



THE JOURNAL OF
FIXED

INCOME

PORTFOLIO
MANAGEMENT
RESEARCH

FALL
2020

VOLUME 30
NUMBER 2

(Systematic) Investing
in Emerging
Market Debt

JORDAN BROOKS, SCOTT
RICHARDSON, AND ZHIKAI XU

JFI.PM-RESEARCH.COM



(Systematic) Investing in Emerging Market Debt

JORDAN BROOKS, SCOTT RICHARDSON, AND ZHIKAI XU

JORDAN BROOKS

is at AQR Capital Management LLC in Greenwich, CT.
jordan.brooks@aqr.com

SCOTT RICHARDSON

is a professor at the London Business School and is affiliated with AQR Capital Management LLC in Greenwich, CT.
scott.richardson@aqr.com

ZHIKAI XU

is at AQR Capital Management LLC in Greenwich, CT.
zhikai.xu@aqr.com

KEY FINDINGS

- We find that a systematic approach to active risk taking “works” in emerging market (EM) fixed income. Exposures linked to carry, defensive, momentum and valuation themes have been well compensated in EM markets.
- We further find that an excess of benchmark returns for incumbent EM managers contains a lot of traditional beta and significant macroeconomic sensitivities.
- There is potentially a large diversification benefit for a well-crafted systematic long-only portfolio of EM bonds.

ABSTRACT: *The authors extend the analysis of systematic investment approaches to emerging market (EM) fixed income. They focus on hard currency bonds issued by emerging sovereign and quasi-sovereign entities. They find that systematic exposures linked to carry, defensive, momentum, and valuation themes are well compensated and lowly correlated in EM markets. A transaction-cost and liquidity aware long-only portfolio generates an information ratio above 1. They further show that an excess of benchmark returns for a broad set of EM managers is (i) largely explained by passive exposures to EM corporate credit excess returns and EM local currency returns, and (ii) has nontrivial macroeconomic exposures (growth, inflation, volatility, and liquidity). A systematic approach to EM debt may be a powerful diversifier.*

TOPICS: *Emerging markets, currency**

Emerging market (EM) fixed income has seen considerable growth over the last couple of decades. EM bonds are those issued by entities

(corporate and sovereign) domiciled in emerging markets and can be issued in local and hard (typically USD) currency. J. P. Morgan’s global EM indices, which capture the investible section of EM markets, have increased from around 350 billion USD in 2002 to nearly 2.5 trillion by the end of 2018. This article is a specific application to a fixed-income asset class with some unique features, but the framework and results will echo evidence from previous research in other fixed-income markets (e.g., Houweling and van Zundert 2017; and Israel et al. 2018 for corporate bonds).

Our purpose is to lay out a framework to understand the risk and return drivers of hard currency bonds issued by emerging sovereign and quasi-sovereign entities. These bonds have two sources of risk. First, they inherit exposure to sovereign rates from the hard currency they are issued in (typically USD). Second, they contain exposure to a relatively unique source of credit risk,

*All articles are now categorized by topics and subtopics. **View at [PM-Research.com](https://www.pm-research.com).**

and hence return. The credit risk for hard currency bonds issued by a sovereign entity is the potential inability for it to service the foreign currency obligation from locally generated cash flows. Our focus is to understand cross-sectional determinants of this second credit risk component of hard currency EM bond returns.

In contrast, local currency bonds from corporates have a similar risk and return profile for bonds issued by companies domiciled in developed markets, which have been examined in depth previously (e.g., Houweling and van Zundert 2017; Israel et al. 2018). Likewise, local currency bonds from emerging sovereigns exhibit a similar rate risk and reward profile to bonds issued by developed sovereigns, again which has been examined in depth previously (e.g., Brooks et al. 2018; Brooks and Moskowitz 2019).

As of December 31, 2018, the J. P. Morgan EMBI Global Diversified Index contained 679 bonds from 66 sovereign and 76 quasi-sovereign issuers with an aggregate value of 873 billion USD. For this set of hard currency bonds, we describe a set of systematic “factors” that can help explain cross-sectional variation in the credit excess returns of these bonds. The characteristics that we examine include carry, defensive, value, and momentum, which have been examined extensively in other asset classes (see e.g., Asness et al. 2013, for value and momentum; Kojien et al. 2018, for carry; Frazzini and Pedersen 2014, for defensive). We show that these characteristics (i) both individually, and in combination, are significantly associated with future credit excess returns of EM hard currency bonds and (ii) translate to economically meaningful excess of benchmark returns in the context of a systematic long-only, transaction-cost-aware, portfolio. Kang et al. (2019) also find evidence that simple measures of value and momentum can explain cross-sectional variation in EM bond (excess of cash, not credit excess) return variation, and that these simple measures can be incorporated into an optimized long-only portfolio. We extend the set of measures examined (both for value and momentum, as well as for carry and defensive investment themes) and further examine exposures of a broad set of EM managers to both traditional market risk premia and our selected systematic factors.

To assess whether systematic exposures to carry, defensive, value, and momentum are potentially useful in an emerging market bond context, we construct long/short portfolios using five-year credit default swaps (CDSs).

Over the 2004–2018 period, we can measure the four systematic investment themes over 25 emerging sovereign reference entities. Sharpe ratios of long–short portfolios range from 0.3 for carry to 0.6 for momentum. Given the low correlation across the four themes (carry and defensive are strongly negatively correlated; value and momentum are moderately negatively correlated), a portfolio allocating risk equally across the four themes has a Sharpe ratio of 1.1.

Although this sounds exciting, these long–short portfolios may not be implementable. They are, however, a necessary condition to demonstrate the potential efficacy of a systematic investment approach in emerging market debt. We construct long-only portfolios by limiting ourselves to more liquid EM bonds (e.g., sufficiently high trading volumes and sufficiently low bid–ask spreads) within the J. P. Morgan Emerging Market Bond Index. Our long-only portfolio seeks to maximize exposure in a risk-aware, and market neutral, manner to a roughly equal allocation across measures of carry, defensive, value, and momentum. We use multiple measures for each investment theme and combine views on both the country (level) and maturity (slope) dimensions. For the long–short CDS portfolio this was not possible, as only the five-year point is sufficiently liquid. Our long-only portfolio targets an annualized tracking error of around 2%. After accounting for transaction costs, this long-only portfolio generates an excess of benchmark return of around 2.5% with a realized tracking error of 1.5%, which translates to an information ratio of about 1.7. This suggests that it may be possible to build a long-only EM bond portfolio seeking exposure to systematic investment themes.

We then examine the returns of a broad set of 64 long-only active EM managers with an explicit emerging markets bond index over the 2004–2018 time period. Like recent research documenting attractive excess of benchmark returns for fixed-income managers (see e.g., Baz et al. 2017; Brooks et al. 2019), we find that the average active EM manager has an excess of benchmark return of 0.8% and an information ratio of 0.36. Collectively, active EM managers have generated attractive risk-adjusted returns over the last two decades.

We conduct two further sets of analyses. First, we assess whether these positive excess of benchmark returns are indeed alpha and not an exposure to traditional risk premia. In the case of hard currency EM active managers, the most natural traditional risk premia

would be exposures to EM local currency debt and EM corporate debt. We find that these traditional risk premia explain more than half of the aggregate, and individual, active EM manager returns. This has important implications for asset owners in understanding the nature of positive excess of benchmark returns, particularly for broader asset allocation decisions and fee discussions. Notably, given the commonality in traditional risk premia exposures across active EM managers, there is a heightened pairwise correlation of excess of benchmark returns across managers. We show that our long-only portfolio targeting market neutral exposure to carry, defensive, value, and momentum has not only minimal exposure to traditional risk premia (i.e., it is market neutral), it also has very low correlation with the set of active EM bond managers. An allocation to a systematic EM manager alongside a traditional discretionary active EM manager, therefore, has the potential to be a powerful diversifier. As we, and others, have argued elsewhere, neither systematic nor discretionary approaches are, or even need to be, inherently superior (see e.g., Palhares and Richardson 2019; Baz et al. 2018). If both are well executed and charge fair fees, they may complement each other very well in an overall active EM mandate.

Second, we examine the consequences of traditional risk premia explaining excess of benchmark returns. If excess of benchmark returns are primarily attributable to traditional sources of risk (especially credit risk), this can introduce macroeconomic sensitivities into the active returns. We show that active EM bond managers both individually, and in aggregate, have nontrivial exposures to macroeconomic variables. Specifically, we show that excess of benchmark returns for active EM bond managers are positively related to (i) changes in growth expectations, (ii) changes in inflation expectations, and (iii) changes in real yields; and negatively related to changes in volatility. This is, perhaps, not too surprising as traditional market risk premia are exposed to these macroeconomic variables. In contrast, our long-only portfolio targeting market-neutral exposure to carry, defensive, value, and momentum has only minimal exposure to macroeconomic variables. This emphasizes a general benefit of a systematic investing approach as it allows you to control ex ante for exposures to traditional risk premia and macroeconomic variables.

The remainder of this article proceeds as follows. The following section explains our data sources, measures of systematic investment themes for EM bonds,

and our sample-selection criteria for EM bond funds. The next section describes our empirical analyses, and the final section concludes.

DATA AND METHODOLOGY

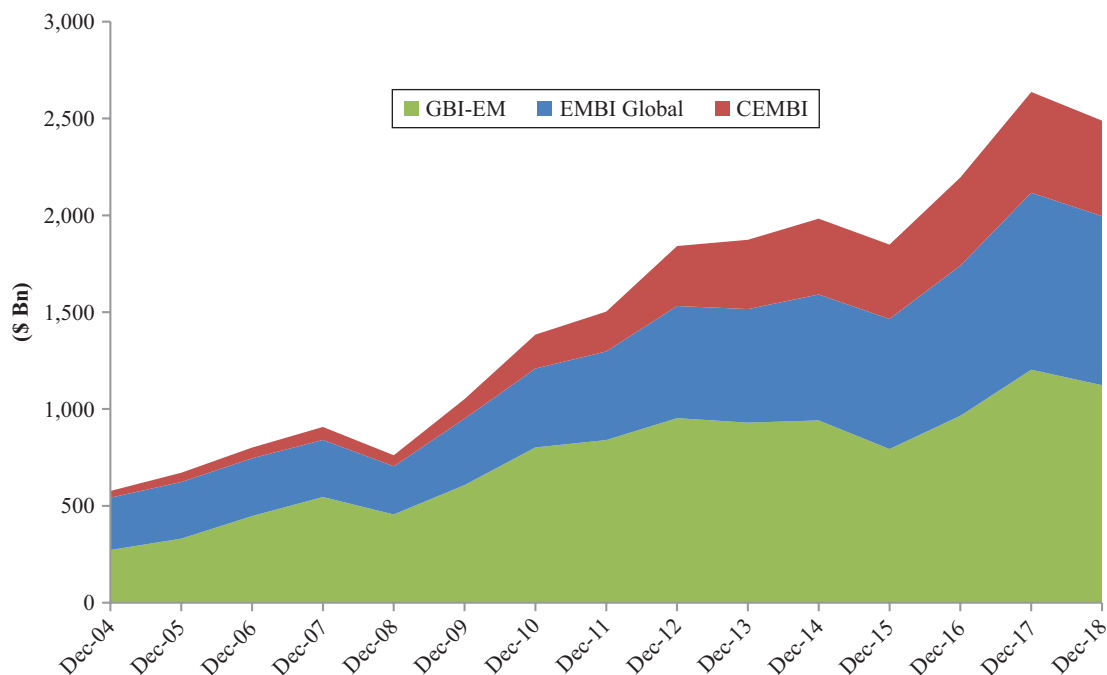
Emerging Market Bonds

The purpose of this section is to describe the investment universe for emerging market debt. We use data from the relevant J. P. Morgan indices. These indices are designed to capture the investible universe of EM bonds globally. Exhibits 1 and 2 show the growth in EM bonds over the 2004–2018 time period. We examine three EM bond indices from J. P. Morgan that cover both local and hard currency bonds issued by both sovereign and corporate issuers. The J. P. Morgan Emerging Markets Bond Global Index (EMBI Global) tracks returns for traded external debt (hard currency) instruments issued by emerging sovereign (and related) entities. The J. P. Morgan Government Bond Index—Emerging Markets (GBI-EM) tracks returns for local currency bonds issued by emerging sovereign entities. The J. P. Morgan Corporate Emerging Markets Index (CEMBI) tracks the returns of USD-denominated bonds used by emerging market corporate entities. For all J. P. Morgan indices, we use their global versions, which are intended to be an investable benchmark that only includes countries that are accessible to a foreign investor.

The most noticeable pattern from Exhibits 1 and 2 is the huge increase in issuance from entities domiciled in emerging markets. Index sizes are reported in billions of USD. Across the three indices, there is a 430% increase in the market value of EM bonds over the last two decades, with corporate issuance experiencing the largest percentage growth (over 1,400% growth). At the start of our time period, the secondary market value of investible EM bonds was 577 billion dollars, and at the end of our time period, this market grew to nearly 2.5 trillion dollars.

As discussed in the introduction, our focus is on the EMBI Global index. This index contains USD bonds issued by EM sovereign and quasi-sovereign issuers. These bonds contain two distinct sources of risk and return. First, there is a risk-free component of returns. This is exposure to US risk-free rates (which itself includes exposure to term premium). Second, there is a risky component attributable to the credit risk implicit

EXHIBIT 1 The Emerging Market Debt Universe



Notes: This exhibit shows the growth in the size of the emerging market fixed-income universe broken down into three distinct categories from 2004 through to 2018. The J. P. Morgan Emerging Markets Bond Global Index (EMBI Global) tracks returns for traded external debt (hard currency) instruments issued by emerging sovereign (and related) entities. The J. P. Morgan Government Bond Index—Emerging Markets (GBI-EM) tracks returns for local currency bonds issued by emerging sovereign entities. The J. P. Morgan Corporate Emerging Markets Index (CEMBI) tracks the returns of USD-denominated bonds used by emerging market corporate entities. For all J. P. Morgan indices, we use their global versions, which are intended to be an investable benchmark that only includes countries that are accessible to a foreign investor. Index sizes are reported in billions of USD.

in servicing foreign currency commitments. The first rates component can be approximated by multiplying the key rate duration exposure of each EM bond by the respective (negative) change in US yields. The second credit component is then the difference between the total return for the EM bond and its rate return. This additive decomposition of returns reveals over the 2004–2018 time period, the rate and credit component of EM bond returns are approximately equal in importance. However, a variance decomposition of returns reveals that the rate (credit) component accounts for 18% (82%) of the total return variation. Defining the rates component of EM index returns as r_r , the credit component of EM index returns as r_c , and the return on the EM index as r_p (noting that $r_p = r_r + r_c$), the return variation attributable to the rates (credit) component can be computed as $\frac{\sigma_r^2 + \rho_{r,c} \sigma_r \sigma_c}{\sigma_p^2}$ ($\frac{\sigma_c^2 + \rho_{r,c} \sigma_r \sigma_c}{\sigma_p^2}$). The credit component is the most

important driver of hard currency EM bond returns, and that is the focus for the rest of the article.

Exhibit 3 provides greater details on our sample of EM hard currency bonds. In 2004, the EMBI Global index contained 187 EM bonds with a market value of 271 billion reflecting 28 (9) sovereign (quasi-sovereign) issuers. At the end of our sample, the EMBI Global index covers a much greater set of EM bonds: 679 bonds across 66 (76) sovereign (quasi-sovereign) issuers. Across our time period, there is a growing trend of increased issuance by (i) quasi-sovereign issuers, (ii) IG rated issues, and (iii) issuers domiciled in Asia relative to Latin America (the traditional EM hard currency issuer). Like other growth-sensitive assets, there is the expected counter-cyclical relation between credit spreads and overall market conditions: spreads widen in periods of economic stress, most noticeably around the crisis period of 2008.

EXHIBIT 2

The Emerging Market Debt Universe

Year	EMBI Global	CEMBI	GBI-EM	Total
2004	271	35	272	577
2005	292	49	331	672
2006	299	55	447	801
2007	295	67	545	907
2008	249	57	456	761
2009	342	102	608	1,052
2010	407	175	802	1,384
2011	457	206	840	1,503
2012	579	310	953	1,842
2013	586	358	930	1,874
2014	651	391	941	1,983
2015	672	383	793	1,849
2016	776	455	965	2,196
2017	913	521	1,203	2,637
2018	873	493	1,123	2,489

Notes: This exhibit reports the size of the emerging market fixed-income universe broken down into three distinct categories from 2004 through 2018. The J. P. Morgan Emerging Markets Bond Global Index (EMBI Global) tracks returns for traded external debt (hard currency) instruments issued by emerging sovereign (and related) entities. The J. P. Morgan Government Bond Index—Emerging Markets (GBI-EM) tracks returns for local currency bonds issued by emerging sovereign entities. The J. P. Morgan Corporate Emerging Markets Index (CEMBI) tracks the returns of USD-denominated bonds used by emerging market corporate entities. For all J. P. Morgan indices, we use their global versions, which are intended to be an investable benchmark that only includes countries that are accessible to a foreign investor. Index sizes are reported in billions of USD.

Emerging Market CDSs

For our initial empirical analysis on the efficacy of EM systematic investing, we focus on liquid five-year credit default swaps (CDSs). We begin our analysis with EM CDS instruments, rather than EM bonds, as CDSs are standardized, liquid contracts that allow for relatively easier cross-country comparisons and long–short implementation. These CDS contracts provide insurance against the likelihood of nonpayment of USD hard currency reference bond obligations by emerging sovereign reference entities. We use five-year *on the run* CDS contracts that (i) are linked to reference entities that are emerging sovereign, (ii) have reference obligations denominated in USD, and (iii) are sufficiently liquid as captured by membership in the J. P. Morgan Global EMBI+ index (this index requires each bond to be at least 500 million and meet additional stringent secondary market liquidity requirements).

Exhibit 4 summarizes our sample of EM CDS contracts. There is a relatively stable universe of EM reference entities over our time period with a reasonable stable split between IG and HY rated entities, although there is an increase in HY rated entities toward the end of our sample. The geographic breakdown across Latin America, Asia and EMEA is also relatively stable over our sample period. Finally, as we saw with the cash bond index data in the section on emerging market bonds, there is the expected temporal variation in credit spreads, with spreads widening in periods of economic stress (e.g., 2008).

Measuring Systematic Investment Themes for Emerging Market Debt

For our systematic investment themes, we rely on an extensive academic and practitioner literature that has documented pervasive evidence of robust associations between measures of carry, defensive, momentum, and value and future excess returns across multiple asset classes. Kojien et al. (2018) show pervasive evidence for carry across asset classes and long time periods. Frazzini and Pedersen (2014) provide pervasive evidence for the defensive theme across multiple asset classes and time periods. Asness et al. (2013) show strong evidence of the combined efficacy of value and momentum across multiple asset classes and time periods. Our aim is to introduce intuitive measures of these four themes anchored to the credit risk embedded in EM bonds. As such, we introduce measures that are deliberately simple. Although this approach has the benefit of transparency and replicability, it comes with a potential cost that it may not reflect the depth of analysis (measures and portfolio construction choices) used in actual portfolios. This may limit the potential efficacy of the systematic investment approach that we describe in the following.

Carry is the tendency for higher-yielding assets to outperform lower-yielding assets. *Carry* is the expected return if nothing changes with the passage of time (i.e., the discount and hazard rate curves remain unchanged). Of course, as time passes there will be changes in expectations of credit risk, with coincident changes in discount rates and hence returns. *Carry* is a source of risk, but one that has generated a positive risk-adjusted return across many asset classes and time periods (e.g., Kojien et al. 2018). We measure *carry* as the spread of the five-year CDS contract at the start of each month,

EXHIBIT 3

The EMBI (hard currency) Universe

Year	#Bonds	MCAP	Issuer Split		% Breakdown across Categories							Avg. Values		
			#SOV	#QSOV	SOV	QSOV	IG	HY	ASIA	LATAM	EMEA	SDur	Life	S
2004	187	271	28	9	95%	5%	32%	68%	11%	59%	30%	6.0	11.6	232
2005	188	292	30	9	94%	6%	30%	70%	14%	58%	29%	6.6	12.3	177
2006	191	299	29	13	92%	8%	31%	69%	16%	54%	30%	7.2	13.0	123
2007	196	295	34	17	90%	10%	29%	71%	17%	51%	32%	7.1	12.9	196
2008	194	249	35	17	90%	10%	48%	52%	18%	49%	33%	6.3	12.4	546
2009	219	342	37	16	86%	14%	42%	58%	20%	46%	34%	6.6	11.7	188
2010	258	407	38	26	82%	18%	41%	59%	18%	44%	38%	6.7	11.7	182
2011	288	457	42	33	80%	20%	40%	60%	18%	45%	37%	6.8	11.6	325
2012	337	579	50	44	76%	24%	52%	48%	17%	43%	39%	7.3	12.0	167
2013	412	586	55	60	73%	27%	57%	43%	17%	41%	42%	6.5	10.9	249
2014	462	651	58	65	71%	29%	59%	41%	21%	40%	39%	7.0	11.5	247
2015	513	672	60	71	70%	30%	42%	58%	23%	38%	39%	6.5	10.9	315
2016	559	776	65	75	70%	30%	46%	54%	23%	42%	35%	6.5	10.7	244
2017	643	913	67	78	70%	30%	50%	50%	25%	40%	35%	7.0	11.5	166
2018	679	873	66	76	71%	29%	55%	45%	27%	38%	35%	6.7	11.4	259
AVG	355	511	46	41	81%	19%	44%	56%	19%	46%	35%	6.7	11.7	241

Notes: This exhibit summarizes features of hard currency bonds included in the J. P. Morgan Emerging Markets Bond Global Index (EMBI Global), which tracks returns for traded external debt (hard currency) instruments issued by emerging sovereign (and related) entities. We report the number of bonds, the number of issuers both for pure sovereign (SOV) and quasi-sovereign (QSOV) entities, the fraction of bond issued by each type of sovereign entity, a breakdown across rating categories and geographies and information on the typical spread duration (SDur), remaining time to maturity (Life), and credit spreads (S, in basis points) of EM hard currency bonds.

where we prefer to sell protection on CDS contracts with higher spread levels. This is a simple implementation of *carry*, as it ignores roll-down and higher-order measures of curve shape.

Defensive is the tendency of safer, lower-risk assets to deliver higher risk-adjusted returns relative to their low-quality, higher-risk counterparts. Unlike *carry*, *defensive* is a multifaceted construct and, as such, we use multiple measures capturing different dimensions of this theme. Although data may be more challenging for sovereign entities than it is for corporate entities, we wish to measure similar aspects as we would for corporates (e.g., high, and more stable, levels of profitability; lower levels of leverage). For our EM issuers, we measure the defensive theme with two distinct measures. First, we use a measure of sovereign quality as indicated by its ability to achieve low, and stable, levels of inflation. We think of this as a reduced form measure reflecting the quality of macroeconomic policy of the sovereign entity. A lower level of forecasted inflation is an indicator of higher-quality macroeconomic risk management

by the sovereign. We use a constant 12-month ahead forecast of inflation from Consensus Economics. We prefer to sell protection on CDS contracts where there is a lower level of expected inflation. Second, we use a measure designed to capture the overall indebtedness of the sovereign entity (i.e., asset/debt ratio). We compute an asset value for the sovereign, which combines foreign reserves (obtained from Thomson Reuters International Comparable Economics, TRICE) and the level of GDP grossed up by expectations of GDP growth for the next 12 months (GDP growth expectations are obtained from Consensus Economics). Estimating debt precisely for sovereign entities is a challenging task, as there are oftentimes many implicit government guarantees linked to government-sponsored entities. We take a simple approach and compute a debt value as the sum of government external debt and 50% of nongovernment external debt (reflecting the contingent nature of external private sector debt, which may be assumed by the sovereign in the event of default). External debt data are obtained from TRICE. We then take the log of

EXHIBIT 4

The EM CDS Universe

Year	#Issuers	% Breakdown across Categories					Spreads		
		IG	HY	ASIA	LATAM	EMEA	Q1	Median	Q3
2004	24	17	7	4	8	12	34	132	293
2005	24	17	7	4	8	12	36	69	213
2006	25	17	8	4	8	13	20	74	114
2007	25	17	8	4	8	13	70	99	153
2008	25	17	8	4	8	13	304	416	642
2009	24	17	7	4	7	13	131	176	246
2010	23	17	6	4	7	12	113	140	253
2011	24	17	7	4	7	13	168	279	472
2012	23	17	6	4	7	12	97	127	241
2013	24	17	7	4	7	13	118	188	283
2014	23	17	6	4	6	13	111	176	234
2015	23	16	7	4	7	12	166	204	319
2016	24	15	9	4	8	12	123	160	274
2017	25	14	11	4	8	13	67	104	164
2018	25	15	10	4	8	13	88	137	359
AVG	24	16	8	4	7	13	110	165	284

Notes: This exhibit summarizes features of the five-year credit default swap (CDS) contracts linked to (i) reference entities that are “emerging sovereign,” (ii) have reference obligations denominated in USD, and (iii) are sufficiently liquid as captured by membership in the J. P. Morgan Global EMBI+ index (this index requires each bond to be at least 500 million and meet additional stringent secondary market liquidity requirements). The data cover the 2004–2018 time period. We report the number of issuers each year with a breakdown based on rating and geography and distributional information on credit spreads.

asset/debt as our measure of sovereign indebtedness. The defensive theme is then an equal-weighted combination of forecasted inflation and indebtedness.

Momentum is the tendency for an asset’s recent performance to continue, leading to outperformance of recent winners relative to recent losers. Recent performance can be measured using return data from the asset itself, as well as return data from other related assets. We measure momentum as an equal-weighted combination of three return-based metrics: (i) 6-month trailing EM CDS returns, (ii) 6-month trailing FX returns, and (iii) 6-month trailing country equity returns. Kang et al. (2019) use a risk-adjusted measure of FX momentum, noting that it has superior performance relative to other choices. We have chosen to stick with simpler measures of momentum (trailing 6-month returns) across the direct asset (EM CDS) and closely related assets to help mitigate data overfitting problems. We prefer to sell protection on CDS contracts with positive CDS returns, positive local currency returns relative to USD, and positive country equity returns.

Value is the tendency for relatively cheap assets to outperform relatively expensive assets on a risk-adjusted basis. For *value*, we need a credible fundamental anchor to compare against quoted market spreads. A cheap EM bond (or CDS contract) is one where the credit spread is wide relative to fundamental credit risk. Contingent claim models (e.g., Merton 1974) suggest distance to default as the theoretical anchor for credit spreads. Although prior research examining *value* measures for corporates has generated relatively sophisticated distance to default measures using a variety of market and fundamental sources (e.g., Correia et al. 2012; Correia et al. 2018), it is difficult to compute a clean measure of distance to default for EM sovereigns. Instead, we use a reduced form specification linked to third-party estimates of credit risk (credit ratings) and market-based estimates of credit risk (volatility of country equity returns). These two measures help capture the essential ingredients of distance to default (leverage and volatility). To construct our *value* measure, we regress credit spreads onto credit ratings (an ordinal rank of sovereign issuer ratings) and equity volatility. This regression is

estimated on an expanding window basis, including time fixed effects. We require at least three months of data to estimate this expanding panel regression (and hence use data in 2003 to help seed the estimation). The country-specific residual from the expanding window regression is our value measure.

Although we have tailored the respective measures of carry, defensive, momentum, and value to be relevant to the economic risks embedded in EM bonds, our belief in the efficacy of these investment themes is the same as we have for other asset classes. A combination of risk-based, cognitive error, and market frictions gives rise to the positive risk-adjusted returns associated with each of these investment themes (see e.g., Asness et al. 2015). The fact that these factors work in government bond, corporate bond, FX, and now emerging bond markets is both a potential boon to fixed-income investors and a wonderful out-of-sample test of the original equity-centric results, enhancing our belief that the efficacy of these factors is the result of real forces and not random data mining.

Emerging Market Bond Funds

For our analysis of the return drivers of incumbent active EM bond funds, we identify strategies in the eVestment database that fall within the EM universe. This sample includes live and graveyard strategies. The initial sample contains 133 distinct EM benchmarked strategies. We filter this sample by retaining funds that have (i) a stated benchmark that is either J. P. Morgan Global Diversified, J. P. Morgan EMBI Global, or J. P. Morgan EMBI+ (deletes 18 strategies); (ii) at least 60 months of return data (deletes 37 strategies); and (iii) USD share classes (deletes 8 strategies). We further remove four strategies that appear to be duplicates and two strategies where the tracking error exceeds the volatility of the stated benchmark (these are likely misspecified EM benchmarked strategies). After applying these filters, 64 EM benchmarked strategies remain. The included funds represent 75% of the total assets managed by EM bond funds within the eVestment database. The 69 excluded funds tend to be smaller in size (the average AUM of excluded funds is \$1,257 million compared to \$3,987 million for the 64 included funds). Total return and excess-of-benchmark data are provided by eVestment and are gross of fees. The average EM bond fund in our sample exists for 143 months.

RESULTS

Long–Short CDS Portfolios

Our first set of analyses examines the potential efficacy of applying systematic investment themes to EM five-year CDS contracts. The CDS contract is exposed to the credit risk of the emerging sovereign so CDS returns map neatly to our framework. Using our sample of approximately 25 emerging sovereign CDS contracts, we build a long–short portfolio each month. Our long (short) positions are achieved by selling (buying) protection on the relevant five-year EM sovereign contract. At the start of each month, we rank the universe on our four investment themes, either individually or in aggregate, as described in the section on measuring systematic investment themes for emerging market debt. We form beta-neutral views for each investment theme (and composite). A beta-neutral view implies that the notional exposures on the long and short side of the portfolio are equal in beta (not dollar) amounts. To estimate beta, we use an asset-by-asset variance-covariance matrix, modeling correlation and volatility separately. Portfolios are scaled to 10% volatility and are rebalanced monthly, but do not account for transaction costs. The purpose of this analysis is to show the potential for our systematic approach (i.e., these characteristics are associated with future credit excess returns). We address implementability issues in the next section.

Exhibit 5 summarizes the main results for the long–short portfolios. Panel A of Exhibit 5 reports the correlations of the returns accruing to each of the four investment themes. These correlations are quite intuitive. Carry and defensive are strongly negatively correlated (wider spreads represent riskier, lower-quality, issuers), and value and momentum are moderately negatively correlated. Perhaps less intuitively, but consistent with other asset classes, value and carry are essentially uncorrelated. Although *value* measures anchor the spread level to fundamentals, and the spread level itself is our measure of carry, the two are lowly correlated. Similar to prior research from other asset classes, the investment themes are lowly correlated with each other, creating the potential for a combination across the four investment themes to be highly diversifying.

Panel B of Exhibit 5 reports a variety of return statistics for each long–short portfolio. All portfolios realize a volatility close to 10% as they are targeting

EXHIBIT 5

Performance of Long–Short Systematic Investment Portfolios in CDS Universe

Panel A: Correlations across Systematic Investment Themes

	Carry	Defensive	Momentum	Value
Carry				
Defensive	–0.74			
Momentum	–0.12	0.23		
Value	0.07	0.04	–0.29	

Panel B: Return Properties of Systematic Investment Themes

	Carry	Defensive	Momentum	Value	Composite
Average	3.8%	3.6%	5.4%	3.7%	10.8%
Std. Dev.	11.2%	10.5%	8.5%	10.2%	10.1%
<i>t</i> -Stat	1.30	1.32	2.46	1.41	4.13
Sharpe Ratio	0.34	0.34	0.64	0.37	1.07
α	1.8%	5.1%	6.5%	3.5%	11.6%
β	0.35	–0.29	–0.20	0.04	–0.15
Skewness	–0.54	0.99	1.09	0.37	0.26
Kurtosis	4.9	3.9	4.1	1.4	0.3
Max Drawdown	–36.4%	–22.7%	–17.7%	–31.2%	–15.8%

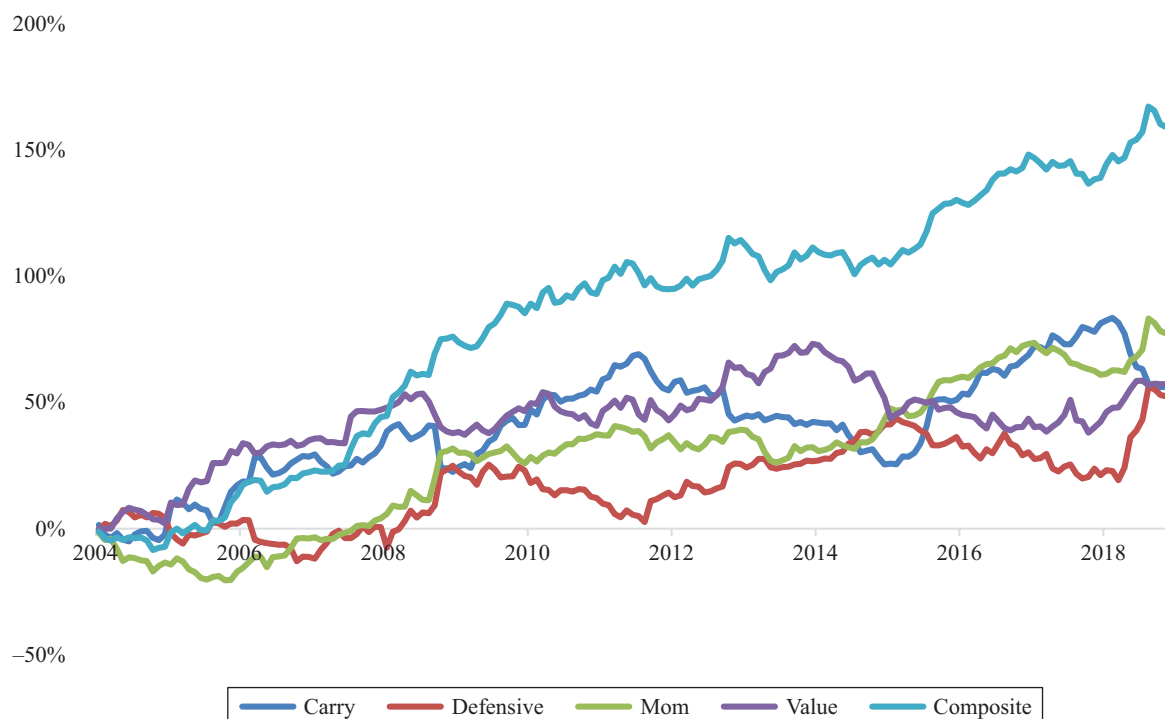
Notes: This exhibit summarizes the correlation structure and performance of long–short EM CDS portfolios that target constant volatility (10%) across four systematic investment themes: carry, defensive, momentum, and value. Carry is measured as the spread of the respective CDS contract at the start of the month (preferring EM debt with higher spread levels). Defensive is measured as an equal-weighted combination of forecasted inflation (preferring EM debt with lower expected levels of inflation) and asset/debt ratio (preferring EM debt with higher assets relative to external debt). Assets are the sum of foreign reserves and GDP, and debt is government-related external debt (data obtained from Thomson Reuters International Comparable Economics). Momentum is measured as an equal-weighted combination of 6-month trailing EM CDS returns, 6-month trailing FX returns, and 6-month trailing country equity returns (preferring EM debt with positive CDS returns, positive local currency returns relative to USD, and positive country equity returns). Value is measured as the residual from a regression of credit spreads onto credit ratings (an ordinal rank of sovereign issuer ratings) and equity volatility. This regression is estimated on an expanding window basis including time-fixed effects. We build portfolios individually for each theme and a composite portfolio that allocates equal risk across each theme. Portfolios are rebalanced monthly over the 2004–2018 time period. We form beta-neutral views for each theme (and composite) and use an asset-by-asset variance-covariance matrix to scale positions to target 10% ex ante volatility.

10% ex ante (momentum slightly under-realizes volatility in this time period). Sharpe ratios for the four individual themes range from 0.34 for carry and defensive to 0.63 for momentum and, given the low correlation across investment themes discussed previously, the composite portfolio that targets an equal allocation across the four themes realizes a Sharpe ratio of 1.04. Panel B of Exhibit 5 also reports α and β from a full-sample regression for a given long–short portfolio's return onto the EMBI index return. Across the four individual investment themes, we see muted exposures to the market (carry is positively correlated to the market and defensive and momentum are mildly negatively correlated) and the composite has a mild negative correlation with the EM market. Most importantly, the regression intercept (α) continues to be strongly positive for the composite long/short portfolio (unreported *t*-statistic of 4.47).

Exhibit 6 plots the cumulative returns across the four investment themes, as well as the composite long–short portfolio. There are a few observations to note. First, the carry portfolio retains some sensitivity to periods of market volatility (sharply lower returns around the financial crisis period and over the latter period of our sample). Given the negative correlation between carry and defensive, it is not surprising to see the defensive portfolio generating positive returns in those same periods. Second, the diversification potential of a risk-balanced exposure to multiple systematic investment themes is evident in the relatively smooth cumulative return profile of the composite portfolio. We revisit this point on minimal macroeconomic sensitivities formally in the upcoming section on active EM bond managers.

EXHIBIT 6

Performance of Long—Short Systematic Investment Portfolios in CDS Universe



Notes: This exhibit shows cumulative returns for long—short EM CDS portfolios that target constant volatility (10%) across four systematic investment themes: carry, defensive, momentum, and value. Carry is measured as the spread of the respective CDS contract at the start of the month (preferring EM debt with higher spread levels). Defensive is measured as an equal-weighted combination of forecasted inflation (preferring EM debt with lower expected levels of inflation) and asset/debt ratio (preferring EM debt with higher assets relative to external debt). Assets are the sum of foreign reserves and GDP, and debt is government-related external debt (data obtained from Thomson Reuters International Comparable Economics). Momentum is measured as an equal-weighted combination of 6-month trailing EM CDS returns, 6-month trailing FX returns, and 6-month trailing country equity returns (preferring EM debt with positive CDS returns, positive local currency returns relative to USD, and positive country equity returns). Value is measured as the residual from a regression of credit spreads onto credit ratings (an ordinal rank of sovereign issuer ratings) and equity volatility. This regression is estimated on an expanding window basis including time-fixed effects. We build portfolios individually for each theme and a composite portfolio that allocates equal risk across each theme. Portfolios are rebalanced monthly over the 2004–2018 time period. We form beta-neutral views for each theme (and composite) and use an asset-by-asset variance-covariance matrix to scale positions to target 10% ex ante volatility.

Long-Only Bond Portfolios

Although the analysis in the previous section supports the case for systematic investing within EM, it is subject to various criticisms related to implementation. Could exposures to systematic investment themes generate positive excess of benchmark returns when faced with real-world constraints? Many investors do not allow the use of leverage and/or are hesitant to use credit derivative instruments. We now turn to examine the potential for our four systematic investment themes to identify attractive USD bonds issued by EM sovereigns in the context of a long-only, risk-aware and liquidity-aware portfolio.

To build a long-only portfolio, we first start with the constituents of the EMBI Global index described in the earlier section on emerging market bonds. At the start of each month, we first apply a variety of filters to retain only a subset of bonds that we deem to be sufficiently liquid. Our liquidity filters span multiple measures including expected trading volumes and quoted bid–ask spreads. Bonds passing these filters are typically larger in size, have tighter bid–ask spreads, have less-concentrated holdings, have more and higher-quality pricing sources, and have higher expected volumes as reported by Bloomberg. The typical universe of USD bonds that remain after these liquidity filters is about

EXHIBIT 7

Performance of Long-Only Systematic Investment Portfolios in EM Bond Universe

	Hypothetical Long-Only Portfolio	EMBI Global Benchmark	Active Returns
Average	8.4%	5.8%	2.5%
Std. Dev.	7.9%	8.0%	1.5%
SR or IR	1.06	0.73	1.68
Skewness	-1.69	-2.24	0.57
Kurtosis	10.99	14.75	0.77

Notes: This exhibit summarizes the performance of a long-only hypothetical portfolio that explicitly targets exposure to a weighted combination of the four systematic investment themes (carry, defensive, momentum, and value). Returns are in excess of US 3-month T-Bill returns. Measures for the investment themes are described in earlier tables. Each month we identify a liquid subset of constituents of the J. P. Morgan Emerging Markets Bond Global Index (EMBI Global). Liquidity filters span multiple measures including trading volumes and quoted bid-ask spreads. Each liquid bond is scored based on the carry, defensive, momentum, and value measures. We incorporate both country-level and maturity views in the portfolio. Country-level views are expressed by weighting liquid bonds linked to an emerging sovereign inversely proportional to their spread duration. Maturity views are expressed by first defining a country-specific steepener that is spread-duration neutral within each country. We then form a 70/30 combination of country level and maturity views. These scores are then used to form beta-neutral views, and, the final portfolio targets around 2% tracking error to the EMBI Global index. The hypothetical portfolio also subtracts an estimate of transaction costs.

(70%) 30% of the issuers (issues) contained in the EMBI Global Index. The typical liquid bond is about 15% larger and has a bid-ask spread about 20% tighter than the typical bond in the index.

In contrast to our CDS long-short portfolios, we have an additional dimension to take active risk when trading EM bonds. The only consistently liquid CDS contract is the five-year contract, which meant that we could only compare emerging countries relative to each other and we did not have the ability to express views along the maturity dimension. With our long-only EM bond portfolio, we have enough liquidity to include multiple bonds for each emerging sovereign entity, allowing us to incorporate both country-level and maturity views. Prior research has shown that security selection can span both the level and slope of fixed-income securities to better extract available investment opportunities (see e.g., Brooks and Moskowitz 2019). To do this, we start with a combined score for each liquid bond and then aggregate (roll-up) these

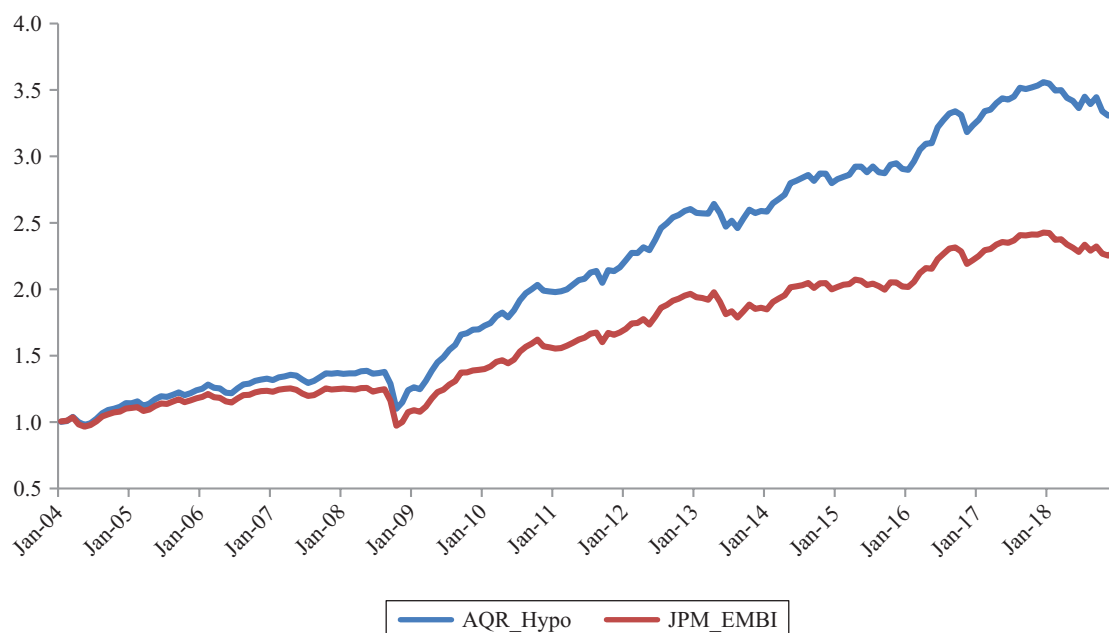
scores to form an aggregate asset. We have two types of aggregate assets, one for country and one for maturity. For country-level views, we roll-up across multiple issues proportional to the inverse of spread duration. For example, if an issuer has three bonds with spread duration of 2, 5, and 7, the weights for the country asset would be 59%, 24%, and 17%, respectively. If there are liquid bonds linked to either sovereign or quasi-sovereign entities within the same country, we keep both types of bonds. For emerging countries that have at least two liquid bonds, we are also able to form maturity views, for which we can define a country-specific steepener that is spread-duration neutral for each country. We then assign an overall score that is a weighted combination of country level (70%) and maturity (30%) views. These weights are selected as, similar to other fixed-income assets, the first principal component of return variation (level shifts in credit spreads) explains the majority of credit excess returns, and in an unlevered long-only portfolio it is difficult to fully capture slope and curvature dislocations. Similar to the long-short CDS portfolios described in the section on long-short CDS portfolios, we convert these scores to a market-neutral view and target around 2% tracking error relative to the EMBI Global index. As a final step, the hypothetical portfolio also subtracts an estimate of transaction costs.

Exhibit 7 summarizes the performance of this hypothetical long-only portfolio relative to the EMBI Global Index (benchmark). Exhibit 8 reports the cumulative returns for the hypothetical long-only portfolio and the benchmark separately. The systematic long-only portfolio generates an annualized return of 8.4% relative to 5.8% for the benchmark with a very similar level of volatility. The information ratio (IR) is around 1.7 (again noting this is after an estimate of transaction costs). The IR of our long-only portfolio is higher than the IR of our long-short portfolio. At first glance this seems unusual, but the difference is primarily attributable to (i) a larger cross section (we have over 40 emerging issuers in our long-only universe and about 25 emerging entities in our long-short universe, as discussed in Exhibits 3 and 4) and (ii) our ability to express views along the country and maturity dimension in our long-only portfolio and only the country dimension for our long-short portfolio.

It is also interesting to note that the excess of benchmark (active) return has more muted tails, especially

EXHIBIT 8

Performance of Long-Only Systematic Investment Portfolios in EM Bond Universe



Notes: This exhibit shows the cumulative performance of a long-only hypothetical portfolio that explicitly targets exposure to a weighted combination of the four systematic investment themes (carry, defensive, momentum, and value). Measures for the investment themes are described in earlier tables. Each month we identify a liquid subset of constituents of the J. P. Morgan Emerging Markets Bond Global Index (EMBI Global). Liquidity filters span multiple measures including trading volumes and quoted bid-ask spreads. We incorporate both country-level and maturity views in the portfolio. Country-level views are expressed by first selecting weights across all liquid bonds for a given emerging entity (weights are selected to ensure spread duration is equal across different sections of the curve), and we then rank each country based on a combined across investment themes. Maturity views are expressed by first defining a country specific steepener that is spread-duration neutral within each country. Individual bonds are then assigned scores based on a combination of country level and maturity views. These scores are then used to form beta-neutral views, and, as a final step, an asset-by-asset variance-covariance matrix scales positions to target around 2% tracking error to the EMBI Global index. The hypothetical portfolio also subtracts an estimate of transaction costs.

relative to the left-tail embedded in the benchmark itself. This is a deliberate feature of the beta-neutral implementation incorporated into the portfolio. A full-sample regression of the long-only portfolio excess of US 3-month T-bill returns onto the EMBI index excess of US 3-month T-bill returns reveals an intercept of 0.0023 with a slope coefficient of -0.03 . This is equivalent to an annualized alpha of 2.75%, slightly higher than the active returns reported in Exhibit 7, as the EM markets generated a positive return over our sample period and the long-only portfolio was marginally short that traditional market risk premium. As we show in the next section, careful attention to portfolio construction can remove, or mitigate, exposures of portfolio excess of benchmark returns to either traditional market risk premia or to other macroeconomic state variables.

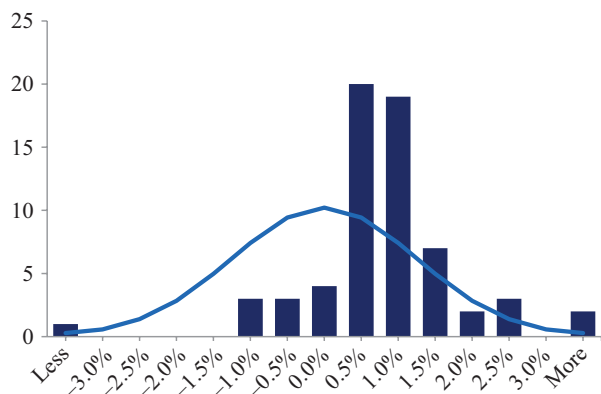
Active EM Bond Managers

Our final analysis is to examine the excess of benchmark returns for a broad set of EM bond funds. The sample selection criteria are described in detail in the prior section on measuring systematic investment themes for emerging market debt. We conduct two sets of analyses for the 64 EM bond funds that meet our selection criteria. First, we document whether EM bond funds, both individually and in aggregate, beat the benchmark. Recent research has shown that various classes of active managers within fixed income tend to beat their benchmarks (e.g., Brooks et al. 2019; Baz et al. 2017). Is this pattern also evident for EM bond funds? Second, we document the determinants of excess of benchmark returns, with a specific focus on whether EM bond funds have *alpha*, defined as the ability to generate positive active returns after adjusting for passive exposures

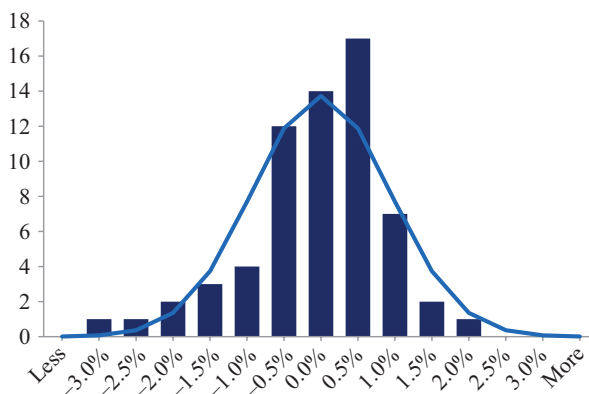
EXHIBIT 9

Distribution of Excess of Benchmark (active) Returns and Alpha across Active EM Bond Funds

Panel A: Distribution of Annualized Excess of Benchmark Returns



Panel B: Distribution of “alpha”



■ Fund Distribution — Normal (0, STD)

	Excess of Benchmark Returns			Alphas		
	Active Return	Volatility	Information Ratio	Alpha	Volatility	Information Ratio
Mean	0.8%	2.6%	0.36	0.2%	1.5%	0.18
Std. Dev	1.3%	1.3%	0.38	1.0%	0.9%	0.65
Q1	0.4%	1.8%	0.19	-0.2%	1.0%	-0.21
Q3	1.2%	3.0%	0.58	0.7%	1.7%	0.62
t-Stat	5.28			1.26		

Notes: These panels report the distribution of active EM bond fund excess of benchmark (alpha) returns in panel A (B). Returns are reported gross of fees. We start with 133 active EM bond funds that are covered in the eVestment dataset (covering both live and dead funds). We limit ourselves to funds that (i) clearly mention on the of the relevant J. P. Morgan EMBI indices as their benchmark EMBI (Global Diversified, EMBI Global or EMBI Global+), (ii) have at least 5 years of monthly return observations, and (iii) have USD share classes. This leaves us with a set of 64 active EM bond funds that represent 75% of the total assets managed within the EM universe covered by eVestment. Alphas are estimated by regressions to remove passive exposures to traditional market risk premia. We do this individually for each fund using a full sample regression of quarterly non-overlapping excess of benchmark returns onto (i) the credit excess returns of the Bloomberg-Barclays Emerging Markets Corporate index (EM CORP), and (ii) the excess of cash returns of the J. P. Morgan Government Bond Index—Emerging Markets, GBI-EM, (EM-LOCAL). The annualized intercept from this regression is alpha. The line in each figure shows a normal distribution with mean 0 and standard deviation equal to that of the respective return distribution. The table on the bottom shows the full-sample distribution of the relevant return metrics.

to traditional risk premia. Recent research has documented a pervasive behavior of active FI managers to seek returns outside of their stated benchmarks through exposure to higher-yielding and riskier credit sensitive assets (see e.g., Brooks et al. 2019; Baz et al. 2017). Third, we document the macroeconomic sensitivity of EM bond funds. If their excess of benchmark returns contains nontrivial exposure to traditional market risk premia, it is likely that the excess of benchmark return will also inherit potentially undesirable macroeconomic sensitivities. As a point of contrast, we also assess the

alpha and macroeconomic sensitivity of the hypothetical systematic long-only portfolio described in the section on long-only bond portfolios.

Panel A of Exhibit 9 reports the distribution of annualized excess of benchmark returns for our 64 EM bond funds. The superimposed line shows a normal distribution with mean zero and standard deviation equal to that of the sample’s annualized excess of benchmark returns. The probability mass of this distribution is clearly to the right of zero. The average EM bond fund has (i) an annualized excess of benchmark return of 80

basis points, (ii) a tracking error of 2.6%, and (iii) an information ratio of 0.36. The interquartile range of IR is between 0.19 and 0.58, and a t -statistic of 5.28 strongly rejects the null hypothesis that excess of benchmark returns for EM bond funds is equal to zero. Similar to previous research examining active fixed-income managers, we find that the majority of active EM bond funds beat their respective benchmarks.

To assess whether the positive excess of benchmark returns is, indeed, alpha, we regress excess-of-benchmark returns onto a contemporaneous measure of traditional market risk premia relevant for EM bonds. We do this individually for each fund, using the entire return time series for that fund. The explanatory variables are (i) the credit excess returns for the Bloomberg-Barclays Emerging Markets Corporate index (EM-CORP) and (ii) the excess of US cash returns for the J. P. Morgan Government Bond Index—Emerging Markets, GBI-EM, (EM-LOCAL). We use the Bloomberg-Barclays index for EM corporates because we require duration-adjusted credit returns that we do not have access to from J. P. Morgan. The annualized intercept from this regression is alpha, which we report in panel B of Exhibit 9.

Our reported regression results are estimated using nonoverlapping three-month windows. This choice is deliberate to help mitigate concerns of potential staleness in reported fund returns that may dampen any measured correlations or volatilities. In unreported analysis, we have repeated our regression analyses using two alternative approaches. First, we use monthly return observations and include two lags of our independent variables. This approach has the benefit of allowing differential loadings across contemporaneous and lagged returns. Second, we use overlapping three-monthly returns and explicitly account for potential dependence introduced by that repeated sampling choice. Our inferences are unaffected by these alternative regression choices, and we choose to report the simplest method.

For the sake of brevity, we describe some high-level details of the regression results across the set of 64 EM bond funds. The average (interquartile range) adjusted R^2 is 39% (24% to 58%), suggesting that a significant fraction of excess of benchmark returns can be explained by passive exposure to traditional market risk premia. The average loading on EM-CORP (EM-LOCAL) across the 64 funds is 0.13 (0.04) and 53 (48) out of 64 EM bonds funds have positive exposure to EM-CORP (EM-LOCAL), respectively. Panel B of

Exhibit 9 reports the annualized alphas for our 64 EM bond funds. The superimposed line shows a normal distribution with mean 0 and standard deviation equal to that of the sample's annualized alpha. A standard t -statistic for the null hypothesis that the alpha is equal to zero is 0.62 (0.28) for an equal-weighted composite across the 64 EM bond funds (for the average individual EM bond fund). The distribution has clearly shifted to the left, and the average EM bond fund has (i) an annualized alpha of 20 basis points, (ii) a standard deviation of 1.5%, and (iii) an information ratio of 0.18. The interquartile range of IR across the 64 funds is -0.21 to 0.62. The alphas are about 75% lower than the excess of benchmark returns and are not significantly different from zero (reported t -statistic of 1.26). The clear takeaway from Exhibit 9 is that most of the active returns can be explained by passive exposure to traditional market risk premia.

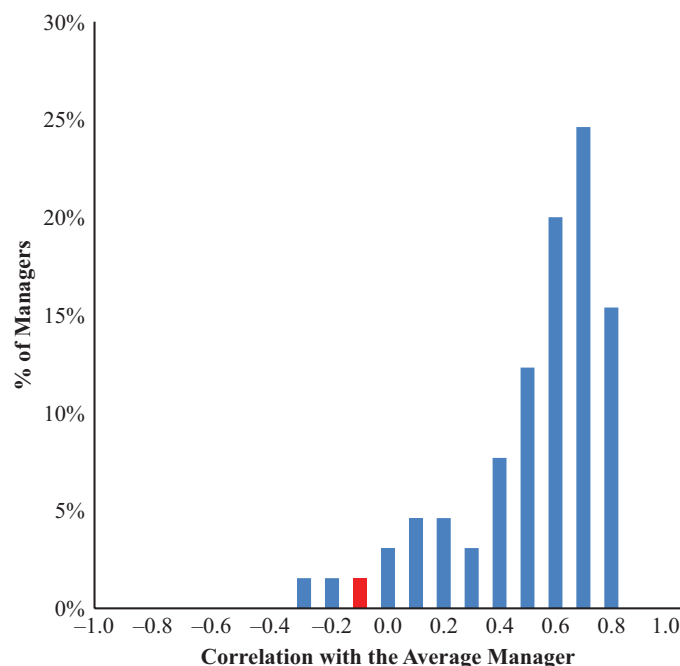
The commonality in the positive association between excess of benchmark returns and traditional market risk premia is perhaps more clearly shown in Exhibit 10. Panel B of Exhibit 10 reports the distribution of full-sample contemporaneous correlation between excess of benchmark returns and EM traditional market risk premia across the set of 64 active EM managers. EM traditional risk premia is calculated as a 50/50 blend of (i) the credit excess returns of the Bloomberg-Barclays Emerging Markets Corporate index (EM-CORP) and (ii) the excess of cash returns of the J. P. Morgan Government Bond Index—Emerging Markets, GBI-EM, (EM-LOCAL). Returns are measured over quarterly nonoverlapping windows. The average correlation in panel B of Exhibit 10 is 0.36; consistent with the analysis shown in Exhibit 9, there is a strong association between excess of benchmark returns and traditional market risk premia. A consequence of this hidden beta across EM bond funds is shown in panel A of Exhibit 10, which reports the distribution of correlations between each EM bond fund excess of benchmark return and the contemporaneous equal-weighted average excess of benchmark returns across the set of 64 EM bond funds. The average correlation is 0.52, which suggests that the commonality in hidden beta reduces the potential diversification benefit of allocating across multiple EM bond funds.

As a point of contrast, we highlight (in red) the relevant bin where the hypothetical systematic long-only portfolio would reside. The potential diversification benefits from a systematic approach become readily

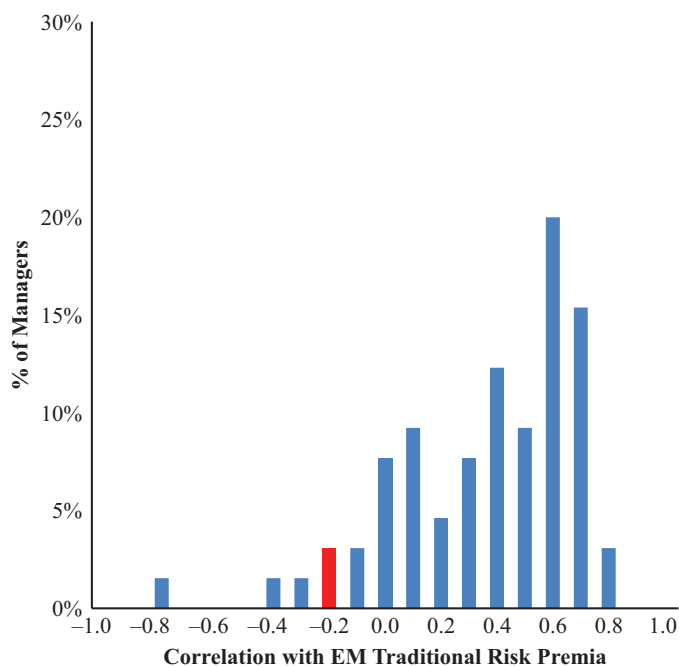
EXHIBIT 10

Correlation of Active EM Manager Excess of Benchmark Returns with Traditional Market Risk Premia

Panel A: Correlation of Active Returns across Managers



Panel B: Correlation of Active Returns with EM Risk Premia



Notes: These frequency histograms report the full-sample contemporaneous correlation between excess of benchmark returns and EM traditional market risk premia across the set of 64 active EM managers. Returns are reported gross of fees. We start with 133 active EM bond funds that are covered in the eVestment dataset (covering both live and dead funds). We limit ourselves to funds that (i) clearly mention on the of the relevant J. P. Morgan EMBI indices as their benchmark EMBI (Global Diversified, EMBI Global or EMBI Global+), (ii) have at least 5 years of monthly return observations, and (iii) have USD share classes. This leaves us with a set of 64 active EM bond funds that represent 75% of the total assets managed within the EM universe covered by eVestment. EM traditional risk premia is calculated as a 50/50 blend of (i) the credit excess returns of the Bloomberg-Barclays Emerging Markets Corporate index (EM CORP), and (ii) the excess of cash returns of the J. P. Morgan Government Bond Index—Emerging Markets, GBI-EM, (EM-LOCAL). Our sample covers funds for the period 2004–2018. Returns are measured over quarterly non-overlapping windows. The figure on the left shows correlations of each fund's excess of benchmark returns with the equal-weighted average excess of benchmark returns across the set of 64 active EM managers. The figure on the right shows correlations of each fund's excess of benchmark returns with the EM traditional risk premia defined herein. The highlighted red bar is where the hypothetical long-only portfolio targeting exposure to systematic investment themes (carry, defensive, momentum, and value) resides.

apparent. First, the excess of benchmark return is not positively correlated with EM traditional risk premia (the correlation is -0.18). Second, the systematic long-only portfolio is very lowly correlated with other EM bond funds (correlation is -0.06). Like what previous research has suggested in the context of active credit managers (e.g., Palhares and Richardson 2019), a well-implemented systematic approach may provide powerful diversification benefits to an overall EM allocation.

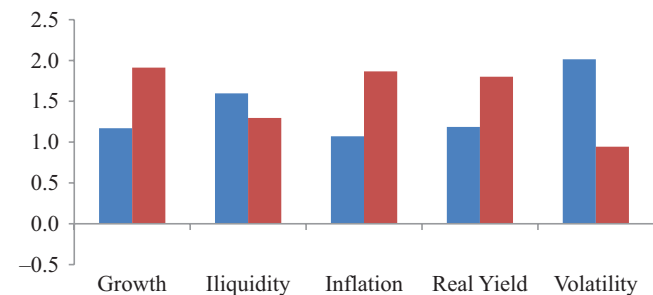
An alternative way to assess the potential diversification benefit from a systematic investment approach is to assess whether the excess of benchmark returns exhibit any macroeconomic sensitivity. Our priors are

that any macroeconomic sensitivity should be small, as the excess of benchmark return is designed to be market neutral. We use five measures to capture the macroeconomic environment. Each is measured in changes to capture shocks to the underlying macroeconomic variable. Δ GROWTH is the quarterly revision in one-year ahead real US gross domestic product growth forecast as captured by Consensus Economics. Δ INFLATION is the quarterly revision in one-year ahead US Consumer Price Inflation forecasts as captured by Consensus Economics. Δ REAL_YIELD is the quarterly change in the real 10-year bond yield measured as the difference between the yield on the 10-year benchmark bond

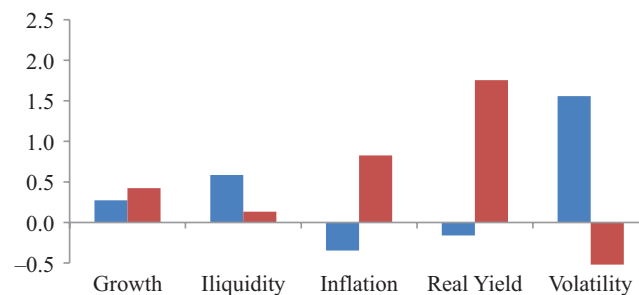
EXHIBIT 11

Macroeconomic Exposures of Active EM Bond Manager Returns

Panel A: Hypothetical Systematic Portfolio



Panel B: Equal-Weighted Average of Active EM Bond Funds



■ Decreasing ■ Increasing

Notes: This exhibit shows information ratios for active EM strategies across different macroeconomic environments. We consider an equal-weighted composite excess of benchmark returns across 64 active EM bond managers (sample selection described in earlier figures). We also consider a hypothetical long-only portfolio targeting exposure to systematic investment themes (carry, defensive, momentum, and value) described in Exhibit 7. We split the full time period from 2004–2018 into up and down periods based on changes in five key macroeconomic variables. Each is measured in changes to capture shocks to the underlying macroeconomic variable. Δ GROWTH is the quarterly revision in one-year ahead real US gross domestic product growth forecast as captured by Consensus Economics. Δ INFLATION is the quarterly revision in one-year ahead US Consumer Price Inflation forecasts as captured by Consensus Economics. Δ REAL_YIELD is the quarterly change in the real 10-year bond yield measured as the difference between the yield on the 10-year benchmark bond from Bloomberg and the 10-year inflation expectation from Consensus Economics (measured at the start of the quarter). Δ VOLATILITY is the average of quarterly percentage changes in bond (MOVE) and equity (VIX) volatility indices. Δ ILLIQUIDITY is the quarterly change in the TED spread (the spread between 3-month T-Bill rates and the London Interbank Offered Rate). The figure on the left (right) is for the hypothetical systematic portfolio (equal-weighted average across 64 active EM bond funds).

from Bloomberg and the 10-year inflation expectation from Consensus Economics (measured at the start of the quarter). Δ VOLATILITY is the average of quarterly percentage changes in bond (MOVE) and equity (VIX) volatility indices. Δ ILLIQUIDITY is the quarterly change in the TED spread (the spread between 3-month T-bill rates and the London Interbank Offered Rate).

Exhibit 11 reports the simplest exercise to assess macroeconomic sensitivity. Using nonoverlapping three-monthly periods from 2004–2018, we group the 60 quarterly periods into *up* versus *down* across the five measures. We then report the Sharpe ratios for the respective EM strategy across those two subperiods. Panel A (B) of Exhibit 11 reports results for the hypothetical systematic long-only portfolio (an equal-weighted composite across the 64 individual EM bond funds). Risk-adjusted returns are essentially flat for the systematic portfolio across macroeconomic environments (unreported *t*-statistics fail to reject the null hypothesis of return equality across up and down periods). In contrast, panel B shows clear evidence of macroeconomic sensitivity for the set of 64 EM bonds funds, especially for changes in real yield and changes in volatility (unreported *t*-statistics reveal

returns are different across up and down periods for these two partitions). Discretionary EM bond funds tend to outperform in periods of rising real yields (at least during the 2004–2018 time period) and underperform during periods of heightened volatility.

An alternative way to assess macroeconomic sensitivity is via regressions. Using the full sample of non-overlapping three-month returns, we regress excess of benchmark returns onto contemporaneous continuous measures of our five macroeconomic variables. Exhibit 12 reports regression results averaged across the set of 64 EM bond funds, as well as for the systematic long-only portfolio. We do not report the intercept, as it is not interpretable as alpha because the included explanatory variables are not tradable portfolios. Our focus is the magnitude and significance of the regression coefficients that directly quantify macroeconomic exposures.

Across the set of 64 EM bond funds, there is a consistently positive exposure to (i) changes in inflation expectations and (ii) changes in real yield; and a consistently negative exposure to changes in volatility. The positive sensitivity to changes in growth expectations and changes in illiquidity is only evident in the simple

EXHIBIT 12

Macroeconomic Exposures of Active EM Bond Manager Returns

Variable	Average across 64 Active EM Bond Managers		Systematic Portfolio	
Δ GROWTH	0.0061 (4.63)		0.0012 (1.17)	0.0001 (0.02)
Δ INFLATION	0.0069 (5.12)		0.0034 (3.50)	-0.0021 (-0.79)
Δ REAL_YIELD		0.0085 (8.53)	0.0045 (6.09)	0.0009 (0.42)
Δ VOLATILITY		-0.0155 (-8.48)	-0.0147 (-6.62)	0.0027 (0.60)
Δ ILLIQUIDITY			-0.0001 (-0.09)	0.0038 (2.28)
				-0.0076 (-2.83)

Notes: This exhibit reports regression results for active EM bond manager returns. Our sample covers the 64 active EM bond managers described in earlier exhibits. We have five measures designed to capture key macroeconomic sensitivities. Each is measured in changes to capture shocks to the underlying macroeconomic variable. Δ GROWTH is the monthly revision in one-year ahead real US gross domestic product growth forecast as captured by Consensus Economics. Δ INFLATION is the monthly revision in one-year ahead US Consumer Price Inflation forecasts as captured by Consensus Economics. Δ REAL_YIELD is the monthly change in the real 10-year bond yield measured as the difference between the yield on the 10-year benchmark bond from Bloomberg and the 10-year inflation expectation from Consensus Economics (measured at the start of the quarter). Δ VOLATILITY is the average of monthly percentage changes in bond (MOVE) and equity (VIX) volatility indices. Δ ILLIQUIDITY is the monthly change in the TED spread (the spread between 3-month T-Bill rates and the London Interbank Offered Rate). Regressions are run individually for each manager using non-overlapping quarterly observations over the time period 2004–2018. We report regression coefficient averages in the exhibit across individual manager regressions, with Fama–Macbeth t -statistics in parentheses. We also report regression results for the hypothetical long-only portfolio targeting exposure to systematic investment themes (carry, defensive, momentum, and value) described in Exhibit 7.

(multiple) regression specification, respectively. The final column in Exhibit 12 reports the multiple regression specification for the systematic long-only portfolio, and consistent with the prior results on the diversifying nature of that portfolio's excess of benchmark returns, there is minimal macroeconomic exposure (there is only a negative sensitivity to changes in illiquidity).

CONCLUSION

We undertake a comprehensive analysis of the determinants of hard currency bonds issued by EM sovereign entities. We find strong evidence that well-known systematic investment themes such as carry, defensive, momentum, and value are associated with future credit excess returns of hard currency EM bonds. A long–short portfolio designed to capture exposure to these systematic themes generated a share ratio of 1.1, and a liquidity aware long-only portfolio generated an information ratio of 1.7 after accounting for transaction costs.

An analysis of a broad set of EM bond funds reveals that although most have a positive excess of benchmark returns, the vast majority of that can be explained by

passive exposure to traditional market risk premia (EM corporate bond credit excess returns and EM local bond total returns). We further find significant macroeconomic exposures across the set of 64 EM bond funds. In contrast, our systematic long-only portfolio has no exposure to traditional market risk premia and only minimal macroeconomic sensitivity. This suggests that there is potentially a large diversification benefit for a well-crafted systematic long-only portfolio of EM bonds.

ACKNOWLEDGMENTS

We thank Tony Gould, Antti Ilmanen, Ronen Israel and Connor Stack for helpful comments and Ing–Chea Ang for excellent data analysis on this project. The views and opinions expressed herein are those of the authors and do not necessarily reflect the views of AQR Capital Management LLC (AQR), its affiliates, or its employees. This information does not constitute an offer or solicitation of an offer, or any advice or recommendation, by AQR, to purchase any securities or other financial instruments and may not be construed as such.

REFERENCES

Asness, C., A. Ilmanen, R. Israel, and T. Moskowitz. 2015. "Investing with Style." *Journal of Investment Management* 13: 27–63.

Asness, C., T. Moskowitz, and L. Pedersen. 2013. "Value and Momentum Everywhere." *The Journal of Finance* 68: 929–985.

Baz, J., M. Devarajan, M. Hajo, and R. Mattu. 2018. "When Alpha Meets Beta: Managing Unintended Risk in Active Fixed Income." PIMCO. <https://www.pimco.com/en-us/insights/viewpoints/research/when-alpha-meets-beta-managing-unintended-risk-in-active-fixed-income>

Baz, J., R. Mattu, J. Moore, and H. Guo. 2017. "Bonds are Different: Active versus Passive Management in 12 Points." PIMCO Quantitative Research. <https://www.pimco.com/en-us/insights/viewpoints/research/bonds-are-different-active-versus-passive-management-in-12-points/>

Brooks, J., T. Gould, and S. Richardson. 2019. "Active Fixed Income Illusions." *The Journal of Fixed Income*.

Brooks, J., and T. Moskowitz. 2019. "Yield Curve Premia." Working paper. Greenwich, CT: AQR Capital Management and Yale University.

Brooks, J., D. Palhares, and S. Richardson. 2018. "Style Investing in Fixed Income." *The Journal of Portfolio Management* 44: 127–139.

Correia, M., J. Kang, and S. Richardson. 2018. "Asset Volatility." *Review of Accounting Studies* 23: 37–94.

Correia, M., S. Richardson, and I. Tuna. 2012. "Value Investing in Credit Markets." *Review of Accounting Studies* 17 (3): 572–609.

Frazzini, A., and L. H. Pedersen. 2014. "Betting Against Beta." *Journal of Financial Economics* 111: 1–25.

Houweling, P., and J. van Zundert. 2017. "Factor Investing in the Corporate Bond Market." *Financial Analysts Journal* 73: 100–115.

Israel, R., D. Palhares, and S. Richardson. 2018. "Common Factors in Corporate Bond Returns." *Journal of Investment Management* 16 (2): 17–46.

Kang, J., K. So, and T. Tziortziotis. 2019. "Embedded Bets and Better Bets: Factor Investing in Emerging Market Bonds." *Journal of Investment Management* 17: 27–46.

Koijen, R., T. Moskowitz, L. Pedersen, and E. Vrugt. 2018. "Carry." *Journal of Financial Economics* 127: 197–225.

Merton, R. 1974. "On the Pricing of Corporate Debt: The Risk Structure of Interest Rates." *The Journal of Finance* 29: 449–470.

Palhares, D., and S. Richardson. 2019. "Looking Under the Hood of Active Credit Managers." *Financial Analysts Journal*.

To order reprints of this article, please contact David Rowe at d.rowe@pageantmedia.com or 646-891-2157.

ADDITIONAL READING

Active Fixed Income Illusions

JORDAN BROOKS, TONY GOULD, AND SCOTT RICHARDSON

The Journal of Fixed Income

<https://jfi.pm-research.com/content/early/2020/03/04/jfi.2020.1.086>

ABSTRACT: Over the past 20 years, active fixed income (FI) managers have tended to deliver returns in excess of their benchmarks. This has generated a popular notion that active investing in fixed income markets is "easy." The aim here is to assess the veracity of that notion. Across a broad set of popular active FI categories, this article finds that passive exposures to traditional risk premia (especially exposure to credit risk) explain the majority of FI manager active returns. The resulting implication is that, contrary to popular belief, traditional discretionary active FI strategies offer little in the way of true alpha and that traditional active FI strategies may significantly reduce the strategic diversification benefit of FI as an asset class.

Style Investing in Fixed Income

JORDAN BROOKS, DIOGO PALHARES, AND SCOTT RICHARDSON

The Journal of Portfolio Management

<https://jpm.pm-research.com/content/44/4/127>

ABSTRACT: Style investing has become part of the investing nomenclature for equity markets. To date, despite the massive size of fixed-income markets, little research has examined the efficacy of style-based investing in fixed income. In this article, the authors summarize a common style-based framework for capturing excess returns for both government and corporate bonds. Importantly, from an investor perspective, these style-based excess returns are highly diversifying with respect to the classic risk premiums in fixed-income markets (i.e., term premium and credit risk premium) and exhibit low macroeconomic sensitivities.