Looking under the Hood of Active Credit Managers

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Abstract

Extensive research has explored the style exposures of actively managed *equity* funds. We conduct an exhaustive set of returns- and holdings-based analyses to understand actively managed *credit* funds. We find that credit long/short managers tend to have high passive exposure to the credit risk premium. In contrast, we find that high-yield-focused long-only managers provide less exposure to the credit risk premium than their respective benchmarks. For both credit hedge funds and long-only credit mutual funds, we find that neither have economically meaningful exposures to well-compensated systematic factors; there is the potential for a powerful diversifier to be added to a typical credit allocation.

JEL classification: G12; G14; M41
Key words: corporate bonds, fixed income mutual funds, fixed income hedge funds

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1. Introduction

The purpose of this paper is to examine the behaviour of actively managed credit hedge funds and mutual funds. Do actively managed credit funds deliver diversifying sources of active returns? Or are excess of benchmark returns simply exposures to traditional risk premia? Ultimately, an investor should care about receiving positive excess-of-benchmark returns that are uncorrelated with whatever else is in their portfolio. If an asset owner allocates to a hedge fund, presumably that is to gain access to returns that are not correlated with traditional risk premia (e.g., equity risk premium, credit risk premium or term premium). Ideally, a full-fee hedge fund investment vehicle should hedge out market exposures (see, e.g., Asness, Krail and Liew 2001). Similarly, if an asset owner allocates to an actively managed long-only fund, presumably that is to gain access to both the traditional risk premia embedded in the benchmark (e.g., credit risk premium) and active (excess of benchmark) returns that are not correlated with traditional risk premia.

We examine the returns and holdings of credit hedge funds and high-yield (HY) credit mutual funds to assess whether actively managed credit funds deliver on the promise of diversification. Our analysis makes use of a comprehensive set of 219 credit hedge funds covered in the live and graveyard files of HFR and 96 mutual funds benchmarked to a HY corporate bond index covered by both Lipper (holdings data) and Morningstar (returns data). For both sets of actively managed credit funds, we are able to analyse their excess returns. However, we can conduct holdings based analysis only for the credit mutual funds where we have access to periodic portfolio holdings information. Our analysis covers the time period from 1997 through 2018, providing us with a sample of 264 months for our returns analysis and 88 quarters for our holdings-based analysis.

We conduct two sets of analyses. First, we examine the 'betas' of actively managed credit funds to traditional risk premia. Specifically, do the excess of cash returns of credit

hedge funds exhibit no correlation to traditional risk premia and do the excess of benchmark returns of actively managed credit long-only funds exhibit no correlation to traditional risk premia? We find that they do not, and the strength of this result is sobering. Credit hedge funds, like their equity siblings, provide meaningful (passive) exposure to traditional risk premia. For example, across our 219 credit hedge funds we find that nearly 40 percent of the median manager's time series variation in excess of cash return can be explained by passive exposures to traditional market risk premia (covering equity, credit and term premia). HY credit mutual funds, in contrast, provide less credit exposure than the benchmark. We find that across our 96 HY credit funds, excess of benchmark returns have a negative correlation (–0.24) with the credit risk premium, suggesting that the typical HY credit mutual fund is run with a beta of 0.94 with respect to the benchmark.[1] While some investors may prefer a beta different from one, we think it is important to be aware of, and pay careful attention to, the 'beta' exposure in your actively managed credit allocation. For credit hedge funds, you are probably getting too much passive credit exposure, and for HY credit mandates, you are probably getting too little. There is, however, an alternative: ensure portfolio positions are ex ante beta neutral for credit hedge funds and ex ante beta = 1 for long-only funds.[2]

Second, we examine whether recently documented systematic investment approaches (see, e.g., Houweling and van Zundert, 2017 and Israel, Palhares and Richardson, 2018) are

[1] Prior research examining popular active Fixed Income categories (e.g., Global Aggregate, U.S. Core and Core Plus) has documented a pervasive overweight to credit markets. Specifically, AQR show in 'The Illusion of Active Fixed Income Diversification' that the excess of benchmark returns of Global Aggregate (Core Plus) managers have a 0.76 (0.95) correlation with the credit risk premium. The key difference in the directionality of the weighting to the credit risk premium lies in the risk of the respective benchmark. Unlike managers in other categories, HY managers cannot enhance returns by adding persistent out-of-benchmark exposures to risky credit. Instead, HY managers tend to avoid the riskiest issuers potentially to avoid adverse headline risk from holding defaulted names.

[2] Of course, there is always the possibility of market timing. There is an extensive literature on the challenges of market timing. While market timing is not the focus of this paper, we note that the persistence in beta mismatch for both credit hedge funds and credit mutual funds is inconsistent with the attempt to time the market, let alone demonstrate skill in such timing.

able to explain excess of cash returns of credit hedge funds or excess of benchmark returns of actively managed credit long-only funds. Alternatively stated, can a systematic approach to harvesting alternative risk premia (e.g., valuation, momentum, carry and defensive) provide a diversifying set of returns relative to incumbent active credit managers? They can, and the strength of this result is encouraging. While systematic approaches to investing are commonplace in equity markets, until relatively recently, research exploring cross-sectional drivers of returns in fixed income markets had been limited, particularly so for corporate credit. With (i) the growth of the corporate bond market itself, (ii) accessibility of data, and (iii) an awareness of the applicability of systematic approaches to fixed income markets, that pattern is changing. While recent papers (e.g., Correia, Richardson and Tuna 2012; Chordia, Goyal, Nozawa and Subrahmanyam 2017; Houweling and van Zundert 2017; Israel, Palhares and Richardson 2018) have documented pervasive evidence of predictability in the cross section of corporate bond returns, we still know very little about the behaviour of actively managed credit hedge funds and mutual funds.

For our sample of 219 credit hedge funds, both individually and in aggregate, we find that their excess of cash returns exhibit very low correlation with systematic valuation, momentum, carry and defensive factors. Specifically, between 8 percent and 14 percent of excess of cash returns can be explained by these systematic exposures. Similarly, for our sample of 96 HY credit mutual funds, both individually and in aggregate, we find that only 8 percent of excess of benchmark returns can be explained by systematic exposures.

For a set of 154 credit mutual funds, we complement the active return analysis with a thorough examination of holdings. Similar to what we observed with the returns analysis, credit mutual fund active weights are only lowly correlated, both individually and in aggregate, with systematic factor attributes. Specifically, the sum-product of credit mutual fund manager active weights with standardized scores of attractiveness based on measures of

valuation, momentum, carry and defensive are all close to zero (there is some evidence of reaching for yield with carry having a slightly higher active tilt). Not surprisingly, a portfolio that is designed to target these systematic factor attributes can generate a much larger economic exposure to those attributes.

Like our first result regarding credit beta, this finding has a clear implication for investors. An allocation to a systematic credit manager alongside a traditional discretionary active credit manager has the potential to be a powerful diversifier. Neither systematic nor discretionary approaches are, or even need to be, inherently superior. If both are well executed and charge fair fees, they may complement each other very well in an overall active credit mandate. Our analysis suggests that excess of benchmark return correlations between systematic and discretionary managers are very low and excess of benchmark weights also exhibit very low correlations.

Our paper adds to the long line of research on fund manager performance. Most studies have focused on equity-oriented funds, but our research is conducted entirely on credit-oriented funds. We are aware of only one paper exploring the exposures of individual actively managed credit funds. Specifically, Kahn and Lemmon (2015) study a two-year sample of 121 fixed income investment managers and find that two beta factors—duration and credit—on average explain about 67% of the time variation in their returns. They do not examine the ability of systematic factor characteristics to explain fund manager returns. The mandates of the funds included in their sample encompass both interest rate risk and credit risk. Our focus is primarily on the latter, and thus our empirical analysis is new.

Fung and Hsieh (2002, 2006) also examine fixed-income hedge-fund index returns. For a sample of 20 high-yield hedge funds, reflecting $8.9 billion of assets under management as of December 2000, Fung and Hsieh (2002) document that the first principal component across these 20 funds can explain nearly 70 percent of the time-series variation of

their returns, consistent with a very strong market loading. Fung and Hsieh (2006) extend this result into the mid-2000s by showing that changes in aggregate credit spreads are a key determinant of credit hedge fund returns.

We greatly extend this past research in several dimensions. Most actively managed mutual funds and even some hedge funds have mandates to provide both beta as well as active management. We carefully disentangle the two by showing, first, the importance of traditional risk premia in explaining active credit manager fund returns and, second, the lack of importance of alternative risk premia (value, momentum, carry and defensive) in explaining active credit manager fund returns or holdings. We also expand both the time series and cross section of actively managed credit funds covered. In addition, while most studies focus on just returns, we also study holdings, increasing the power of our analysis.

The key findings in our paper are twofold. First, both actively managed credit hedge funds and credit mutual funds differ substantially in their credit risk premium exposures. In the case of credit hedge funds, it is that they provide too much of it, when arguably they are supposed to 'hedge' out traditional market risk premia. In the case of credit mutual funds, it is that they provide too little of it, perhaps due to a fear of adverse headline risk from holding a defaulted bond. In both cases, the implication for investors is to pay attention to the traditional market risk premia embedded in their active credit manager allocation and further to make sure that the fee you paid for that traditional market risk is appropriate (i.e., low).

Second, both actively managed credit hedge funds and credit mutual funds fail to provide any economically meaningful exposure to well-compensated systematic factors. This is not to say that a traditional discretionary approach to risk taking in credit markets is inferior. Rather, the implications for asset owners are that there is more than one way to skin the cat and a well-executed portfolio that targets exposures to well-compensated alternative

risk premia (e.g., value, momentum, carry and defensive) can provide powerful diversification benefits to an overall credit allocation.

The remainder of this paper proceeds as follows. Section 2 explains our data sources, sample-selection criteria for credit hedge funds and credit mutual funds, and summarises the return properties of the funds and factor returns that we use for our analysis. Section 3 describes our empirical analyses, and Section 4 concludes.

2. Data and Methodology

2.1 A Preamble on Labels

The purpose of this section is to help define what 'systematic credit investing' is, and what it is not. Systematic credit investing is a fundamentally driven, yet systematically implemented, approach to portfolio construction. It is not simply a 'smart beta' approach. A lot of academic research has been conducted on cross-sectional drivers of equity returns. That in turn has led to a proliferation of investment products designed to harvest these return drivers (typically described as 'factors' or 'styles' or 'smart beta'). To the extent that measures are well known and understood, and there is general agreement as to their implementation, we think it is fine to label systematic harvesting of said return drivers as factor- or style-based investing. For credit markets, however, we feel it is premature to label systematic harvesting of recently documented cross-sectional drivers of credit excess returns as factor or style investing. First, very few asset managers have a truly systematic approach in credit markets (indeed that is the point of this paper). Second, there is not yet clear agreement on how various attributes (e.g., how to model default) should be measured. Third, the credit markets themselves are far more challenging to trade in and hence build a portfolio that systematically targets exposures to desirable attributes.

To make this distinction clear, we highlight the multiple dimensions across which systematic active credit manager offerings may differ. While our focus is on security selection within *credit* markets, this could be generalized to other systematic strategies. Figure 1 contains a cube designed to convey the three primary dimensions for successful security selection and portfolio construction. On the front face of the cube, the vertical axis spans various investment themes that identify (cross-sectional) measures of attractiveness across credit assets. As discussed below, the better known themes include value, momentum, carry and defensive. Additional less documented signals might include sentiment, liquidity provision and management signalling.

Moving across the face of the cube, we highlight how each investment theme can be measured with increasing precision and sophistication. For example, when measuring valuation, the fundamental anchor for credit spreads is a view on default probability or credit migration risk. There are older, simpler methods for modelling default (e.g., Z-scoring originating in Altman 1968), more recent, structural models for estimating default (e.g., Correia, Richardson and Tuna 2012) and, extending further, various machine learning techniques could be used to improve out-of-sample classification accuracy using a wide array of fundamental and market-based information. A good systematic investment approach should span across simple and more sophisticated measures for each investment theme.

Finally, the third dimension (going backwards in Figure 1) reflects all of the choices that an investor needs to make when mapping a signal of attractiveness for a given investment theme to a final portfolio weight. This involves choices relating to (i) how much active risk to take within and across peer groups (e.g., industry groupings) , (ii) ensuring the final portfolio has the appropriate amount of risk (i.e., for a credit hedge fund targeting volatility and beta neutrality or, for a long-only fund, ensuring the portfolio has a beta of one to the stated benchmark but is still generating the desired amount of tracking error), (iii)

position limits that respect the liquidity of each bond, (iv) trade size limits that reflect the nature of the still dealer-intermediated HY market, (v) explicitly trading off the attractiveness of each bond to its contribution to risk and its expected cost to trade into and out of that bond, and (vi) the many choices related to mapping data across vendors to ensure that the fundamental and market data used are appropriate for the credit asset you wish to trade.

In this paper, we make use of broad-based measures across the four primary themes (value, momentum, carry and defensive) and employ proprietary portfolio construction tools to map a bond's attractiveness to portfolio weights. In a previous paper (Israel, Palhares and Richardson 2018), we describe simple measures of valuation, momentum, carry and defensive themes and create academic factor-mimicking portfolios that take long (short) positions in only the top (bottom) quintile of corporate bonds. While this approach is useful to describe the general properties of credit factor portfolios, it is somewhat limited in attempting to explain what one might see in actual portfolios. In a similar spirit to Israel, Jiang and Ross (2017), who explore portfolio craftsmanship in the context of equity style portfolios, the systematic portfolios examined in this paper include the various dimensions outlined in Figure 1. Specifically, we (i) capture multiple measures for each theme spanning the simpler measures from our prior research and more advanced approaches to estimate default and identify winners and high quality companies; (ii) select portfolio weights based on the strength of the investment theme—that is, our portfolios are not simple equal- or value-weighted extreme quintiles, but instead place larger positive (negative) weights on bonds that rank better or worse on a given theme; and (iii) include explicit attempts to mitigate any unintended risks or exposures in the portfolio such as ensuring sector balance, ratings balance and beta balance across the long and short sides of the portfolio. The returns and active weights associated with these systematic portfolios form the basis of our analysis of credit hedge fund and credit mutual fund returns and credit mutual fund holdings.

2.2 Credit Hedge Fund Data and Initial Returns Analysis

For our empirical analysis of actively managed credit hedge funds, we source our data from HFRI (HFR database). For our time-series analysis examining the beta and systematic exposures of actively managed credit hedge funds, we use the HFRI Relative Value: Fixed Income: Corporate Index. We have monthly hedge fund index return data from January 1997 through to June 2018. We are also able to look at individual funds within this HFR category that clearly take active risk from credit sensitive assets (we select individual funds based on a careful reading of each fund's investment approach). We use net-of-fee monthly return data for individual hedge funds that have at least 24 months of return data. To minimize survivorship bias, we examine both funds currently operating and all 'graveyard' funds that fall out of the respective index return series. We end up with 219 credit hedge funds to examine.

Table 1, panel A, summarizes the performance (excess of cash returns) of the credit hedge funds in our sample. Over this time period, the average credit hedge fund reported a net-of-fee and net-of-cash return of nearly 4% per year. Figure 2A reports the distribution of monthly net-of-fee and net-of-cash returns of our sample of 219 individual credit hedge funds. The distribution is notably shifted to the right of zero and the average Sharpe ratio across the 219 funds is 0.79. At first glance it appears that credit hedge funds have delivered excellent excess of cash returns. The purpose of this paper is to examine the source of these excess of cash returns.

2.3 Active HY Credit Mutual Fund Data and Initial Returns Analysis

For our empirical analysis of actively managed credit mutual funds, we source our data from Morningstar Direct. Specifically, we select mutual funds in the Morningstar

database with an explicit high-yield benchmark belonging to the two most popular benchmark providers: Bank of America Merrill Lynch and Barclays. We further filter the dataset by requiring mutual funds to have at least three years of returns history, manage at least $50 million in corporate bond holdings in a reporting quarter and hold at least 80% of their corporate bond portfolio in US high-yield bonds. This last filter is important as some credit-benchmarked mutual funds hold nontrivial positions in noncorporate bond assets (e.g., loans and equities), and these positions can distort a mutual fund's excess-of-benchmark returns and introduce noise to our returns analysis. After these filters are applied, 96 actively managed credit mutual funds remain.[3] Both total return and excess-of-benchmark return data are provided by Morningstar. Similar to our credit hedge fund data, these returns are net of all fees and are available at a monthly frequency from January 1997 to June 2018.

Table 1, panel B, summarizes the performance (excess of benchmark returns) of long-only HY credit mutual funds in our sample. Unlike credit hedge funds, over this time period the average credit mutual fund reported a net-of-fee and net-of-benchmark return of –0.82% per year. Figure 2B reports the distribution of monthly net-of-fee and net-of-benchmark returns of our sample of 96 individual credit mutual funds. Unlike credit hedge funds where the distribution is shifted to the right of zero, the distribution for credit mutual funds is notably shifted to the left of zero. The average information ratio across the 96 funds is –0.34. Our purpose in this paper is to look through this headline result and assess whether credit mutual funds are providing adequate exposure to the traditional risk premia embedded in the benchmark and/or to well-compensated systematic exposures.

[3] We also ran our analysis on a less restrictive sample, which removes the filter of at least 80 percent of the portfolio to be held in corporate bonds. This creates a sample of 146 actively managed credit funds. Our results are very similar for that alternative sample (i.e., too little beta and too little systematic exposures). We prefer the returns analysis to be based on the reduced sample as it allows for cleaner inference. For example, in the larger sample a failure to find evidence of systematic exposures could be criticized as the excluded assets (e.g., loans and equities) may distort any credit beta or systematic credit exposures from the corporate bond portion of the portfolio.

For the holdings analysis of actively managed credit mutual funds, we source holdings data from the Lipper EMAXX corporate bond holdings database. For this analysis, we no longer need to be as strict on our selection criteria for credit funds. For our returns analysis, we required at least 80 percent of holdings to be in corporate bonds to avoid the returns of other assets contaminating our analysis of exposure to the credit market or systematic credit factors. For the holdings analysis, we can include a broader set of credit funds and rescale the weights on the corporate bond portion of the portfolio to sum to one. We thus use a larger, less restrictive set of 146 mutual funds previously selected from Morningstar to which we add the 8 largest funds that are indexed to a Bank of America Merrill Lynch or Barclays Capital benchmark from the Lipper EMAXX database but are not included in Morningstar, to give us a total sample of 154 funds. The Lipper EMAXX holdings data are available at a quarterly frequency from January 1998 to June 2018. The average fund in our sample has 36 quarters of holdings data and approximately $600 million held in corporate bonds, of which 96% are in US high-yield bonds.

3. Results

3.1 Detailed Returns Analysis of Credit Hedge Funds

In section 2.2, we noted how the average credit hedge fund had positive net-of-cash returns and a Sharpe ratio of 0.79. But how much of that exposure is simply attributable to passive exposure to the credit market itself? Asness, Krail and Liew (2001) made the point that hedge funds in general, and in particular equity hedge funds, contain a lot of passive exposure to the equity market, but little research documents how pervasive this phenomenon is for credit hedge funds. Figure 3A is a scatter plot showing the contemporaneous correlation between the monthly excess of cash (and fee) returns of an equally weighted basket of credit hedge funds and the credit excess returns of a diversified HY corporate bond

index. There is a clear positive relation with a correlation of 80 percent (reported R^2 is 65%). A potential limitation of looking at correlation to traditional risk premia from a portfolio of individual credit hedge funds is that any true idiosyncratic returns may be diversified away. To address this issue in Figure 4A we examine the same correlation for each individual fund. The frequency histogram suggests that the vast majority of credit fund excess of cash returns are strongly positively correlated with the credit risk premium. The median correlation is 0.50.

To explore this issue further we extend the set of traditional risk premia we examine to include (i) credit risk premium (the credit excess returns from a broad diversified HY index), (ii) equity risk premium (the excess of cash returns to the S&P500 index), and (iii) the term premium (the excess of cash returns from a diversified basket of 7-10 year US Treasury securities). Table 2 reports annualised returns, Sharpe ratios and correlations for these three traditional risk premia over our sample period of 1997-2018. All three traditional risk premia have positive risk-adjusted returns and both credit and equity risk premium are strongly positively correlated in this time period, and they are both negatively correlated with the term premium in this time period.

Table 3 reports regression results where we project monthly net of fee and net of cash credit hedge funds onto the three traditional risk premia described earlier. Panel A reports results for individual credit hedge funds where we use the full sample of available monthly returns for each fund. Across our 219 credit hedge funds, we find that the average (median) hedge fund has 38 (37) percent of its return variation explained by passive exposure to traditional market risk premia. Clearly there is hidden 'beta' packaged as alpha within the set of credit hedge funds. Panel B reports regression results for the HFRI Relative Value: Fixed Income: Corporate Index category returns. Passive exposure to the credit risk premium alone explains 67 percent of the credit hedge fund category returns, and all three traditional risk

premia explain 68 percent of the return variation. Notably in the last specification reported in panel B of Table 3, we see that the intercept is 0.48 and is not significant (implying an alpha of 48 basis points annualized). Across the set of 219 credit hedge funds the mean (median) annualized regression intercept is 1.6 (1.2) with corresponding test-statistics of 1.06 (0.65). This means that the average excess of cash return of 3.43% reported in Figure 2 is primarily explained by passive exposures to traditional risk premia. We note that the regression intercept (alpha) is likely to understate true alpha as the included explanatory variables are gross of fees. However, these return series are relatively cheap to access for most institutional investors. What appeared at first glance as impressive net-of-fee returns compared against a cash benchmark is significantly reduced after subtracting returns associated with passive exposures to traditional risk premia. To be fair, there is still an attractive risk-adjusted return across the set of credit hedge funds (the average information ratio across credit hedge funds is 0.46), just that it is significantly smaller than a simple Sharpe ratio would suggest (average across credit hedge funds was 0.79 from Figure 2).

Our next objective is to assess whether credit hedge funds, both in aggregate and individually, provide exposures to well-compensated systematic investment themes. For this exercise, we first account for passive exposures to traditional risk premia and remove this component of returns from each credit hedge fund. We then regress this alpha onto long–short portfolio returns that target exposure to the four themes described in section 2.1 and Figure 1. Previous research has shown these systematic themes deliver positive risk-adjusted returns without providing exposure to traditional market risk premia (see, e.g., Israel, Palhares and Richardson 2018). Table 4 reports the results of this regression using an average across credit hedge funds. Panel A uses the HFRI credit fund index return as provided by HFR. Panel B (C) uses an equal- (value-) weighted average across our set of 219 individual credit hedge funds. Across all three panels, there is only limited evidence that credit hedge

fund returns are associated with systematic investment themes. Carry is the only consistently positive exposure across all three benchmarks when themes are considered individually. When investment themes are considered jointly, there is some evidence of exposure to value (at least for our custom benchmarks of credit hedge funds in panels B and C), and carry remains significant. Collectively, the four systematic investment themes explain between 8 percent and 14 percent of aggregate credit hedge fund alpha.

A limitation of the previous analysis of aggregate credit hedge fund returns is that individual credit hedge funds who provide minimal exposure to traditional risk premia and/or maximal exposure to systematic investment themes may be 'drowned out' by the average manager. Figure 5, therefore, visualises the distribution of test-statistics across our set of 219 credit hedge funds. The test statistic for a given systematic exposure is estimated separately using the full sample of returns for each credit hedge fund. The red line is a normal distribution, and the black line is the empirical distribution. Similar to what we saw with the aggregate credit hedge fund results in Table 4, the probability density of test statistics is shifted to the right for carry and value, with only marginal evidence of exposures to defensive and virtually nothing for momentum. We interpret the results in Table 4 and Figure 5 as showing credit hedge funds, in aggregate and individually, having only limited exposure to these themes. The significance of carry is perhaps not too surprising as recent research has shown a strong tendency for bond investors to reach for yield (see, e.g., Becker and Ivashina 2015 and Choi and Kronlund 2017).

3.2 Detailed Returns Analysis of HY Credit Long-Only Funds

Our methodology for analysing actively managed credit long-only mutual funds largely follows that for credit hedge funds. First, we examine the exposure to the credit risk premium. Unlike hedge funds, however, a long-only mutual fund is meant to provide

exposure to the risk premium embedded in the benchmark. So it is no surprise that Table 3 shows that the average credit mutual fund has 90 percent of its return variation attributable to the credit risk premium. But to what extent does that reflect a full capture of the credit risk premium? Figure 3B is a scatter plot showing the contemporaneous correlation between the monthly *excess of benchmark* (and fee) returns of an equally weighted basket of actively managed credit mutual funds and the credit excess returns of a diversified HY corporate bond index. In contrast to the credit hedge fund results, we see a clear negative correlation of 44 percent (reported R^2 is 19.5%). Long-only active credit managers provide less credit exposure, on average, than their benchmarks. We find similar results looking at individual credit mutual funds in Figure 4B. The frequency histogram suggests that the vast majority of credit mutual fund *excess of benchmark* returns are negatively correlated with the credit risk premium. The median correlation is –0.3. It is important to note that these correlations are based on the full sample of returns and hence reflect a strategic allocation choice. We are not talking about temporal variation in the exposure to credit markets that may coincide with market performance. As such, this static (strategic) underexposure to credit markets may, in part, explain the negative net-of-fee returns documented in Figure 2B. Over the 1997–2018 period, the credit excess return from a broad diversified HY benchmark was nearly 3% annualized. Failing to capture that fully in a portfolio creates a meaningful headwind when returns are compared against a benchmark.

We next examine whether credit mutual funds, both in aggregate and individually, provide exposures to well-compensated systematic investment themes. We run the same regression analysis as described in section 3.1. The regressions for credit mutual funds use the excess of benchmark return as the dependent variable and the same four systematic investment themes as defined previously. Panel D of Table 4 reports results for an equal weighted aggregate of credit mutual funds. Momentum is the only exposure that loads

positively when themes are considered individually, and both momentum and defensive exposures are found when considering all four themes jointly. Given that credit mutual funds are underexposed to the credit risk premium, it is not surprising to see a negative loading on carry. In aggregate, the four themes are only able to explain 8 percent of aggregate credit mutual fund excess returns. Turning to the 96 individual credit mutual funds, Figure 5 reports the distribution of test statistics reflecting exposure to each individual theme. As before the red (black) line corresponds to the normal (empirical) distribution. The analysis here is very mixed, suggesting potential aggregation effects. Similar to the aggregate results, individual credit mutual funds tend to be underexposed to carry and positively exposed to momentum. There appear to be a small number of credit mutual funds targeting exposure to defensive and a subset of credit mutual funds either targeting or betting against the value theme. Similar to what we found for credit hedge funds, we interpret the results in Table 4 and Figure 5 as showing credit mutual funds, in aggregate and individually, having only limited exposure to systematic investment themes.

3.3 Holdings Analysis of HY Credit Long-Only Funds

Our final, and arguably most powerful, analysis to detect exposure to systematic investment themes is to examine bond-level portfolio holdings data for a broad set of credit mutual funds. For this analysis, we use quarterly reports from Lipper EMAXX for our 154 funds, yielding a sample of 5,536 fund-quarter reports over the 1998–2018 time period. We compute a set of active weights for each fund-quarter by differencing the weight held in a given corporate bond with the weight that bonds hold in the respective fund benchmark. We can then use these active weights to assess exposure to systematic investment themes.

We first compute the sum-product of active weights with a standardized measure of each systematic investment theme. This yields a summary statistic, active tilt, which captures

the extent to which credit fund over-weights are consistent with a given systematic investment theme. In panel A of Table 5, we report the global average of active tilt across all funds and quarters. The average active tilt, at least for value, momentum and carry, is positive. However, we note that while statistically different from zero, they are economically close to zero. In panel B, we see a similar result if we instead regress active weights onto the standardized measures directly. Again while directionally positive and statistically significant for value, momentum and carry, the magnitude of these coefficients suggests very small average active weight exposures. For example, a one standard deviation increase in the attractiveness of a corporate bond based on a standardized measure of carry is associated with a 1.6 basis points larger active weight on that corporate bond. Even when jointly considering systematic exposures, there is little evidence to say that the average credit manager targets these systematic exposures. This is perhaps not surprising if we assume that the set of actively managed credit mutual funds is representative of the market (as of the end of our sample period, about 25 percent of the outstanding HY corporate debt was held by mutual funds). Investing is a zero-sum game and so the average active tilt should be close to zero.

What is more interesting, however, is the distribution of active tilts across credit mutual funds. We show the relevant frequency histograms in Figure 6. The vertical green line corresponds to the average value shown in panel A of Table 5. It is striking how concentrated the distribution of active tilts is around zero with the exception of carry where there is a right tail in the distribution of active tilts. This positive active tilt is consistent with the returns exposure evidence discussed in section 3.2. For the purposes of comparison, a hypothetical long-only portfolio that explicitly targets exposures to a weighted combination of the four systematic investment themes, and targets a similar level of active risk as the typical long-only credit mutual fund, is superimposed on Figure 6 (blue vertical line). Not surprisingly, a

systematic portfolio does load on systematic exposures, but the extent of the difference is striking.[4]

To help make that point clearer, Figure 7 contains an alternative visualization of the difference between exposures to systematic investment themes for actively managed credit mutual funds and the hypothetical systematic portfolio. To construct this figure, every constituent bond in the HY index is assigned a score that describes its combined attractiveness across the four systematic themes. Constituent bonds are then sorted from most to least attractive on this composite score and assigned to quartiles. For each fund-quarter, we can then sum up the portfolio weight across the four attractiveness quartiles. The bar on the left is the average across all credit mutual funds, and the bar on the right is for the hypothetical systematic portfolio. Consistent with the analysis in Figure 6, there is no evidence of portfolio tilts towards well-compensated systematic investment themes in incumbent actively managed credit funds. This is not to say that actively managed credit funds take no risk or that they are ignorant in how that active risk is taken. Rather it is simply to say they are *different*. This difference is important as it is a potential source of diversification benefit. What is also true of the hypothetical long-only systematic portfolio is that it is designed to deliver beta of 1 with respect to the HY benchmark, unlike actively managed credit funds, that we showed earlier had too little exposure to the benchmark itself. This combination of a full capture of the credit risk premium and a set of systematic exposures that do not contain exposure to traditional risk premia is a potentially powerful complement to an investor's portfolio.

[4] The weighted combination across the four investment themes allocates slightly more weight to value and less weight to carry. In addition, the systematic portfolio is the result of a robust optimization where multiple constraints effectively reduce the final exposures to carry.

4. Conclusion

We undertake a comprehensive analysis of the behaviour of actively managed credit hedge funds and mutual funds. We ask a simple question: Do actively managed credit funds deliver diversifying sources of active returns? We find little evidence in support of this. First, credit hedge funds provide meaningful exposure to the credit risk premium, and it may be more than their investors expect. Like equity hedge funds, there is a strong footprint of passive exposures to credit beta in credit hedge funds returns. Credit mutual funds, in contrast, provide too little exposure to the credit risk premium. They are, in effect, creating a headwind for themselves. Given the existence of a risk premium from exposure to credit sensitive assets (see, e.g., Asvanunt and Richardson 2017), this headwind may help explain part of the negative net-of-fee returns for credit mutual funds.

Second, despite evidence of (i) a robust relation between well-known systematic investment themes (i.e., carry, defensive, momentum and value) and corporate bond excess returns and (ii) feasible implementation of exposure to these themes, individual credit funds are only minimally exposed to themes that generate meaningfully positive risk-adjusted returns. Investors in actively managed credit funds should be aware of the beta they are exposed to (too much for credit hedge funds and too little for credit mutual funds) and the lack of exposure to systematic investment themes. This suggests credit investors may have an opportunity to gain exposure to well-compensated investment themes that are diversifying with respect to traditional market risk premia.

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Figure 1: Systematic Credit Investing

The cube below highlights the three primary dimensions reflected in a well-designed systematic actively managed credit portfolio: (i) breadth of investment themes, (ii) complexity in measuring each theme, and (iii) complexity in implementation. A pure smart beta approach to systematic credit investing would only capture the front face of the cube toward the left and bottom as indicated by the red ellipse.

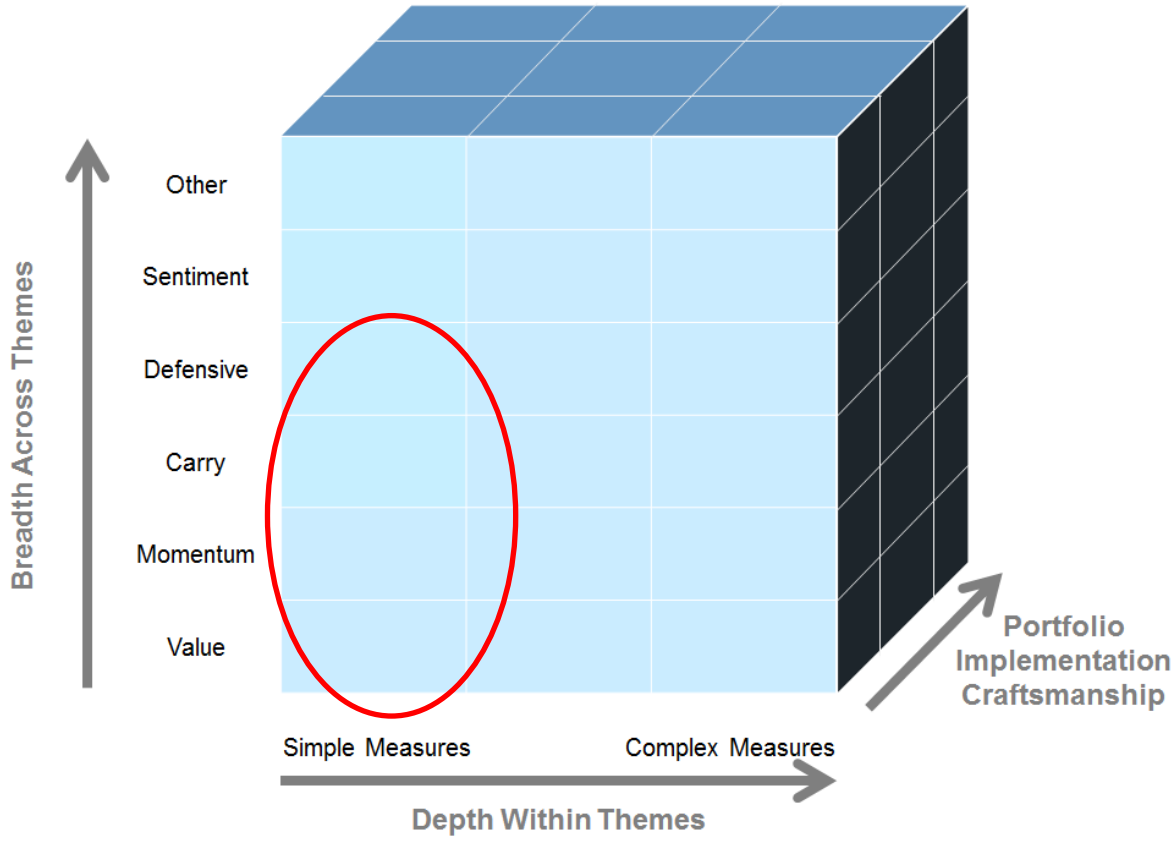


Figure 2: Distribution of Funds by Active Return

The panels below report the distribution of active credit hedge (mutual) fund average net-of-fee monthly excess of cash (excess of benchmark) returns across time. Our sample covers 219 (96) credit hedge (mutual) funds for the period 1997–2018. The figure on the left (right) is for credit hedge (mutual) funds. The line in each figure shows a normal distribution with mean 0 and standard deviation equal to that of the average returns distribution. The table on the bottom shows the full-sample distribution of annualized returns for the credit hedge (mutual) funds.

Figure 2A: Credit Hedge Fund

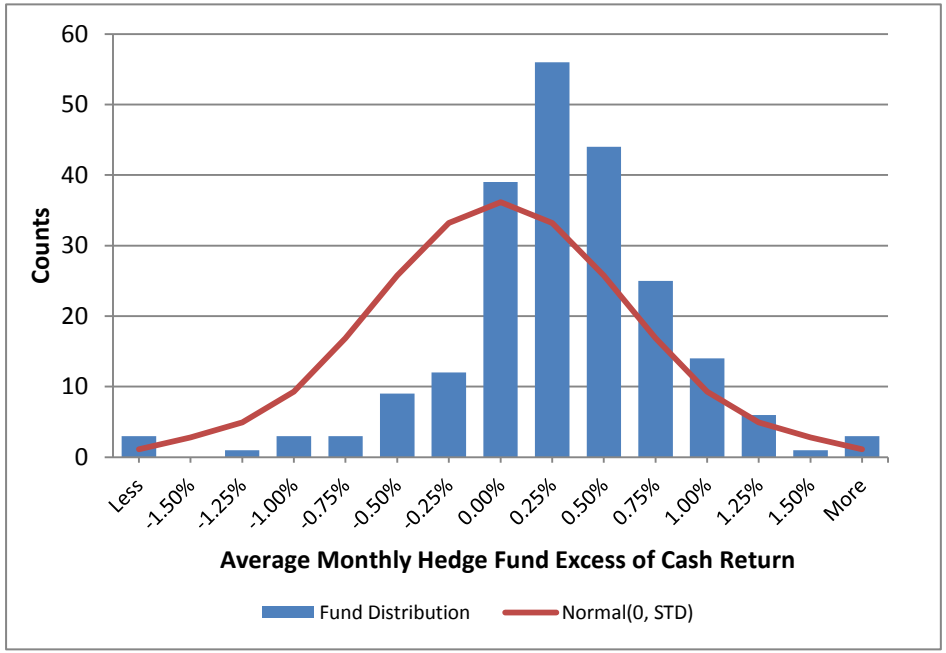
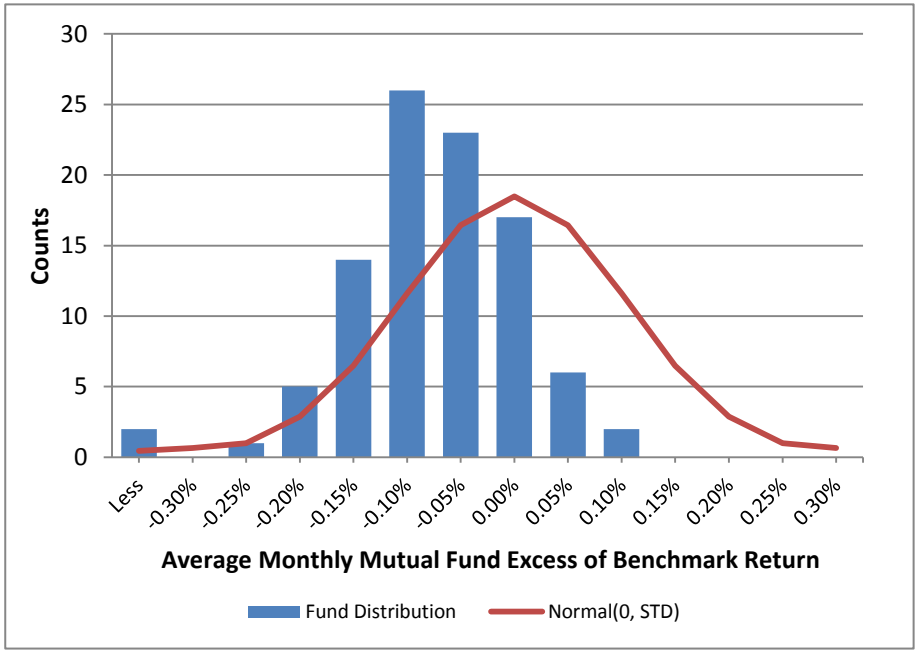


Figure 2B: Credit Mutual Fund



	Credit Hedge Funds			Credit Mutual Funds		
	Excess Return	**Volatility**	**Sharpe Ratio**	**Active Return**	**Volatility**	**Information Ratio**
Mean	3.43%	7.46%	0.79	-0.95%	2.66%	-0.34
Std. Dev	2.04%	5.80%	1.08	0.35%	1.36%	0.35
10P	-3.74%	2.46%	-0.42	-1.99%	1.58%	-0.75
90P	10.87%	13.84%	1.87	0.18%	3.56%	0.07

Figure 3: Aggregate Credit Exposure of Actively Managed Credit Funds

The scatter plots below report the contemporaneous relation between monthly equal weighted averages excess of cash (excess of benchmark) returns and the credit risk premium, measured as HY corporate bond credit excess returns, for our sample of credit hedge (mutual) funds. Our sample covers 219 (96) credit hedge (mutual) funds for the period 1997–2018. Returns are measured monthly. The figures on the left (right) is for credit hedge (mutual) funds.

Figure 3A: Credit Hedge Fund

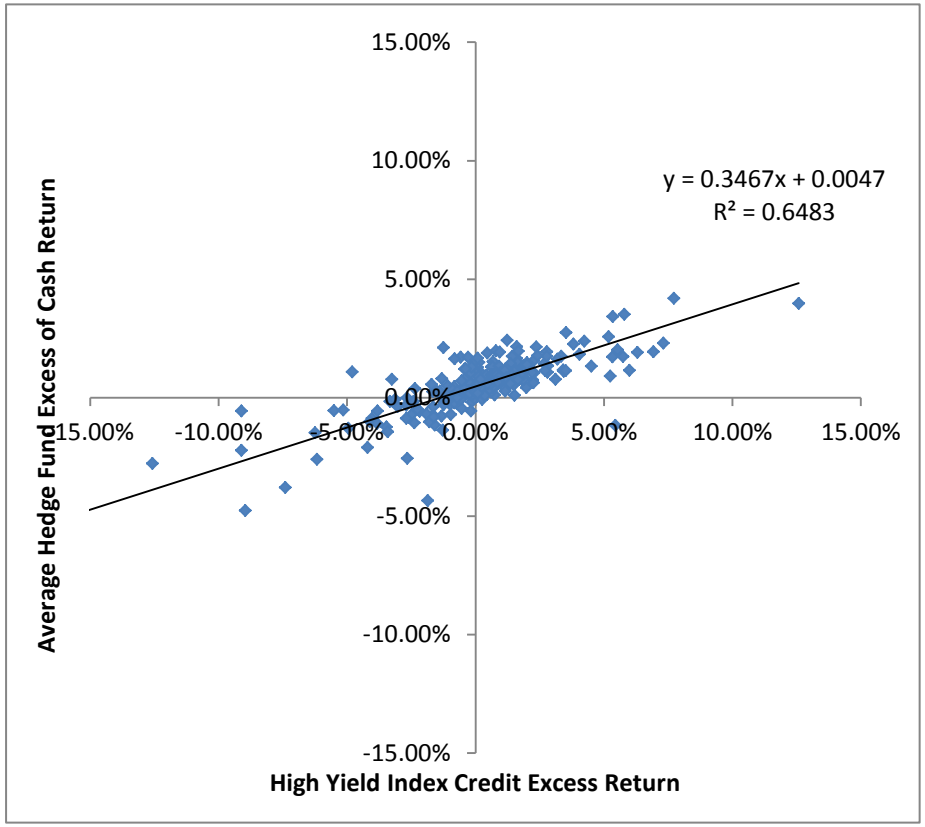


Figure 3B: Credit Mutual Fund

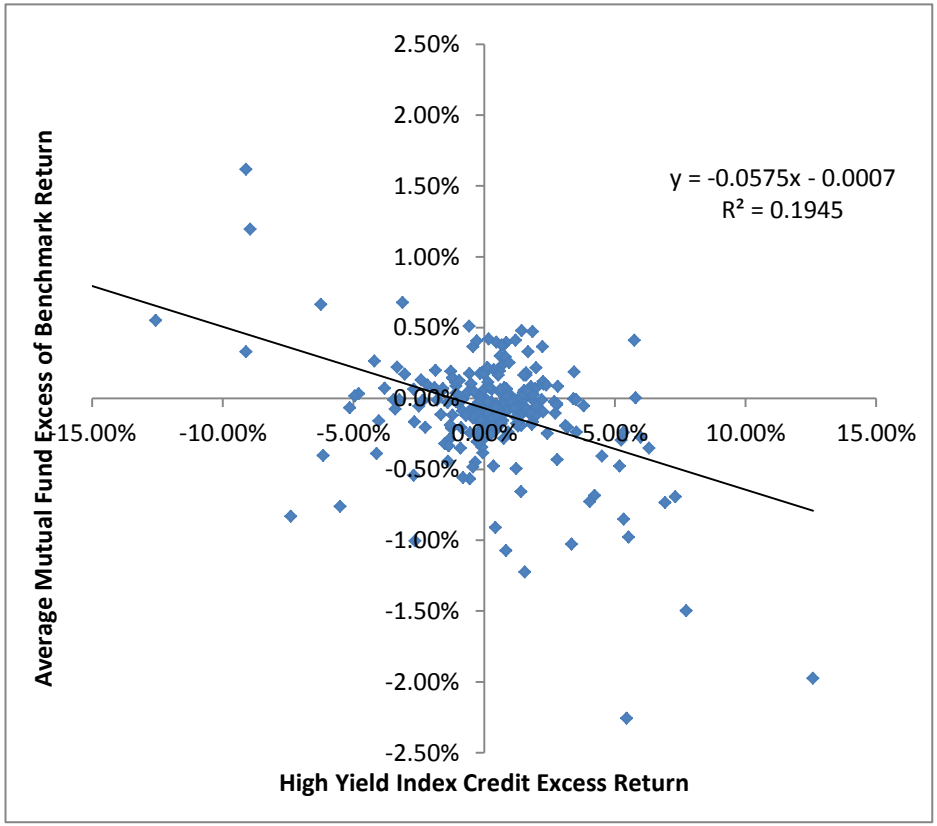


Figure 4: Credit Exposure across Individual Actively Managed Credit Funds

The frequency histograms below report the full sample contemporaneous correlation between excess of cash (excess of benchmark) returns and the credit risk premium, measured as HY corporate bond credit excess returns, for each credit hedge (mutual) fund. Our sample covers 219 (96) credit hedge (mutual) funds for the period 1997-2018. Returns are measured monthly. The figure on the left (right) is for credit hedge (mutual) funds.

Figure 4A: Credit Hedge Funds

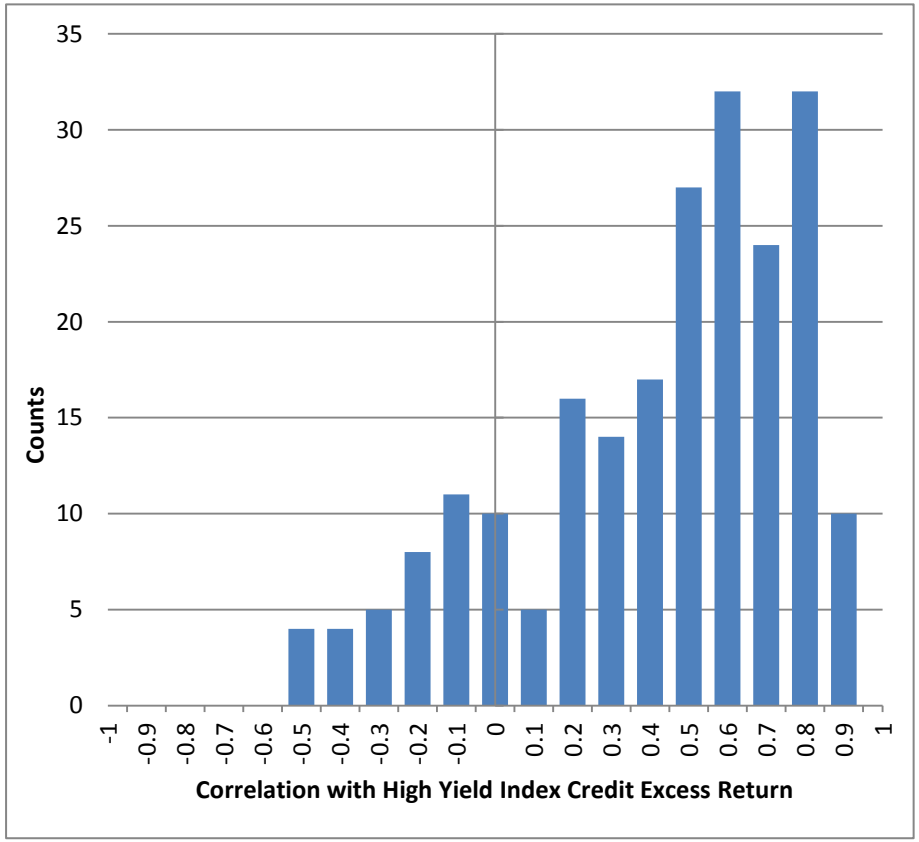


Figure 4B: Credit Mutual Funds

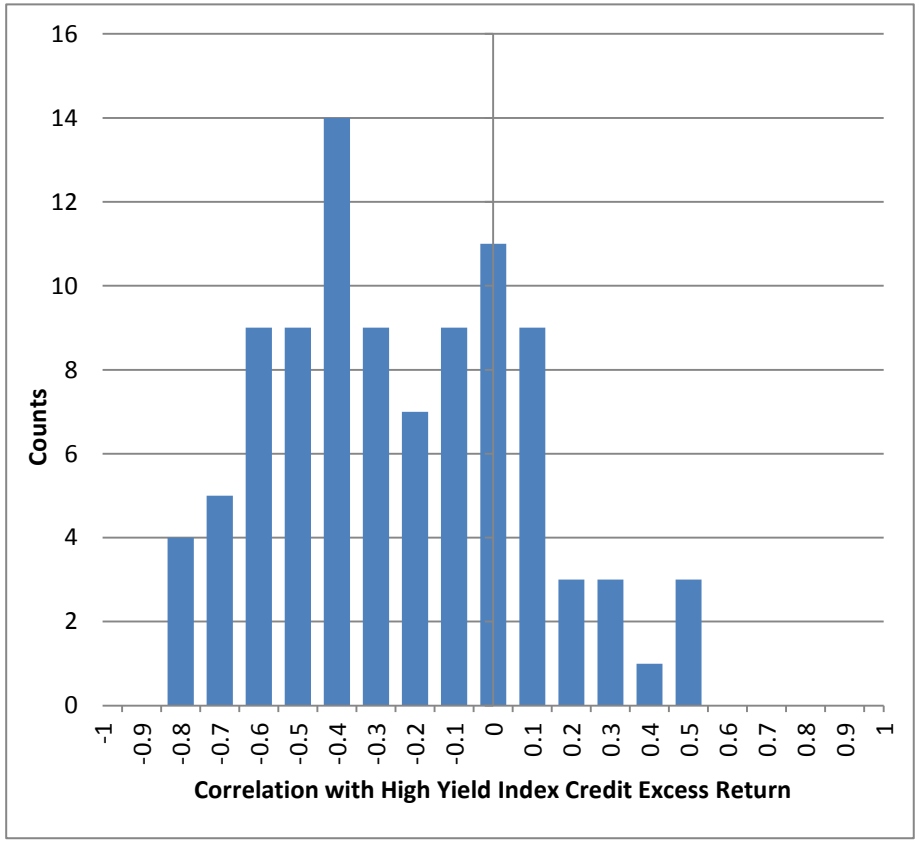


Figure 5: Systematic Factor Exposures across Individual Actively Managed Credit Funds

The panels below report empirical densities of the cross-sectional distribution of test-statistics of the slope coefficient from regressions of individual fund active returns onto long–short portfolios targeting exposures to systematic investment themes (value, momentum, carry and defensive). Our sample covers 219 (96) credit hedge (mutual) funds for the period 1997–2018. Active returns are the differences between the return of each credit fund and that of its respective benchmark. For hedge funds, the benchmark is a linear combination of equity, credit and Treasury market returns where the weight is determined by a full sample regression of fund returns onto those three market returns. For mutual funds, the benchmark is the funds' respective reporting benchmarks. The figures on the left (right) are for credit hedge (mutual) funds.

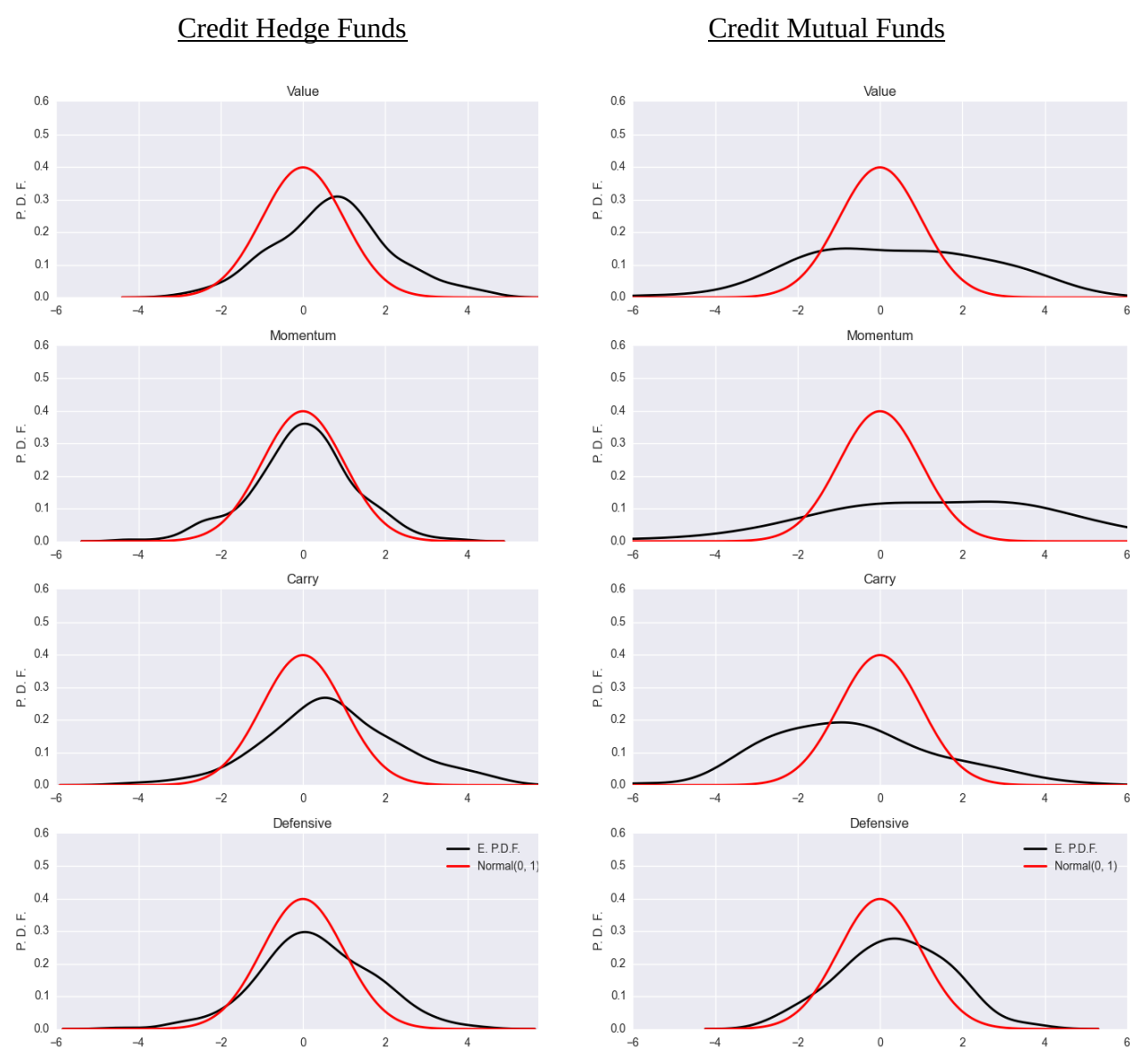


Figure 6: Average Active Tilt on Systematic Investment Themes across Individual Actively Managed Mutual Funds

The frequency histograms below report the full-sample average active weight tilts on systematic investment themes for each high-yield mutual fund. Our sample covers 154 high-yield mutual funds for the period 1998–2018. Bond holdings data are sourced from Lipper EMAXX for these 154 funds. The green line in each graph shows the cross-sectional average active tilt, and the blue line shows the average active theme weight tilt for a hypothetical long-only portfolio designed to maximise exposure to the four systematic investment themes. The active theme weight tilt for a given fund-quarter is computed as the sum-product of active weights and standardized measures representative of each investment theme.

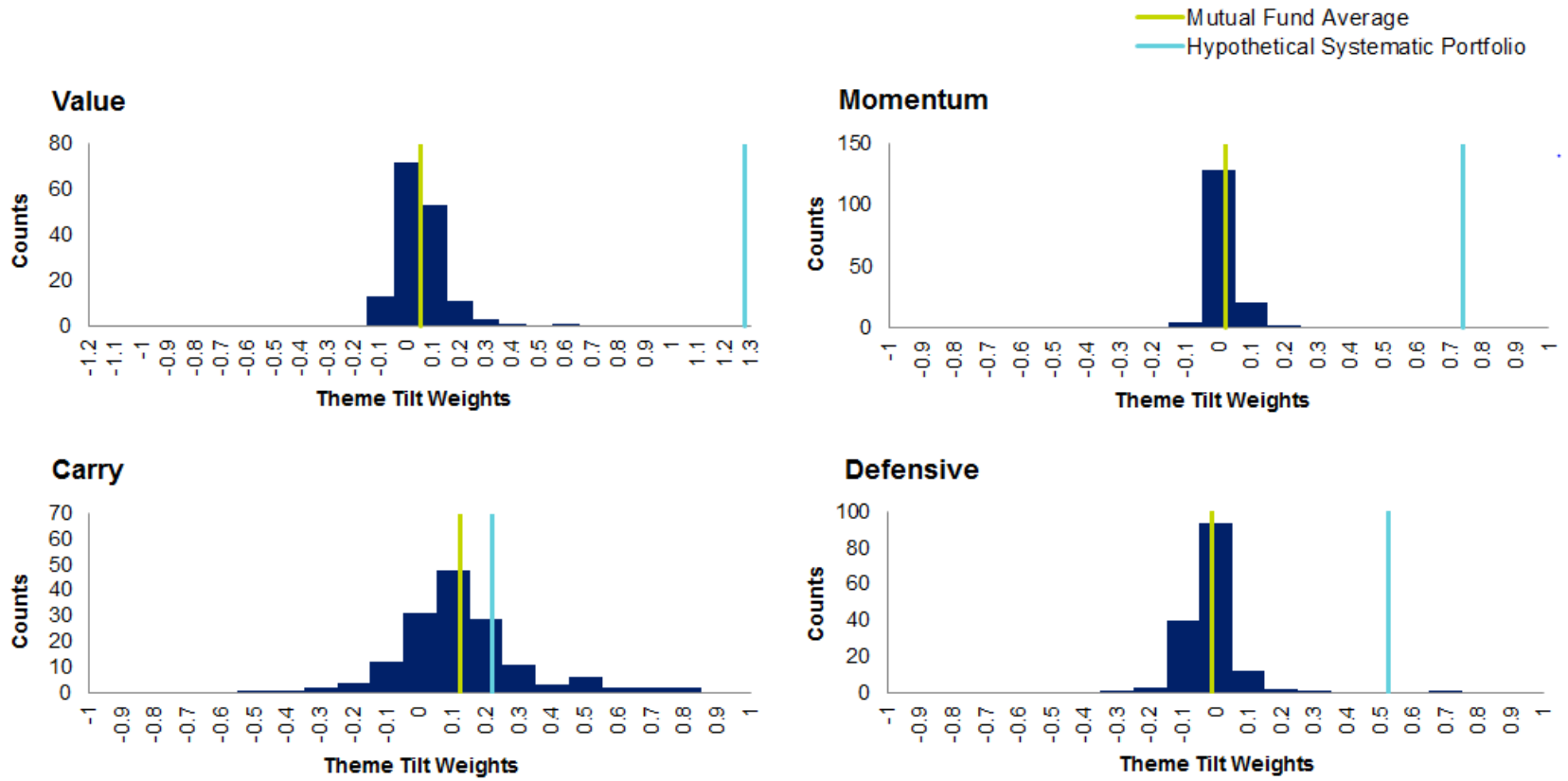


Figure 7: Average Credit Mutual Fund Holdings as Divided into Quartiles Based on Systematic Investing Theme Scores

In the bar chart below, the column on the left shows the average HY mutual fund holdings as divided into quartiles based on combined scores across all four systematic themes (value, momentum, carry and defensive). Quartile 4 (dark blue) represents the holdings with the lowest theme scores, while Quartile 1 (green) represents those with the highest scores. In comparison, the bar chart on the right represents holdings of a hypothetical long-only HY portfolio designed to maximise exposure to the four systematic investment themes as of 11/30/2018, divided into the same quartiles.

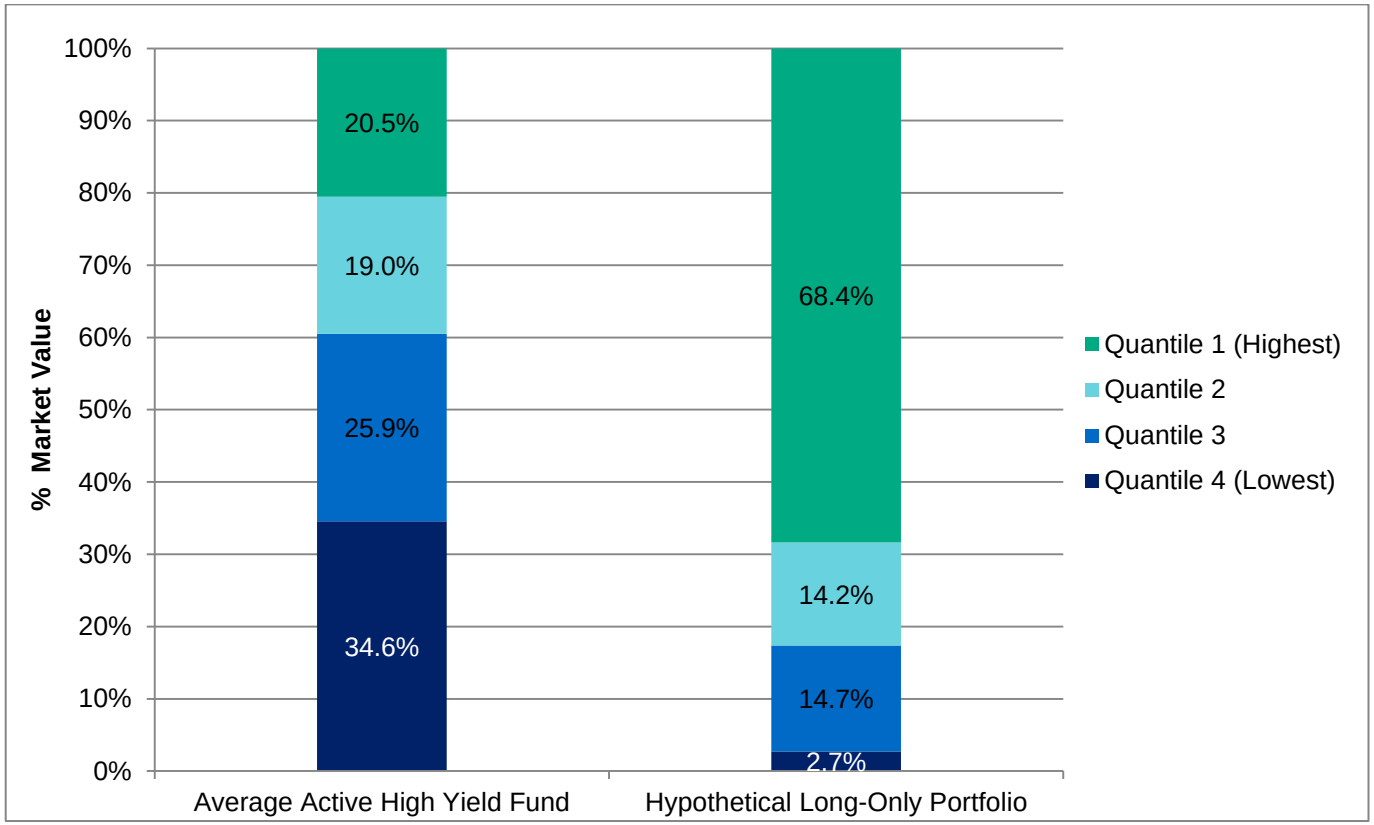


Table 1: Actively Managed Credit Funds

The table below reports the year-by-year annualized active return summary statistics for our set of active credit managers. The dataset used in Panel A is from 219 US-centric credit hedge funds in the HFR index. The dataset used in Panel B is from 96 high-yield corporate bond mutual funds in our Morningstar sample. Active return is defined as returns excess of cash for hedge funds and returns excess of reporting benchmark for mutual funds.

Panel A: Credit Hedge Funds

Year	N	Mean	P10	P25	P50	P75	P90	STD
1997	31	8.81%	-3.36%	-0.23%	1.75%	6.57%	11.90%	26.32%
1998	35	-7.66%	-56.05%	-30.96%	-6.95%	-2.27%	1.55%	5.66%
1999	41	4.35%	-30.84%	-3.56%	-1.95%	2.49%	9.00%	30.49%
2000	41	-1.19%	-36.33%	-16.88%	-6.67%	0.50%	4.69%	16.52%
2001	42	2.93%	-28.87%	-18.49%	0.07%	3.37%	6.04%	16.17%
2002	60	7.69%	-8.84%	-0.30%	1.37%	4.96%	11.37%	21.21%
2003	75	13.23%	-0.21%	1.26%	5.24%	10.68%	19.78%	30.26%
2004	86	6.22%	-3.15%	-0.33%	2.34%	5.33%	8.41%	13.83%
2005	88	2.64%	-5.63%	-4.07%	-0.76%	0.62%	4.37%	8.35%
2006	84	3.09%	-9.63%	-5.45%	-1.50%	2.75%	5.51%	11.95%
2007	76	0.74%	-18.08%	-12.22%	-3.18%	1.37%	5.50%	18.23%
2008	83	-22.92%	-73.11%	-62.92%	-33.36%	-22.11%	0.69%	15.05%
2009	82	25.20%	-16.21%	-3.06%	12.58%	23.43%	36.31%	51.86%
2010	88	11.44%	-1.89%	0.80%	5.42%	9.92%	15.10%	22.57%
2011	86	1.73%	-8.78%	-5.89%	-1.62%	1.35%	4.46%	9.26%
2012	92	10.42%	-3.45%	3.86%	6.69%	10.33%	14.65%	18.44%
2013	91	6.24%	-4.52%	-0.86%	2.37%	7.10%	9.55%	14.30%
2014	89	2.70%	-5.33%	-3.27%	0.41%	2.50%	4.73%	7.68%
2015	88	-1.37%	-13.32%	-10.17%	-5.40%	-0.73%	2.72%	5.82%
2016	91	8.79%	-0.46%	1.56%	3.78%	6.17%	12.61%	16.55%
2017	91	4.82%	-3.35%	-0.83%	2.33%	4.45%	7.47%	10.16%
2018	91	-1.28%	-12.33%	-9.23%	-3.60%	-1.70%	2.68%	5.58%
AVG	74	3.94%	-15.63%	-8.24%	-0.94%	3.50%	9.05%	17.10%

Panel B: Credit Mutual Funds

Year	N	Mean	P10	P25	P50	P75	P90	STD
1996	23	2.43%	-1.79%	-0.02%	1.86%	3.38%	8.45%	2.12%
1997	43	0.69%	-1.22%	-0.32%	0.45%	1.96%	2.92%	1.84%
1998	53	-0.07%	-4.11%	-2.18%	-0.54%	1.66%	3.50%	3.67%
1999	59	1.64%	-2.91%	0.13%	2.04%	4.67%	6.71%	2.00%
2000	62	-1.14%	-9.36%	-4.01%	-0.95%	2.53%	6.88%	2.65%
2001	66	-2.96%	-7.84%	-5.26%	-2.04%	0.25%	2.16%	3.18%
2002	69	-1.12%	-6.82%	-3.96%	-0.47%	2.32%	4.61%	4.09%
2003	71	-3.14%	-7.32%	-6.05%	-3.46%	-0.48%	1.93%	2.02%
2004	74	-0.46%	-2.74%	-1.57%	-0.55%	0.08%	1.25%	1.27%
2005	78	-0.18%	-1.40%	-0.74%	-0.19%	0.59%	1.19%	1.22%
2006	82	-0.82%	-2.45%	-1.85%	-0.64%	0.14%	0.90%	0.81%
2007	85	-0.39%	-1.50%	-0.82%	-0.22%	0.53%	1.19%	1.08%
2008	84	0.14%	-5.70%	-2.96%	1.01%	5.22%	7.63%	4.24%
2009	84	-6.44%	-15.25%	-8.74%	-5.60%	-2.00%	0.70%	4.06%
2010	83	-0.65%	-2.74%	-1.72%	-0.78%	0.37%	1.41%	1.27%
2011	85	-1.17%	-3.12%	-2.00%	-0.93%	-0.22%	0.73%	1.43%
2012	88	-0.52%	-2.37%	-1.46%	-0.57%	0.50%	1.78%	0.98%
2013	87	-0.04%	-1.99%	-1.10%	-0.35%	0.52%	1.99%	0.78%
2014	85	-1.08%	-3.07%	-2.00%	-0.89%	-0.14%	0.93%	0.95%
2015	85	-0.05%	-2.99%	-1.20%	0.20%	1.69%	2.81%	1.20%
2016	84	-2.42%	-4.92%	-3.74%	-2.49%	-1.05%	0.20%	1.68%
2017	84	-0.50%	-1.69%	-1.22%	-0.44%	0.04%	0.80%	0.73%
2018	84	-0.67%	-2.23%	-1.32%	-0.73%	-0.01%	0.54%	0.74%
AVG	74	-0.82%	-4.15%	-2.35%	-0.71%	0.98%	2.66%	1.91%

Table 2: Traditional Market Risk Premia

Panel A below reports the return summary statistics for the traditional risk premia factors that we use. Panel B reports the full-sample return correlations for the traditional risk premia factors. Treasuries and equities correspond to returns on 10-year US Treasuries and the S&P 500 over one-month Treasuries. Credit is the return of the BAML High Yield Master II Total Return Index in excess to a Treasury portfolio with similar cash flows. The return data are from January 1997 to June 2018.

Panel A: Summary Statistics

	Credit	**Treasury**	**Equity**
Ann. Return	2.79%	2.87%	6.33%
Ann. Vol.	9.96%	6.08%	15.10%
Sharpe Ratio	0.28	0.47	0.42

Panel B: Full Sample Return Correlation Matrix

	Credit	**Treasury**	**Equity**
Credit	1.00		
Treasury	-0.46	1.00	
Equity	0.66	-0.25	1.00

Table 3: Traditional Market Risk Premia in Credit Fund Returns

Panel A below displays summary statistics for the distribution of the fraction of returns of a given fund that can be explained by their respective benchmark. For hedge funds, the benchmark is specific to each of our 219 hedge funds, estimated as a linear combination of equity, credit and Treasury market returns with weights determined by a full-sample regression of fund returns onto those three variables. For mutual funds, the benchmark is specific to each of 96 mutual funds and is based on the index that maximally explains fund returns out of a set of eight selected bond indexes. Panel B reports regressions of monthly excess returns of the HFRI RV: Fixed Income—Corporate Index on equity, credit and Treasury market returns. Treasuries and equities correspond to returns on 10-year US Treasuries and the S&P 500 over one-month Treasuries. Credit is the return of the BAML High Yield Master II Total Return Index in excess of a Treasury portfolio with similar cash flows. The data are from January 1997 to June 2018.

Panel A: Explanatory Power of Benchmarks for Hedge Fund and Mutual Funds

	Hedge Funds	Mutual Funds
Average	38%	90%
Median	37%	91%
75th Percentile	59%	94%
Maximum	93%	98%

Panel B: Explanatory Power of Benchmarks for HFRI Fixed Income: Corporate Index

	Credit	Equity	Treasury	All
Credit	0.45			0.46
	[22.5]			[16.2]
Equity		0.21		0.03
		[11.3]		[1.6]
Treasury			-0.26	0.12
			-[4.7]	[3.1]
Intercept (Annual)	1.49	0.86	4.20	0.48
	[2.1]	[0.9]	[3.5]	[0.8]
R-squared	67%	33%	8%	68%

Table 4: Credit Fund Indices Exposures to Characteristics (January 1997–June 2018)

The table below reports regressions of monthly active returns of credit hedge fund and credit mutual fund indices onto characteristic portfolio return. The index used in Panel A is the HFRI RV: Fixed Income—Corporate Index. The index used in Panel B is an equal-weighted average of our 219 US-centric credit hedge funds from the HFR index. The index used in Panel C is an asset-weighted average of our 219 US-centric credit hedge funds from the HFR index. The index used in Panel D is an equal-weighted average of our 96 corporate bond mutual funds in our Morningstar sample. Active returns are the difference between the return of each credit fund or fund index and that of its respective benchmark. For hedge funds, the benchmark is a linear combination of equity, credit and Treasury market returns, where the weight is determined by a full-sample regression of fund returns onto those three market returns. For mutual funds, the benchmarks are the funds' respective reporting benchmarks.

Panel A: Credit Hedge Fund HFRI Index Active Return

	Value	Momentum	Carry	Defensive	All
Value	0.01				0.03
	[0.6]				[1.5]
Momentum		0.01			0.01
		[0.5]			[0.4]
Carry			0.03		0.02
			[3.7]		[2.6]
Defensive				0.08	0.08
				[3.7]	[3.6]
Intercept (Annual)	0.00	0.01	0.00	0.00	-0.02
	[0.0]	[1.2]	[0.4]	-[0.5]	-[1.5]
R-squared	0.16%	0.13%	5.11%	5.02%	14.15%

Panel B: Credit Hedge Fund US-Centric Corporate Index Active Return (Equal Weighted)

	Value	Momentum	Carry	Defensive	All
Value	0.05				0.04
	[3.8]				[2.5]
Momentum		0.01			0.00
		[0.8]			[0.2]
Carry			0.03		0.02
			[4.2]		[2.7]
Defensive				0.02	0.02
				[1.2]	[1.5]
Intercept (Annual)	0.02	0.04	0.05	0.05	0.01
	[2.4]	[5.4]	[8.9]	[8.1]	[1.9]
R-squared	5.69%	0.33%	6.37%	0.59%	14.25%

Panel C: Credit Hedge Fund US-Centric Corporate Index Active Return (Value Weighted)

	Value	Momentum	Carry	Defensive	All
Value	0.04				0.05
	[2.6]				[2.2]
Momentum		0.02			0.01
		[1.4]			[0.5]
Carry			0.02		0.01
			[2.6]		[1.5]
Defensive				0.00	0.02
				[0.1]	[0.9]
Intercept (Annual)	0.01	0.02	0.03	0.03	0.00
	[1.5]	[2.5]	[5.7]	[5.6]	[0.0]
R-squared	2.68%	0.88%	2.57%	0.01%	8.48%

Panel D: Credit Mutual Fund Index Active Return

	Value	Momentum	Carry	Defensive	All
Value	0.00				0.01
	[0.7]				[0.6]
Momentum		0.03			0.02
		[3.6]			[2.8]
Carry			-0.01		-0.01
			-[1.9]		-[1.1]
Defensive				0.01	0.02
				[1.0]	[2.2]
Intercept (Annual)	-0.01	-0.02	-0.01	-0.01	0.03
	-[2.9]	-[5.4]	-[3.3]	-[3.6]	-[5.0]
R-squared	0.19%	5.93%	1.33%	0.37%	8.46%

Table 5: Analysis of High-Yield Mutual Fund Holdings

The table below reports summary statistics for the distribution of quantities of interest across 5,536 mutual fund reports by 154 unique high-yield credit mutual funds between January 1998 and June 2018. These 154 funds have portfolio holding information contained in the Lipper EMAXX database and these funds have an explicit high-yield benchmark belonging to the two most popular benchmark providers: Bank of America Merrill Lynch and Barclays Capital. Panel A displays averages of active tilts across time for the 154 funds. The active tilt for a given fund-quarter is the sum-product of active weights and standardized measures across the respective systematic investment themes. Panel B displays the average coefficients from regressions of active weights onto the standardized measures for each systematic investment theme. Active weights are weights in excess of the respective benchmark for each fund. T-statistics of the averages are clustered at the fund and quarter level.

Panel A: Active Tilt of Mutual Funds on Systematic Investment Themes

	Active Tilt
Value	0.05
	[7.2]
Momentum	0.02
	[6.8]
Carry	0.12
	[7.5]
Defensive	-0.01
	-[1.3]

Panel B: Average Loadings from Regressions of Mutual Fund Holdings on Systematic Investment Themes

	Dependent Variable: Active Weight in Basis Points
Value	0.41
	[3.6]
Momentum	0.25
	[3.3]
Carry	1.57
	[7.5]
Defensive	-0.09
	-[0.8]