain, Core FI managers are typically "long-only" managers and are restricted in the use of non-cash and out-of-benchmark investments.

Our goal is simply to see how managers have performed and identify, if possible, any systematic drivers of their active returns. Using quarterly data for 1Q91-1Q06, Figure 1 presents the distribution of average active returns and active risk for all Core FI managers in our sample.

Over the fifteen year period, the average (equally weighted) manager active return (before fees) was 11bp per quarter. Over time, the standard deviation of the average manager's active return (i.e., active risk or realized TEV) was 16bp per quarter. The average standard deviation of active returns across managers was 39bp per quarter. The relationship between a manager's active returns and realized TEV (Figure 2) was positive, but not particularly strong because the sample correlation coefficient is only 0.26.

² This performance measure is sometimes commonly referred to as "alpha." Strictly speaking, alpha is a manager's performance in excess of returns once all systematic exposures are removed. For example, if an equity manager had a portfolio that had a beta of 1.3 versus the equity market portfolio, then that manager's alpha is defined as his portfolio return less $1.3 \times$ equity market return. For our traditional institutional core FI managers, we assume their beta with the Barclays Capital Aggregate Index is 1.0 and refer to their alpha as "active return." Regressing the average core FI manager's return on the return on the Barclays Capital Aggregate Index produces a beta of 1.01 and an R^2 of 99.7%. The average manager's active return had a correlation of only 0.18 with the return of the Aggregate.

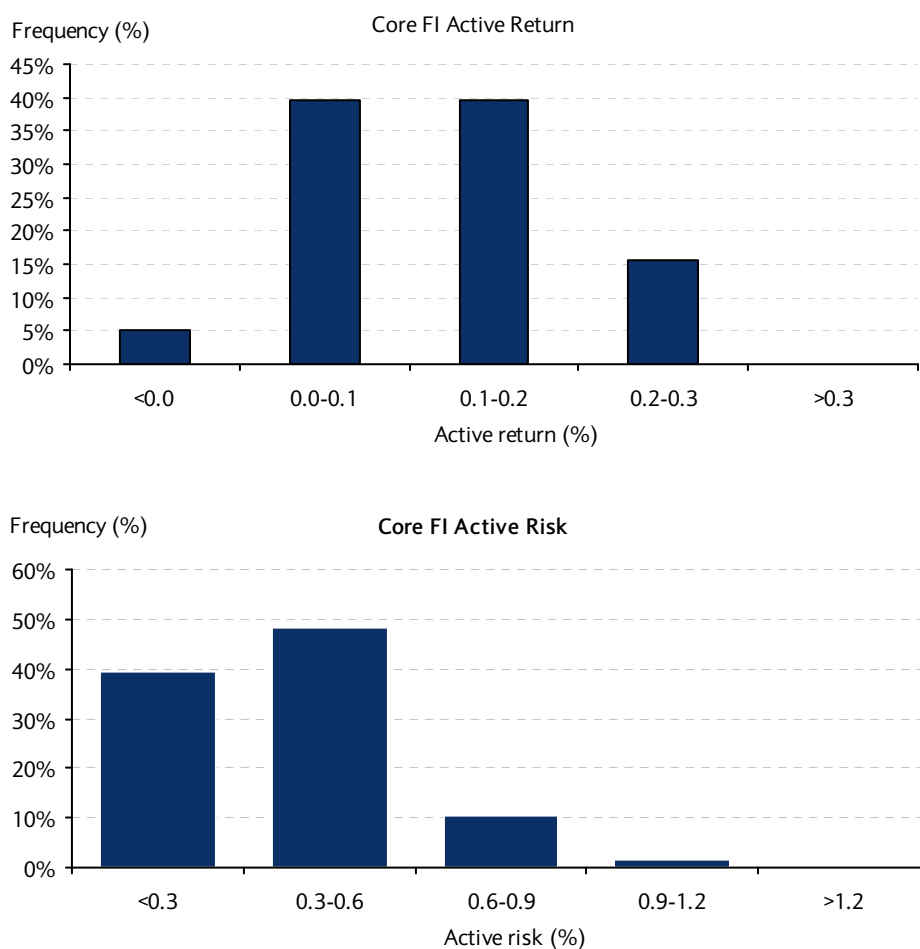
³ *Active Portfolio Management*, 2nd edition, R. Grinold and R. Kahn, McGraw Hill, 2000.

⁴ As discussed later, investment guideline constraints may cause a manager's information ratio to decline if he is required to fully utilize a higher risk budget in an effort to increase active returns.

⁵ Our sample covers 27 firms in 1Q91 and 58 firms in 1Q06 with a total AUM of \$424bn in 1Q06. All managers had AUM of at least \$1bn. Passive index managers were excluded. Only a single performance record per manager was used. Performance is before fees.

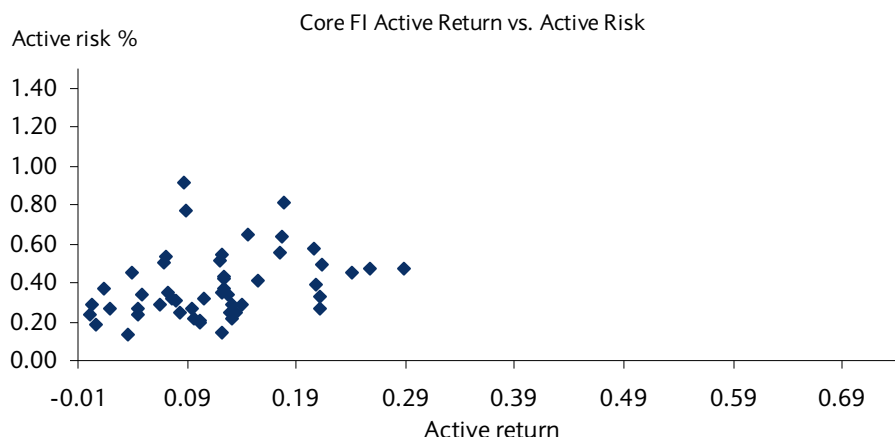
What were the drivers of core FI manager active returns? Managers have an array of active decisions they can make (duration, sector, and security level) relative to the benchmark. Generally, however, Core FI managers have limits on their duration exposure (e.g., \pm a year), as well as sector overweights and underweights and issuer exposures. In addition, Core FI managers are not permitted to hold non-index securities (e.g., high-yield and EMC) and cannot short securities or use leverage. With these constraints, how do Core FI managers generate active returns?

Figure 1: Core FI Managers: Distribution of Quarterly Active Returns and Active Risk 1Q91-1Q06



Source: eVestment Alliance

Figure 2: Core FI Managers: Relationship between Active Returns and TEV 1Q91-1Q06



Source: Barclays Capital

Many Core FI managers try to outperform over time by “out-yielding” the benchmark via a spread sector overweight. Such yield-oriented strategies include spread sector overweights and duration extensions when the curve is steep. Since lower-rated credit offers a relatively strong potential for additional realized income, it seems reasonable that managers will generally have a credit sector overweight relative to the lower-spread MBS sector. In a similar vein, perhaps Core FI managers try to “ride the yield curve” when it is upwardly sloping to add additional yield. So, we examine whether the level of the 2s-30s UST yield spread helps explain active returns. Are Core FI managers able to catch large swings or turning points in the level of interest rates? If so, then active returns are likely to be positively related to the absolute value of changes in the 10y UST yield ($|10y \text{ yield}|$). Also, Core FI managers can produce active returns via security selection and opportunistic trading within a performance quarter.

One commonly heard difference between traditional Core FI managers and hedge funds is that core managers are less able to react quickly to sudden changes in the market’s tolerance for risk (as measured by absolute changes in the VIX) and perform relatively poorly when the market is volatile (as measured by the daily volatility in the Aggregate’s daily total return). We examine the importance of market volatility on Core FI manager active returns.

We hypothesize that historical average FI Core manager active returns likely emanated from the following types of active exposures: spread sector overweights/underweights; long or short duration; Treasury curve shape exposures; implied volatility overweights/underweights; and security selection.⁶ We then regress average FI Core manager active returns on single factors that would proxy for these exposures. For example, one independent variable is the quarterly excess return on the Barclays Capital Credit Index (Credit_ExRet)—if managers tend to have a persistent credit overweight, then the coefficient would be expected to be positive. Another independent variable is the absolute value of Credit_ExRet—if managers tended to time their credit sector overweight/underweight and were successful, then the coefficient on $|Credit_ExRet|$ would be expected to be positive as well. We also divide the fifteen year period

⁶ We recently asked a group of FI managers about what factors drive their long-term active returns. Responses were as follows: 17%: spread sector overweight; 17%: correct duration calls; 17%: correct sector rotation calls; 33%: security selection; and 17%: other (e.g., hold illiquid securities).

into subperiods to examine the stability and statistical significance of a variable's regression coefficient over time. Figure 3 summarizes a portion of the single factor regression results.⁷

Having identified some potential explanatory variables, we then use a multifactor regression model to determine the set of factors most effective in explaining variations in active returns. In the multifactor regression, we only consider factors that are significant individually in the single factor model. Since some of these factors are highly correlated, we conducted further tests to make sure we were not introducing a multicollinearity problem arising from using more than one of these regressors as separate independent variables. We select the set of factors that gives the highest explanatory power (R^2) and are significant individually in the multifactor model. Results are presented in Figure 4.

Figure 3: Active Returns: Average Core FI Manager—Single Factor Regression Results, 1Q91-1Q06

		Curve Spd	chg in 10Y yld	Credit ExRet	Credit Baa ExRet	Credit ExRet	MBS ExRet	Credit- MBS ExRet	ABS+Credit- MBS ExRet	LEH Agg TotRet Vol	VIX
1991-2006	Coef	0.05	0.03	0.04	0.03	(0.03)	(0.09)	0.09	0.07	(0.81)	(0.00)
	t-statistics	2.11	0.43	2.25	2.45	(1.20)	(2.75)	4.40	4.80	(2.34)	(1.32)
	p-value	0.04	0.67	0.03	0.02	0.20	0.01	-	-	0.02	0.19
	R ²	0.07	-	0.08	0.09	0.03	0.11	0.25	0.30	0.08	0.03
1991-1995	Coef	0.10	0.33	(0.23)	(0.15)	(0.21)	(0.20)	0.15	0.20	(1.55)	0.00
	t-statistics	1.52	2.05	(2.35)	(2.40)	(1.32)	(3.86)	1.99	3.40	(2.07)	0.20
	p-value	0.15	0.05	0.03	0.03	0.20	0.00	0.06	0.00	0.05	0.84
	R ²	0.11	0.19	0.24	0.25	0.09	0.47	0.19	0.47	0.19	-
1996-2000	Coef	0.05	(0.03)	0.03	0.02	(0.03)	0.04	0.05	0.03	(0.61)	(0.00)
	t-statistics	0.77	(0.84)	1.61	1.60	(1.25)	0.92	1.85	2.19	(2.16)	(0.78)
	p-value	0.45	0.40	0.12	0.12	0.22	0.37	0.08	0.04	0.04	0.44
	R ²	0.03	0.04	0.13	0.12	0.08	0.04	0.16	0.21	0.21	0.03
2001-2006	Coef	0.00	(0.27)	0.07	0.05	-	0.01	0.06	0.06	(0.07)	(0.00)
	t-statistics	0.06	(2.50)	3.80	4.25	0.02	0.19	3.58	3.44	(0.10)	(0.20)
	p-value	0.96	0.02	0.00	-	0.98	0.85	0.00	0.00	0.91	0.84
	R ²	0.00	0.25	0.43	0.49	-	0.00	0.40	0.38	-	0.00

Source: Barclays Capital

Figure 4: Active Returns: Average Core FI Manager — Multifactor Regression Results, 1Q91-1Q06

		Intercept	ABS+Credit- MBS ExRet	LEH Agg TotRet Vol	R ²
1991-2006	Coef	0.31	0.07	(0.85)	
	t-statistic	4.60	5.53	(3.23)	
	p-value	0.00	0.00	0.00	0.42
1991-1995	Coef	0.37	0.18	(1.04)	
	t-statistic	2.50	3.30	(1.89)	
	p-value	0.03	0.00	0.08	0.59
1996-2000	Coef	0.27	0.05	(0.78)	
	t-statistic	4.50	3.40	(3.40)	
	p-value	0.00	0.00	0.00	0.53
2001-2006	Coef	0.19	0.06	(0.45)	
	t-statistic	1.50	3.50	(0.86)	
	p-value	0.15	0.00	0.39	0.41

Source: Barclays Capital

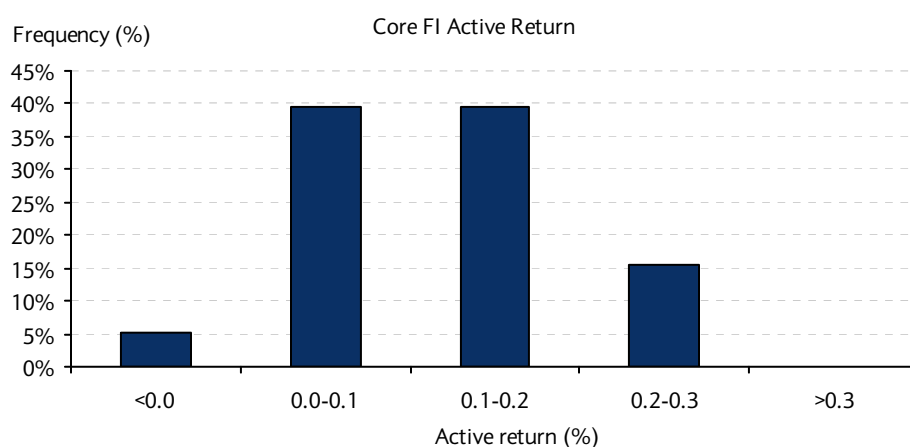
⁷ A complete list of independent variables considered is available from the authors.

Two variables plus a constant explain 42% of the variability in the average Core FI manager's active performance over the past fifteen years. Importantly, the intercept term is positive and highly significant at 31bp per quarter. This indicates that the average Core FI manager is able to generate positive active returns consistently in addition to the systematic factor returns, via such activities as security selection and relative value trading. The $(\text{ABS_ExRet} + \text{Credit_ExRet} - \text{MBS_ExRet})$ factor is also positive and highly significant. This result is reasonable because many Core FI managers have long followed an ABS and credit overweight strategy with a relative underweight to MBS due to their low relative spread levels. Core FI managers tend to underperform whenever ABS + credit underperform MBS, and vice versa. However, this factor contributed little to the manager's active return. With a coefficient value of 0.07 and an average factor value of 0.22, this sector factor contributed only 1bp per quarter to the manager's average active return.

Most noticeable, the realized daily volatility over the quarter of the Aggregate total return is negative and significant, indicating that Core FI managers tend to do less well during volatile market conditions. Perhaps this is due to intra-quarter trading activity or losses on positions that are short volatility.⁸ With a coefficient value of -0.85 and an average factor value of 24bp, this volatility sector factor reduced core FI manager average active returns -20bp per quarter. While the coefficient on the volatility factor was negative for all three sub-periods, the coefficient was not significant during the most recent sub-period.

Overall, the performance data suggest that Core FI managers have consistently produced value added over the past fifteen years. The average Core FI manager, with an average active return of 11bp per quarter and a standard deviation of active returns over time of 16bp, had an annualized IR of 1.41. However, there was wide variability in IR across managers as shown by the distribution of realized information ratios across all the managers in the sample (Figure 5). The average annualized IR across all Core FI managers was 0.62. An annualized IR for a manager over the period of 0.62 is statistically greater than zero at the 1% significance level.⁹

Figure 5: Core FI Managers: Distribution of Realized Information Ratios, 1Q91-1Q06



Source: eVestment Alliance

⁸ One argument heard is that hedge funds are more “nimble” than traditional FI managers and are better positioned to capitalize on periods of market volatility. In fact, total returns for both the Equity Hedge and Market Neutral strategies (discussed below) have negative correlations (-10% to -30%) with VIX and |change in VIX| from 1Q91-1Q06. So the average equity hedge fund did not do well in volatile markets.

⁹ Testing whether a manager's IR is greater than zero at traditional levels of confidence requires a considerable number of observations as the standard error for the annualized information ratio using quarterly observations is approximately $2/\sqrt{\text{number of quarters}}$. For example, to be 97.5% confident that a manager's IR of 0.62 is greater than zero (one-tailed test) would require approximately 42 quarters of observations. Our dataset contains 60 quarters of observations. See “The Information Ratio” by Thomas H. Goodwin, Financial Analysts Journal, July/August 1998.

What Are the Constraints to Improved FI Active Returns?

The performance record for institutional Core FI managers indicates that they produce value for their plan sponsors, yet Core FI active returns are often regarded as too low. Active returns might have been higher if either managers had a higher information ratio (either from greater skill and/or access to strategies with greater breadth) or managers took more active risk.¹⁰ Improving information ratios by increasing skill (i.e., increasing the correlation between forecasts and realized outcomes) is likely to be difficult—certainly over a short horizon—as established managers have long strived to improve their investment management processes. Increasing information ratios by increasing breadth (i.e., increasing the frequency of independent active positions) may be possible if Core FI managers operate under restrictive guidelines. For example, Core FI managers are generally prohibited from selling credit protection in the CDS market. This restriction constrains strategy breadth as a manager with a negative outlook on a credit is practically unable to take a meaningful underweight position.

Active returns may also be constrained because Core FI managers are not permitted to or cannot exercise their skill by taking greater active risk either because investment guidelines restrict the manager to low active exposures or the investment opportunity set restricts the manager to low spread and low volatility asset classes. For example, many investment guidelines restrict duration overweights or underweights as well as sector and issuer exposures. In addition, Core FI managers are generally prohibited from taking active exposures to more volatile assets (e.g., high-yield and EMG) that are likely to have low correlation to other exposures in the portfolio, even if managers have views on those markets. These restrictions likely constrain the level of ex ante active risk that a Core FI manager can take to generate active returns.

We can employ a simple conceptual framework (using Barclays Capital's risk budgeting methodology¹¹) to assess the degree to which Core FI manager active returns are constrained by their investment guidelines and the spread levels and volatilities of their investment universe. We can represent the active investment process as the combination of individual trading strategies. Each strategy is characterized by its own information ratio, which embodies both investment skill and breadth. The strategy outperformance is the product of information ratio and risk loading in terms of isolated tracking error volatility (i.e., $= IR \times TEV$). We allow the information ratio to vary across strategies depending on a subjective assessment of a reasonable level of skill and trading breadth for each strategy. For example, it may be more difficult to demonstrate skill at duration timing, and there may be fewer active duration positions that can be implemented in a typical year compared with a strategy of security selection. Consequently, we assume the manager's IR for the duration strategy is less than that for security selection. The active return contribution of each strategy is essentially a function of how much active risk can be allocated to it.

In the context of a core FI manager who is not allowed to use any leverage, the maximum risk loading can be estimated by perturbing a typical portfolio structure to reflect the maximum

¹⁰ Alternatively, Core FI managers may limit the level of active risk because they know their clients well. Perhaps clients are suffering from "cognitive dissonance" and while they hear of large active returns in the media (usually without any risk measure) clients are reluctant to expose their portfolios to too much tracking error volatility. We recently asked the same group of FI managers about what factors limit their active returns. Their responses were as follows: 0%: said FI managers are too risk averse; 0% FI managers have too little skill; 25%: FI managers have limited investment opportunity set (low volatility assets); 54%: FI managers have binding investment constraints (e.g., long-only) that limit active returns; 13%: clients may want higher active returns but are unwilling to tolerate higher active risk; and 8%: "other."

¹¹ For background on Barclays Capital's risk budgeting methodology, please see Chapter 2, "Value of Skill in Macro Strategies for Global Fixed-Income Investing" in *Quantitative Management of Bond Portfolios*, by L. Dynkin, A. Gould, J. Hyman, V. Konstantinovskiy, and B. Phelps, Princeton University Press, 2007.

underweights and overweights representative of active views and then measuring the corresponding isolated active risk (i.e., TEV). We perform this exercise using the Barclays Capital multifactor risk model¹² and present the resulting isolated TEVs in Figure 6. Relying on our multifactor risk model to estimate achievable risk allocations to individual strategies helps reflect changing market conditions and risks in various parts of the market.

Figure 6 shows that investment guidelines can severely limit the level of active risk associated with typical core FI trading strategies. For example, many Core FI managers are restricted to being no more than one year longer or shorter in duration than the Aggregate. However, Figure 6 shows that a portfolio that takes this maximum possible duration active position has an active risk of only 46.6bp per quarter. A doubling of the portfolio's allocation (relative to the Aggregate's) to credit produces an active risk of 24.0bp per quarter, while a near doubling of the portfolio's allocation to MBS, funded with Treasuries, produces an active risk of only 20.2bp per quarter. In the case of issuer-specific credit views, we also estimate the effect of concentrating the portfolio on only 20 names while conforming to the rating allocation of the Aggregate. Since credit currently represents 23% of the Aggregate's market value, and the more volatile Baa-rated credit names only 7.6%, the level of active risk from security selection is limited to a modest 7.7bp per quarter of isolated TEV. For each strategy in isolation, we can multiply the strategy's IR with its level of active risk to estimate its expected quarterly outperformance. For example, the duration strategy, with an annualized IR of 0.35 and active risk of 46.6bp per quarter, has an expected active return of 8.2bp per quarter.

Assuming that individual strategies don't interfere with each other, one can sum up individual contributions to outperformance to obtain an expected portfolio outperformance target. This, however, may not be fully realistic as active strategies may crowd each other, with the effect that a strategy's IR obtained in a portfolio context is less than that expected when considering the same strategy in isolation from other active strategies. For example, when attempting to overweight both MBS and credit, a Core FI manager may be constrained by the amount of Treasuries that can be used to fund these overweights. So, two different strategies may compete for the use of the same funding constraint. Other interactions are often observed between fully funded active strategies but are beyond the scope of this article.¹³

Figure 6: Evaluating Core FI Active Strategies

Active Strategy	Assumed Annualized IR	Isolated TEV (bp/quarter)	Expected Outperformance (bp/quarter)
Duration +/- 1 year	0.35	46.6	8.2
Credit Sector 100% over/under weight versus UST	0.40	24.0	4.8
MBS Sector near 100% over/under weight versus UST	0.40	20.2	4.0
Credit Security Selection (concentration on 20 names)	0.40	7.7	1.5

Source: Barclays Capital

To examine the active return effect of investment guidelines at the portfolio level, we assemble portfolios of active strategies for different outperformance targets taking into

¹² For details on the Barclays Capital multifactor risk model please see Chapter 26, "The Global Risk Model: A Portfolio Manager's Guide," in *Quantitative Management of Bond Portfolios*.

¹³ For more details see Chapter 24, "Effect of Security Selection on Optimal Sector Allocation" and Chapter 25, "Risk Budget Allocation to Issuer and Sector Views," in *Quantitative Management of Bond Portfolios*.

account expected correlations between strategy payoffs. While performance is additive across strategies, active risk is unlikely to be so due to less than perfect correlations in active returns across strategies. This result can be seen in Figure 7. For low levels of target outperformance, the annualized portfolio IR is substantially higher than any stand-alone strategy IR. For example, the portfolio IR for a 2.5bp per quarter active return target is 0.52, which is greater than the highest strategy IR (e.g., 0.40 for the stand-alone sector allocation strategy). Figure 7 also shows that the maximum level of expected returns, given the guideline constraints and asset volatilities and covariances, is 14.5bp per quarter.

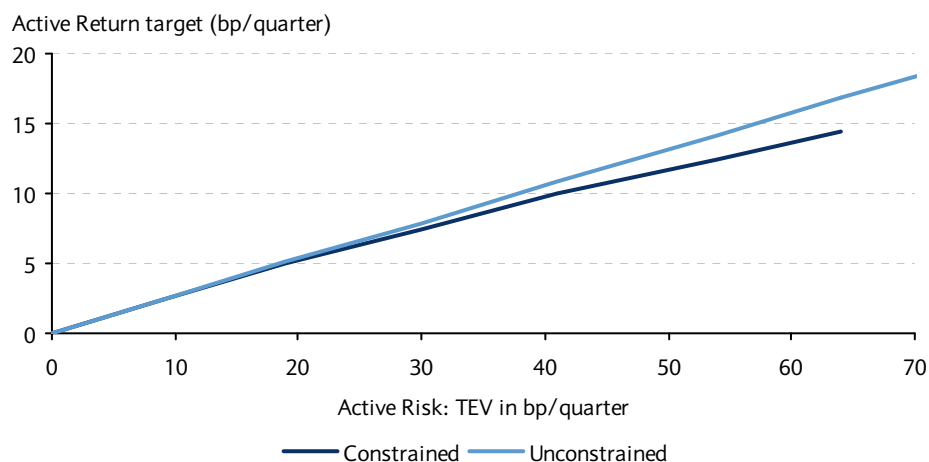
To increase portfolio active returns beyond 2.5bp per quarter the portfolio's information ratio declines because the manager must rely relatively more extensively on the duration strategy to increase portfolio outperformance. For the highest expected outperformance level (14.5bp per quarter) consistent with our conservative assumptions more than half of its active return is contributed by active duration exposures. In fact, as we move from conservative to more aggressive performance targets, the main driver of performance changes from credit to duration, the strategy with the greatest possible risk allocation but lowest IR. The reason the portfolio IR declines with higher performance targets is that to increase returns the manager must rely on "inferior" strategies to a greater extent than would be suggested by correlations and IRs. Indeed, risk allocations to the security selection and sector rotation strategies, which have higher IR, are quickly capped by the constraints and the duration strategy is left as the only possibility to increase performance. In practice, we can view the example presented in the rightmost column of Figure 7 as that of a fund manager who has strong credit capabilities but, facing constraints that prevent him from fully exploiting his credit skill, is forced to turn himself largely into a duration manager to meet the performance target of his sponsor.

Figure 7: Combining Multiple Core FI Active Strategies: Portfolio Active Returns and Information Ratios, Effect of Core FI Investment Guidelines

Target Active Return (bp/quarter)	2.5	5.0	7.5	10.0	12.5	14.5
Portfolio TEV (bp/quarter)	10	20	30	42	54	65
Portfolio Annualized IR	0.52	0.51	0.49	0.48	0.46	0.45
Source of Active Return (bp/quarter)						
Duration	0.3	1.0	2.0	3.7	6.2	8.2
Sector over/underweight	1.0	2.4	4.0	4.8	4.8	4.8
Credit Security Selection	1.1	1.5	1.5	1.5	1.5	1.5
Source of Active Return (% of Portfolio Return)						
Duration	14%	21%	26%	37%	49%	56%
Sector over/underweight	42%	48%	53%	48%	38%	33%
Credit Security Selection	44%	31%	21%	15%	12%	11%

Source: Barclays Capital

Figure 8: Combining Multiple Core FI Active Strategies: Portfolio Active Returns and TEV Effect of No-Leverage Investment Guidelines



Source: Barclays Capital

Core FI managers (unlike hedge funds) are typically not allowed to use leverage. Figure 8 illustrates the effect of the no-leverage constraint on Core FI performance. We plot the relationship between outperformance target and the portfolio's tracking error budget. The slope of this relationship is the portfolio IR. For low-risk portfolios, both constrained (i.e., no leverage) and unconstrained (i.e., leverage allowed) mandates exhibit the same information ratio since constraints are not binding. For higher-risk portfolios (in a quest to earn greater expected active returns), the constrained mandates become less efficient—there is a point, corresponding to 14.5bp per quarter of expected outperformance in Figure 8, beyond which we cannot find any feasible portfolios anymore. However, if the Core FI manager were unconstrained and could employ leverage, then he could achieve both a higher efficiency, which is a higher information ratio that would be shown in Figure 8 as a steeper performance/active risk relationship, and a higher level of outperformance.

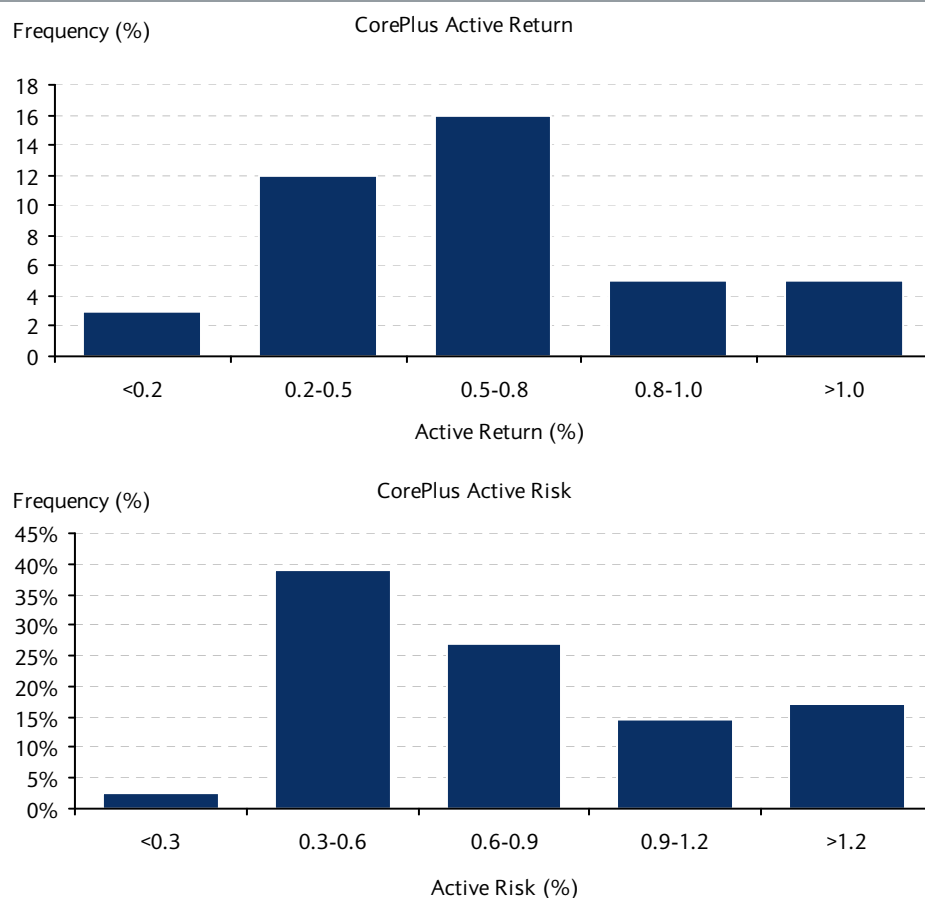
Of course, our framework relies on a simplified representation of the universe of active strategies that would be considered by active Core FI managers. Nevertheless, it helps to compare various alternatives in terms of mandate design and constraints. In the absence of relevant empirical data, it also helps to establish an order of magnitude for the performance drivers and efficiency of new mandates, which include an ability to use newly available derivatives such as CDX or iTraxx contracts.

Some FI managers have sought to boost active returns by asking sponsors to relax their investment constraints in order to allow them to employ strategies with greater breadth or with those involving assets with greater volatility and a low correlation with other strategies. Managers with such mandates are commonly labeled “core-plus” managers and can typically add long positions in more volatile (and less correlated) asset classes (e.g., high-yield, non-dollar, and emerging markets) and, perhaps employing some leverage via derivatives. In addition, core-plus managers have the ability to increase their information ratios through strategies with more breadth via an ability (although not unlimited) to short assets (e.g., structured credit). Presumably, CorePlus FI managers should be able to generate more active returns via greater information ratios or assuming greater active risk with their pre-core-plus information ratios compared with Core FI managers. What has been the performance record for CorePlus managers?

We again use the eVestment Alliance database to collect a sample of CorePlus FI manager performances for the 1Q91 – 1Q06 period.¹⁴ In many cases, an investment management firm with a manager in the Core FI sample will also have a manager in the CorePlus FI sample. The CorePlus managers in the sample are self-described as “core-plus” and their benchmark is the Aggregate Index. CorePlus FI managers are typically “long-only” managers but are allowed to hold out-of-benchmark assets (high-yield, non-dollar and EMG) and use derivatives (futures and structured credit). Figure 9 presents the distribution of average active returns and active risk for all CorePlus FI managers in our sample.

Over the period, the average (equally weighted) CorePlus FI manager active return (before fees) was 28bp per quarter. Over time, the standard deviation of the average manager’s active return (i.e., active risk or realized TEV) was 47bp per quarter. As is the case for Core FI managers, the average standard deviation of active returns across CorePlus managers was considerably greater (96bp per quarter) than the variability of the average CorePlus manager’s active returns, reflecting the considerable variability in active returns across managers. The relationship between a CorePlus FI manager’s active returns and realized TEV (Figure 10) is much stronger compared with the Core FI manager as the sample correlation coefficient for CorePlus is 62% (compared with 0.26% for Core). As for Core FI managers, active CorePlus FI returns also have low correlation (0.04) with the total return of the Aggregate index.

Figure 9: CorePlus FI Managers: Distribution of Quarterly Active Returns and Active Risk 1Q91-1Q06

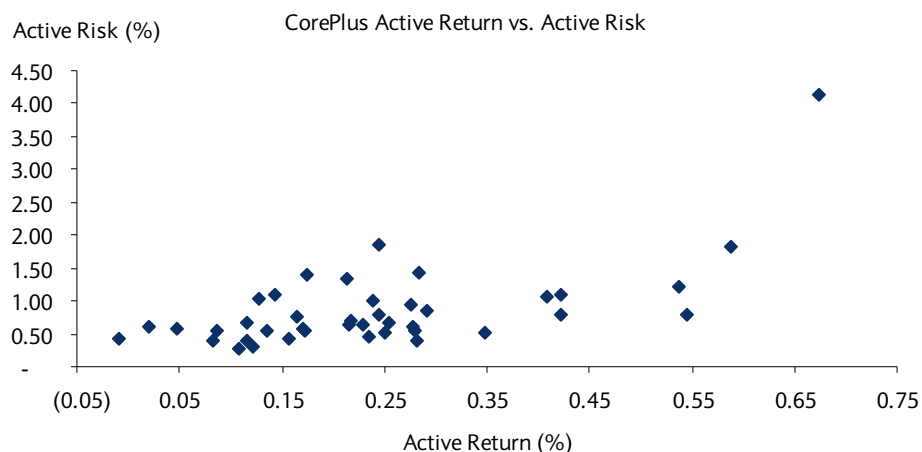


Source: eVestment Alliance

¹⁴ Our sample covers 17 firms in 1Q91 and 41 firms in 1Q06 with a total AUM of \$503bn in 1Q06. All managers had AUM of at least \$1bn. Only a single performance record per manager was used. Performance is before fees.

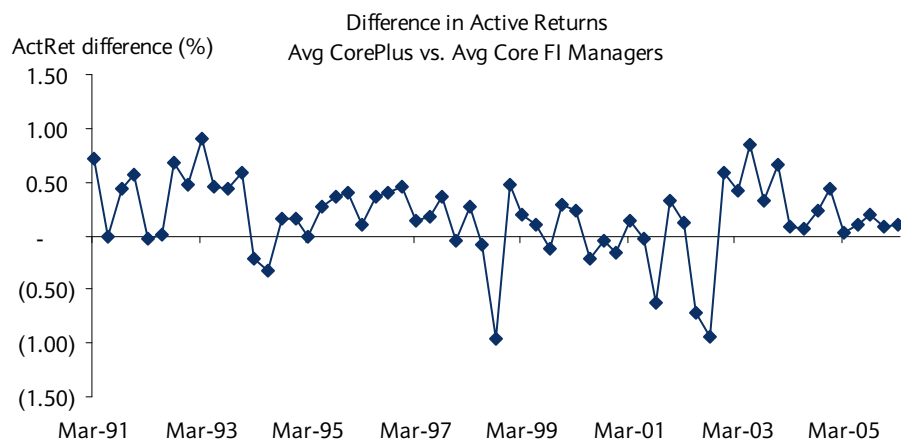
Figure 11 compares the active returns for the average Core FI manager and the average CorePlus manager. Generally, the CorePlus manager outperforms except for the occasional sharp quarterly underperformance. In fact, omitting the worst four quarters of active returns for the average CorePlus manager would have boosted the active return from 28bp per quarter to 37bp per quarter. Because these large negative active return quarters are associated with large negative excess returns for high-yield and EMG, we can infer that CorePlus managers tend to maintain an overweight to those sectors.

Figure 10: CorePlus FI Managers: Distribution of Quarterly Active Returns and TEV, 1Q91-1Q06



Source: Barclays Capital

Figure 11: Difference in Active Returns: Average CorePlus versus Average Core FI Manager, 1Q91-1Q06



Source: Barclays Capital

As for the Core FI managers, we first explore the drivers of average CorePlus FI active returns. We follow the same approach as we did for Core FI managers—we initially consider the same set of potential explanatory variables used for the Core FI manager, and then add additional independent variables associated with an investment strategy in high-yield, unhedged and hedged non-dollar, and EMG.

Starting with the Core FI regression equation, we find that by adding HighYield_ExRet and EMG_ExRet factors and removing the Aggregate volatility factor, we can explain 67% of the variability in CorePlus FI active returns (Figure 12).

The ABS+Credit-MBS_ExRet factor continues to be significant in explaining CorePlus FI active returns, indicating that CorePlus managers also generate active returns by overweighting credit and ABS relative to MBS. However, this factor contributes only 3bp per quarter on average to CorePlus active returns.

Not surprisingly, the HighYield_ExRet and EMG_ExRet factors are very significant and have positive correlations with CorePlus active returns.¹⁵ This indicates that CorePlus managers generate additional active returns by having systematic exposure to high-yield and emerging market debt. These two factors contribute about 5bp per quarter to the CorePlus active returns.

One unexpected difference between average CorePlus and Core managers is that the volatility of the Aggregate total return had little explanatory power for CorePlus, whereas it was a significant drag on Core manager performance.¹⁶ Perhaps the ability of CorePlus managers to use derivatives for hedging and trading might permit them to better weather volatile market environments compared with their Core colleagues?

Figure 12: Active Returns: Average CorePlus FI Manager—Multifactor Regression Results, 1Q91-1Q06

		Intercept	HY ExRet	EM ExRet	ABS+Credit-MBS ExRet	R ²
1991-2006	Coef	0.18	0.03	0.02	0.14	
	t-statistic	4.50	2.20	2.48	2.70	
	p-value	0.00	0.03	0.02	0.00	0.67
1991-1995	Coef	0.25	0.01	0.02	0.35	
	t-statistic	1.55	0.13	1.17	1.95	
	p-value	0.16	0.89	0.27	0.08	0.42
1996-2000	Coef	0.15	0.00	0.03	0.07	
	t-statistic	2.80	0.20	3.08	0.95	
	p-value	0.01	0.84	0.00	0.35	0.68
2001-2006	Coef	0.10	0.07	0.02	0.07	
	t-statistic	2.50	4.00	1.16	1.56	
	p-value	0.04	0.00	0.26	0.14	0.91

Source: Barclays Capital

¹⁵ High Yield and EMG excess returns are also highly correlated with the ABS+Credit-MBS excess return factor. However, they explain 15% of the CorePlus active returns in addition to the 52% explained by the ABS+Credit-MBS factor. We also considered the absolute value of quarterly HighYield_ExRet and EMG_ExRet factors as potential explanatory variables. The idea was that CorePlus managers may show skill at anticipating large changes (up or down) in these sectors' excess returns. However, these factors were not significant. Further details are available from the authors.

¹⁶ VIX is a significant factor in the single-factor regression. Because of its high correlation with HighYield_ExRet (-33%), this factor is excluded in the multifactor model.

Figure 13: Realized Annualized Information Ratios: Average Core and CorePlus FI Manager—Average across All Managers Different Periods 1Q91-1Q06

	Average Manager IR		Average IR across All Managers	
	Core FI	CorePlus FI	Core FI	CorePlus FI
1991-2006	1.41	1.2	0.62	0.63
2001-2006	1.53	0.83	0.76	0.57
1996-2000	1.49	0.85	0.47	0.56
1991-1995	1.54	2.11	0.72	1.21

Source: Barclays Capital

While CorePlus FI managers have demonstrated an ability to add value, somewhat surprisingly, the average CorePlus manager's information ratio (1.20) is lower than that for the average Core manager (1.41). In addition, the average IR across all CorePlus FI managers was 0.63, which is almost the same as the average IR across all Core FI managers (0.62). Given the opportunity to exercise strategies with greater breadth, we might have expected the average CorePlus manager to have a greater information ratio. Also, given the growth of instruments over time that permit more direct active views (e.g., structured credit derivatives), it is somewhat odd that the CorePlus manager's IR has been losing ground on the Core FI manager's.

Our examination of CorePlus managers suggests that relaxing investment guidelines has not unleashed greater FI manager information ratios. Instead, the reason CorePlus managers seem to be able to deliver greater active returns is that they were able to take proportionally greater active risk.¹⁷ This finding has important implications for how traditional FI managers may respond to new non-traditional providers of active returns. If the new competitors can generate higher information ratios either by more skill or even greater breadth, then traditional FI managers are facing a difficult competitive threat. However, if new competitors have similar information ratios but generate greater active returns via proportionally more active risk, then FI managers might be able to respond effectively by increasing their own active risk profile. We now examine this new competition.

Competition to Core and CorePlus FI Active Returns—Synthetic FI Portfolios

Plan sponsors have several options to increase their active returns: continue to look for more skillful Core and CorePlus FI managers; broaden investment guidelines to give managers a chance to improve their information ratios; and accept more active risk. However, in this era of inexpensive, cashless fixed-income index replication, sponsors can extract active returns from managers in other asset classes such as equities and commodities. In other words, sponsors can create a “synthetic” FI portfolio by combining an FI benchmark (beta) return from a passive replication strategy with the active return (alpha) component from a non-fixed-income manager. In this section, we analyze the historical performance of three synthetic fixed-income strategies using the following non-FI managers: an equity hedge fund; an equity market-neutral hedge fund; and a traditional long-only institutional equity manager. We compare the active return characteristics of

¹⁷ Are plan sponsors disappointed? Perhaps sponsors view core-plus mandates as a way to produce greater expected active returns while assuming proportionally greater active risk and not as a way to improve their managers' information ratios.

these three synthetic strategies with those from traditional Core and CorePlus FI managers for 4Q91-1Q06.¹⁸

We assume each synthetic fixed-income portfolio achieves its beta exposure to the Aggregate index via an RBI receiver swap.¹⁹ By entering into a RBI receiver swap (no cash investment required) the synthetic FI portfolio receives the total return on the Aggregate RBI basket while paying 3m Libor + 15bp. The Aggregate RBI basket is a portfolio of derivative instruments that closely tracks the Aggregate's return. Since the RBI basket return history only goes back to 2001, we use the Aggregate's total return as a proxy for the RBI. However, since the RBI basket's average monthly tracking error versus the Aggregate has been approximately 10bp per month,²⁰ we add this random component (or 17.3bp tracking error volatility per quarter) to the Aggregate's return as the proxy for the RBI basket total return. Overall, we assume the net return on the beta portion of the synthetic FI portfolio to be equal to the Aggregate total return less (3m Libor + 15bp).

Each synthetic fixed-income portfolio also has an active return component. Before calculating active returns we first need total returns for the three strategies underlying each synthetic FI portfolio. For the first two synthetic FI portfolios, which are based on two very common hedge fund strategies, we use the total returns (after fees) on HFR's Equity Hedge and the Equity Market-Neutral indices. The equity hedge strategy employs relative value plays on individual stocks or sectors while partially or fully hedging the broader equity market or sector risk. The equity market-neutral strategy is a strategy that more strictly keeps broad equity market and sector exposures to a minimum. Both strategies employ leverage.²¹ For the third synthetic FI portfolio, we use the total returns for the average long-only institutional equity manager from the eVestment Alliance database.

We next have to check, and if necessary make adjustments, for any systematic market exposures (e.g., equity and fixed-income market returns) in the strategies' total returns.²² If a portion of a strategy's total return can be explained by systematic market factors, we must remove this systematic portion from the strategy's return so that the remaining "adjusted" return has minimal correlation with existing asset classes. For example, the long-only equity return is most likely dominated by the S&P500 return (and perhaps other systematic market factors). Since the plan sponsor wishes a synthetic FI portfolio and not a portfolio that tracks the equity market, we must adjust the long-only equity total return for any systematic market exposures. We then combine this adjusted total return with the beta component to construct the synthetic FI portfolio.

We perform factor regression analysis on the three unadjusted total returns. Figure 14 shows the regression results. We find that the total returns for the equity hedge strategy can be well explained by two factors: the S&P500 total return and the SMB return, which is the difference between the Wilshire Large Cap Index return and Wilshire Small Cap Index return. These two factors explain 67% of the total variation of the equity hedge strategy with the S&P500 factor having positive correlation and the SMB factor having negative correlation with equity hedge

¹⁸ As explained below, our sample period is slightly shorter due to the need to estimate systematic factor exposures.

¹⁹ For details see *Replicating Bond Index (RBISM) Baskets*, Barclays Capital, August 23, 2006.

²⁰ Our historical test of the RBI tracking error shows an average tracking error of 6.5bp per month. We use a more conservative tracking error estimate here. See, "Managing Against Barclays Capital Indices by Combining FRNs with RBISM Swaps" by Y. Chen, L. Dynkin, and B. Phelps, May 2006.

²¹ The hedge fund index returns provide a measure of the average hedge fund returns in the strategy class. We have historical quarterly total return from 1Q90-1Q06 for both hedge fund indices. Like many studies that rely on empirical hedge fund returns, our analysis is subject to potential survivorship bias—the same is true for the Core and CorePlus FI manager returns.

²² For a discussion of hedge fund style analysis, please see: *Style Analysis of Hedge Fund Returns: Actual versus Self-Proclaimed*, by A. Ben Dor, L. Dynkin and A. Gould, Barclays Capital, January 2006.

strategy's total returns. This suggests that equity hedge funds are typically long the broad equity market and tend to favor small-cap relative to large-cap stocks.

As expected the total return for the equity market-neutral strategy has low correlation with equity market factors, but it is correlated with the total return of the 10y Treasury (using the Barclays Capital 10y UST bellwether index). Therefore, we use the 10y Treasury total return as a factor for the equity market-neutral returns. Finally, as expected, the total return for the long-only equity hedge fund has a coefficient close to one (0.97) with the S&P500 return, and this single factor explains 98% of the total return volatility.

All the strategies had significant and very positive intercept terms suggesting that these three strategies may offer sponsors attractive active returns for their fixed-income portfolio allocations.

To derive adjusted total returns for the three equity strategies, we construct futures hedges for each strategy. We first replace the S&P500 total return and 10y Treasury total return factor with the corresponding futures factor.²³ We then perform rolling 2y regressions to calculate systematic factor loadings of the futures factor for each quarter. We use these loadings and subtract the hedge return from the total return to get the strategy's "adjusted" total return for the quarter. For example, suppose the equity long-only strategy has an estimated 97% exposure to the S&P500 futures in quarter 15 (estimated over the previous eight quarters). Using this exposure value, we short S&P500 futures to hedge this exposure for quarter 16. If the S&P500 future returns 1% in the quarter, and the equity long-only strategy produces a total return of 1.97% in the quarter, we remove 0.97% of S&P500 futures hedging cost to produce an adjusted total return of 1% for the equity long-only strategy.

Figure 14: Regression Results: Equity Market Neutral, Equity Hedge, and Long-only Equity Total Returns 4Q91-1Q06

		Intercept	SPX TotRet	SMB Ret	10-yr Bellwether Total Return	R ²
Equity Hedge	Coef	2.34	0.47	(31.40)		
	t-statistics	5.61	9.00	(3.80)		
	p_value	0	0.00	0.00		67%
Market Neutral	Coef	1.91			0.10	
	t-statistics	8.05			1.74	
	p_value	0			0.09	5%
Equity (L-O)	Coef	0.43	0.97			
	t-statistics	2.96	53.5			
	p_value	0.04	0			98%

Source: Barclays Capital

For each of the three equity strategies, Figure 15 shows the average and volatility of quarterly total and adjusted total returns for 4Q91-1Q06. The equity hedge strategy has the highest average total return (394bp per quarter) and volatility of 504bp. After removing the systematic factor return, however, its adjusted total return falls to 370bp per quarter and the standard deviation falls to 280bp. The long-only equity strategy has an average total return of 323bp per quarter, but 740bp volatility. After removing the S&P500 future return component, its adjusted total return declines to 142bp per quarter and its volatility falls to 102bp. The market neutral strategy has the lowest average total return and total return

²³ We assume the hedge on the SMB factor can be done by a total return swap since there is no futures contract on that factor.

volatility. Its average adjusted total return and volatility are similar to the average total return and volatility, as the 10y Treasury future factor return is not a major component of the market neutral strategy total return. The three strategies have similar annualized information ratios for their adjusted total returns. Most important, all IRs are substantially greater than those for the traditional Core and CorePlus FI managers.

Figure 16 shows the pairwise correlations between the various return measures (total and adjusted total returns) for the three strategies and the Aggregate and S&P500 total returns. The removal of the systematic factor returns helps reduce the correlations of the three strategies with the Aggregate and S&P500. While the market neutral total return has 30% correlation with the Aggregate, its adjusted total return has very low correlation (3%). The equity hedge total return has 76% correlation with S&P500, while its adjusted total return has only 16% correlation. The long-only equity total return has 99% correlation with S&P500 return, but its adjusted total return has low correlation (-5%).

Figure 15: Quarterly Total and Adjusted Total Returns (bp/quarter): Equity Market Neutral, Equity Hedge, and Long-only Equity Strategies, 4Q91-1Q06

	Market Neutral	Equity Hedge	Equity (L-O)
Average Total Return	207	394	323
Standard Deviation Total Return	170	504	740
Average Adjusted Total Return	188	370	142
Standard Deviation Adjusted Total Return	157	280	102
Annual Adjusted Total Return IR	2.39	2.64	2.78

Source: Barclays Capital

Figure 16: Correlations between Equity Strategy Total and “Adjusted” Total Returns and Barclays Capital Aggregate and S&P500 Total Returns, 4Q91-1Q06

	Barclays Capital Aggregate	S&P500	Market Neutral Total Return	Equity Hedge Total Return	Equity L- O Total Return	Market Neutral Adj. Total Return	Equity Hedge Adjusted Total Return
Barclays Capital Aggregate Total Return	1						
S&P500 Total Return	(0.15)	1.00					
Market Neutral Total Return	0.30	0.22	1.00				
Equity Hedge Total Return	(0.18)	0.76	0.36	1.00			
Equity L-O Total Return	(0.16)	0.99	0.27	0.79	1.00		
Market Neutral Adjusted Total Return	0.03	0.24	0.92	0.38	0.28	1	
Equity Hedge Adjusted Total Return	0.18	0.16	0.38	0.43	0.17	0.37	1.00
Equity-Long Adjusted Total Return	0.03	-0.05	0.44	0.16	0.06	0.46	0.21

Source: Barclays Capital

For each equity strategy we construct synthetic FI strategy total and active returns which we can directly compare to those of traditional Core and CorePlus FI managers. The total return of a synthetic FI strategy equals:

$$\text{Synthetic FI Strategy TR} = \text{adjusted TR equity strategy} + \text{RBI Basket TR} - (3\text{m Libor} + 15\text{bp})$$

(1)

Correspondingly, the synthetic active return equals:

$$\text{Synthetic Active Return} = \text{Synthetic FI Strategy TR} - \text{Barclays Capital Aggregate TR (2)}$$

Figure 17 compares the active returns of Core and CorePlus with the active returns for the three synthetic FI portfolios from 4Q91-1Q06. The two hedge fund synthetic FI portfolios have significantly higher average active returns than Core and CorePlus FI portfolios. They also have significantly higher active risk. The equity hedge synthetic FI portfolio has the highest average active return (262bp per quarter), with the highest active risk (255bp) and the highest annualized information ratio (2.05). The market-neutral synthetic FI portfolio has the second highest average active return (80bp per quarter), with 143bp quarterly volatility and an information ratio of 1.12. The long-only equity synthetic FI portfolio has average active return of 34bp per quarter, slightly higher than the CorePlus average active return (26bp), but it has the lowest information ratio (0.69). In comparison, Core FI managers have substantially lower active return (11bp per quarter) and active risk (16bp) than the other portfolios.

Figure 18 shows the active returns correlations among Core, CorePlus and the three synthetic FI portfolios from 4Q91-1Q06. While Core and CorePlus active returns are highly correlated (76%), the synthetic FI active returns have low correlations with Core and CorePlus active returns. This suggests that synthetic FI strategies can not only bring higher active returns and information ratios to a fixed income portfolio allocation, but offer potential diversification benefits as well.

Figure 17: Active Return Comparison among Core, CorePlus, and Three Synthetic FI Portfolios (bp/quarter), 4Q91—1Q06

	Core	CorePlus	Syn FI (MktN)	Syn FI (Equity Hedge)	Syn FI (Equity L-O)
Average Quarterly ActiveRet	11	26	80	262	34
Stdev Quarterly ActiveRet	15	47	143	255	99
Annual IR	1.47	1.11	1.12	2.05	0.69

Source: Barclays Capital

Figure 18: Active Return Correlation of Core, CorePlus, and Three Synthetic FI Portfolios, 4Q91—1Q06

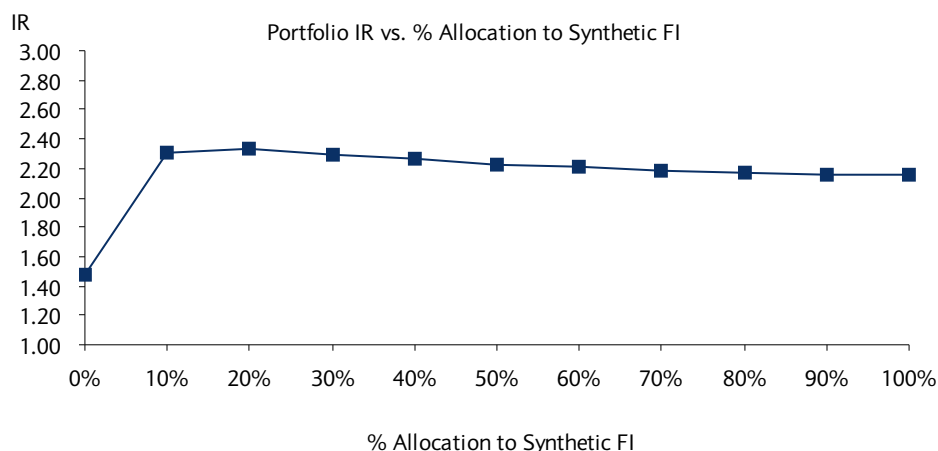
	Core	Core+	Syn FI (Market Neutral)	Syn FI (Equity Hedge)	Syn FI (Equity L-O)
Core ActiveRet	1				
Core+ ActiveRet	0.76	1			
Syn FI (Market Neutral) ActiveRet	0.23	0.26	1		
Syn FI (Equity Hedge) ActiveRet	0.21	0.16	0.21	1	
Syn FI (Equity L-O) ActiveRet	0.06	0.09	0.35	-0.04	1

Source: Barclays Capital

So is there an optimal allocation to the synthetic FI strategies? The answer depends on the investor's expected return and risk tolerance. We give an example of a fixed income portfolio with different allocations to Core FI and synthetic FI portfolios (using an equally-weighted blend of market neutral and equity hedge strategies). Figure 19 shows the portfolio annualized

information ratio as we vary the allocation of the relative weight of core and synthetic FI portfolios. The information ratio rises quickly from 1.47 with 100% allocation to core to 2.39 when we allocate 20% to the synthetic FI portfolio (10% allocation to equity hedge, 10% allocation to market neutral).

Figure 19: Portfolio Information Ratio with Different Allocation to Core and Synthetic FI Portfolios, 4Q91-1Q06



Source: Barclays Capital

This result shows that combining synthetic fixed income portfolios with Core FI portfolios can generate significantly higher active returns and information ratios than traditional Core and CorePlus strategies alone.

Conclusion

We examine fixed-income portfolio manager active returns, as well as the characteristics of those returns, over the past fifteen years. We find that while traditional Core FI managers demonstrated an ability to add value, their active returns are relatively low. CorePlus FI managers with fewer investment constraints delivered higher active returns than Core FI managers, but we do not find evidence that they have higher information ratios. On the other hand, synthetic FI strategies, using portable alpha from alternative asset classes such as equity and hedge funds, can deliver higher active returns than Core and CorePlus strategies and represent a competitive source of active returns. The information ratios of these synthetic strategies are higher than those of the Core and CorePlus strategies implying that synthetic strategies can produce higher active returns with less of an increase in active risk. Combining synthetic FI portfolios with Core and CorePlus portfolios can produce higher information ratios through diversification than if either a synthetic or traditional FI strategy were pursued exclusively for a sponsor's fixed-income allocation.

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