Reaching for Yield by Corporate Bond Mutual Funds*

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This Version: Oct 2015

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*We thank Charles Trzcinka and seminar participants at the University of Illinois at Urbana-Champaign, University of New South Wales, University of Sydney, and Wabash River Finance Conference for helpful comments and suggestions.

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1 Introduction

In the years following the Great Recession, investors have directed unprecedented amounts towards corporate bond mutual funds. These funds' holdings of corporate bonds more than doubled between 2007 and 2013, to over 1.7 trillion dollars.[1] Some commentators have nevertheless expressed a growing concern that the recent sustained run of easy monetary policies may lead asset managers to "reach for yield."[2] Among others, Rajan (2005) and Borio and Zhu (2012) argue that low interest rates can cause investors to reach for yield. Many practitioners have also suggested that corporate bond mutual funds in particular increasingly buy bonds with higher yields than their benchmarks in order to "beat" the benchmark.[3]

In this paper, we examine reaching for yield by U.S. corporate bond mutual funds and the implications for fund investors. Despite the important role these funds play in securities markets, relatively little research has examined the holdings of bond funds compared with the vast literature on equity funds (see Christoffersen, Musto, and Wermers 2014 for a summary of the literature). One reason behind this paucity is that comprehensive data on mutual funds' corporate bond holdings and corporate bond pricing are not readily available. We seek to fill a gap in this literature by investigating the risk-taking and holdings of these funds with a focus on reaching for yield.[4] To do so, we employ unique data on the corporate bond holdings of U.S. open-ended bond mutual funds from Morningstar and corporate bond pricing data from Reuters (also known as Bridge/EJV database). Our analysis also speaks to the current debate on the effect of the unconventional monetary policies and the incentives of delegated asset managers on risk-taking in securities markets

[1] See Investment Company Institute: 2014 Investment Company Factbook and also Feroli, Kashyap, Schoenholtz, and Shin (2014).

[2] Reaching for yield, while not often defined in a precise way, broadly refers to an investor's preference for higher-yielding, and thus potentially riskier, securities. We measure reaching for yield as a portfolio consisting of bonds with higher yields relative to the universe of bonds in the same rating and maturity categories. These fund-level measures of reaching for yield are formally described in Section 2.3.

[3] See, for example, "Bond Funds Get Aggressive", The Wall Street Journal, Sep 28 2012 and "A Disappearing Act", Blackrock, May 2014.

[4] While, to our knowledge, we are the first to study reaching for yield by corporate bond funds, a few other papers also study bond funds, including Blake, Elton, and Gruber (1993), Chen, Ferson, and Peters (2010), Cici, Gibson, and Merrick (2011), Cici and Gibson (2012), Chen and Qin (2014), and Goldstein, Jiang, and Ng (2015). Preferences to reach for yield has also recently been studied among money market funds in Di Maggio and Kacperczyk (2014) and among insurance companies in Becker and Ivashina (2014).

(see, e.g., Borio and Zhu (2012) and Rajan (2013)). Corporate bond mutual funds offer a compelling setting to study these effects, given the fierce competition in this industry and strong incentives to showcase superior returns.

Our key findings can be summarized as follows. Corporate bond funds reach for yield more when the level and slope of the yield curve are low and the default spread is narrow, and thus when high-yielding investment opportunities in fixed income markets are scarcer in aggregate. Further, reaching for yield is associated with greater risk taking in other dimensions, as the funds that reach for yield also have lower levels of liquidity buffers (e.g., cash and Treasuries), they tend to hold bonds that are more illiquid, hold a greater fraction of equity, and are exposed to greater redemption risks. These funds also tend to be younger and larger. We further show that the funds that reach for yield attract larger flows and have higher returns. However, any superior raw returns that funds earn from reaching for yield can be explained by betas on common risk factors (if anything, fund alphas can even be negative after adjusting for risk). In other words, funds that reach for yield merely load on these risk factors and do not have superior bond picking skills.

We start by examining whether term structure variables predict reaching for yield by corporate bond funds. Theoretically, Feroli et al. (2014) and Acharya and Naqvi (2015) show that asset managers reach for yield when interest rates are low. But it is an open empirical question whether fund managers are actually more likely to engage in reaching for yield in low interest rate environments.[5] We find evidence that funds reach for yield to a greater extent when both the level and slope of the yield curve are low, consistent with a hypothesis whereby when interests are low, funds substitute towards relatively higher-yielding (and thus potentially riskier) bonds to enhance their yields. Furthermore, when the yield spread between BBB and AAA rated bonds (the default spread) is narrow and thus premia on corporate bonds are low, funds also reach for yield to a greater extent. In sum, corporate bond mutual funds shift towards the relatively higher-yielding securities in times when there are fewer high-yield investment opportunities in aggregate.

[5]For example, in her confirmation hearing for the Chair of the Board of Governors of the Federal Reserve System, Janet Yellen noted that there is only limited evidence that Fed policies had resulted in reaching for yield. See transcript at http://blogs.wsj.com/economics/2013/11/14/live-blog-janet-yellens-confirmation-hearing-for-fed-chair/

Even though reaching for yield could be an intended outcome of the unconventional monetary policies by encouraging investment to riskier projects (Rajan 2013), the agency problems of delegated asset managers can lead to other, unintended outcomes (Stein 2013). For example. Acharya and Naqvi (2015) theoretically show how the incentives of delegated asset managers results in over-investment in risky assets and underinvestment in safe assets under easy monetary policies. Feroli et al. (2014) show that when mutual fund managers have an incentive to boost relative performance, excessive flows to these funds can pose threat to financial stability.

Whether reaching for yield might be a concern to financial stability crucially depends on whether these funds are taking appropriate measures to prudently guard against redemption risk and runs. We thus next analyze whether funds that reach for yield also engage in greater risk-taking in other dimensions, or whether funds compensate for reaching for yield by adopting more conservative policies in liquidity management (e.g., by having higher cash holdings). Because buying relatively high-yielding securities can put funds at particular risk of large redemptions in a crisis, we may expect funds that reach for yield to have a particularly large cash buffer. In contrast, if reaching for yield is a sign of aggressive risk taking in general, we may expect these funds to have a small cash buffer and also invest in a greater fraction of other relatively riskier securities like equities. We find that funds that reach for yield tend to hold *less* cash and cash-like securities (e.g., Treasury bills), more illiquid corporate bonds, and more equities. These results hold controlling for the funds' style. We further show that funds that reach for yield more tend to be relatively younger and larger and that investment-grade (IG) funds reach for yield to a greater extent compared with high-yield (HY) funds.

An underlying reason why some funds engage in reaching for yield may be to attract flows. We thus ask whether investors direct greater flows towards the funds that reach for yield. To do so, we employ a novel decomposition of changes in reaching for yield into active and passive components. The active component is the part of changes in reaching for yield that can be attributed to a fund's portfolio choices, while the passive component is caused by bond price movements while holding the portfolio constant. When

a bond's price falls, its yield rises (and vice versa), so even if a fund makes no changes to its holdings, the yield of its portfolio can increase or decrease if the bonds held by the fund experiences price changes (and the reaching for yield measure may thus change mechanically depending on whether price changes are greater than that of benchmark returns). We find that future fund flows react positively to an increase in "active" reaching for yield. But, unsurprisingly, flows react negatively to "passive" reaching for yield, as this component is associated with suffering poor returns. These results show that funds may want to actively change portfolio holdings towards higher-yielding bonds. These results are also consistent with anecdotal evidence that many mutual fund investors consider a fund's current yield (in addition to its past performance) when they decide which funds to invest in.

Lastly, we examine the performance implications of reaching for yield.[6] In Fama-MacBeth regressions of individual mutual fund performance, we find that funds that reach for yield tend to have higher returns. Similarly, in a calendar-time portfolio approach, returns on a portfolio consisting of mutual funds in the highest reaching-for-yield tercile are higher than are those on a portfolio of funds in the lowest reaching-for-yield tercile, by around 10–15 basis points monthly. However, the superior performance achieved by funds that reach for yield is fully explained by higher risk. When we regress returns on high-minus-low reaching-for-yield portfolios on the bond-level risk factors of Fama and French (1993), alphas are all indistinguishable from zero or even negative for IG funds. These results show that superior fund returns generated by reaching for yield are due mainly to taking on more risk, rather than a result of bond-picking skills.

Our paper is closely related to recent studies on preferences for higher-yielding securities in other settings, particularly in times of easy monetary policies. In the money market fund industry, Di Maggio and Kacperczyk (2014) show that these funds take on greater risk by investing in longer-maturity and riskier asset classes in response to zero interest rate policies, even though these funds are intended to hold only safe, short-term assets

[6]The literature on mutual fund performance is vast. Studies include Brown and Goetzmann (1995), Ferson and Schadt (1996), Daniel, Grinblatt, Titman, and Wermers (1997), Wermers (2000) Chen, Hong, Huang, and Kubik (2004), Berk and Green (2004), and Kacperczyk, Sialm, and Zheng (2005) among many others.

and therefore are strictly regulated based on ratings and maturities. Becker and Ivashina (2014) show that insurance companies also tend to invest in relatively higher-yielding securities within each rating class, which is consistent with regulatory arbitrage as their capital requirements are based on ratings. Finally, Hanson and Stein (2015) document evidence of reaching for yield among commercial banks.

Unlike insurance companies, reaching for yield by corporate bond funds is unlikely to be driven by regulatory arbitrage, since these funds do not have capital requirements based on ratings. Further, although every fund's prospectus describes its overall investment strategy (e.g., that a fund will mainly invest in investment-grade bonds), these investment guidelines are not typically binding or strictly regulated as they are for money market funds. Rather, corporate bond funds have strong incentives to showcase superior returns to attract inflows.[7] If funds can beat their benchmarks by taking on more risk, and if some investors chase returns but do not properly evaluate each fund's performance on a risk-adjusted basis (Sensoy (2009) and Del Guercio and Reuter (2014)), that may provide a strong incentive to reach for yield even absent regulatory frictions.[8]

Our paper thus also contributes to the large body of literature on mutual fund incentives and risk-taking behaviors (*i.e.*, "risk-shifting"). To our knowledge we are the first paper to examine risk-shifting by corporate bond funds. For example, Brown, Harlow, and Starks (1996), Chevalier and Ellison (1997) Chen and Pennacchi (2009), and Christoffersen and Simutin (2014), among many others, show how risk taking by equity mutual funds is affected by their incentives. Goetzmann, Ingersoll, Spiegel, and Welch (2007) show how mutual funds can manipulate performance measures, and Sensoy (2009) presents evidence that funds use self-designated indices to beat benchmarks and attract more flows. A closely related paper on equity funds is by Huang, Sialm, and Zhang (2011), who use fund-level holdings data by equity mutual funds to show that excess risk-taking

[7]The body of work that documents the relation between flow and performance, includes, among many other studies, Sirri and Tufano (1998) and Chevalier and Ellison (1997).

[8]While much research has shown that equity funds on average do not beat a passive index, a study by Morningstar suggested that a majority of corporate bond funds beat their index in large part by investing outside their benchmarks (see Wall Street Journal, Sept. 12 2012, "Funds Leap Beyond Their Benchmarks").

by these funds has a negative impact on their performance.[9]. Similarly, Kacperczyk and Schnabl (2013) examine the relation between risk taking by money market funds and their flows during the financial crisis.

2 Data and Variable Construction

To examine reaching for yield by corporate bond mutual funds, we combine multiple datasets, including (i) CRSP for mutual fund characteristics and returns, (ii) Morningstar for detailed holdings data of these funds, including their holdings of corporate bonds, (iii) the Fixed Income Securities Database (FISD) from Mergent for bond characteristics data (e.g., ratings), and (iv) the Bridge EJV database (more recently known as Thomson Reuters Pricing Service) and TRACE for corporate bond prices and yields.

2.1 Mutual Fund and Holdings Data

We start with a sample of bond funds from the CRSP Survivor-Bias-Free Mutual Fund Database. Because this paper focuses on funds that invest in corporate bonds, we first limit the sample to only funds classified as either corporate bond funds or general funds based on their CRSP fund style.[10] We obtain monthly returns and net asset values (NAV), as well as quarterly data on turnover, expense ratios, fund age, and other fund characteristics from the CRSP database.

We then merge the CRSP fund data with bond holdings data which are obtained from Morningstar spanning the period from 2002 to 2012. The Morningstar database provides holdings of U.S. open-end taxable fixed-income funds at a quarterly frequency. From Morningstar, we obtain information on bond identifiers (bond CUSIP) and the number

[9]Cremers and Petäjistö (2009), among others, also study risk taking using holdings-level data among equity funds.

[10]Specifically, we limit the sample of funds to CRSP style categories I, ICQH, ICQM, ICQY, ICDI, ICDS, or IC. After we match all funds' holdings to FISD, we also further limit the sample to funds that at least at one point during the sample period held a bond identifiable as a corporate bond in FISD. In some tests, we will further limit the sample to funds whose holdings predominantly consist of corporate bonds (over 75%).

of each bond held, as well as data on other securities held by the fund such as Treasuries and equities. This database includes both surviving and dead funds.

Our main analysis is performed at the fund level, so if the same portfolio is held by several share classes, all fund-level characteristics (e.g., age) are calculated as the asset-weighted average of these characteristics across all share classes that belong to the same fund. The merged sample consists of around 24,000 fund-quarters covering the period from January 2002 through June 2012.[11]

2.2 Corporate Bond Data

We next merge these holdings data with detailed bond characteristics data from the Fixed Income Security Database (FISD) from Mergent. FISD is a comprehensive database for corporate bond issues, providing detailed data on issuers (e.g., industry) and issue characteristics (ratings, terms and conditions, etc).

We obtain bond pricing and yield data as well as historical amounts outstanding from the Thomson Reuters Fixed Income Database. The database contains daily bid quotes provided by major dealers in corporate bond markets. The database is fairly comprehensive, covering most corporate bonds held by mutual funds in the merged database. A potential issue with pricing data based on dealer quotes is price staleness. In our paper, however, we only employ quarterly yield data, which mitigates a possible concern about price staleness at higher frequencies. For example, Choi and Richardson (2015) and Choi (2013) show that corporate bond prices in the Thomson Reuters database do not exhibit significant price staleness over a one-month horizon and that Thomson Reuters prices follow transaction-based prices quite well.[12] If pricing data from Reuters are missing for a bond, we instead use pricing data from TRACE if available.

[11]The principal limitation on our sample period is imposed by the Morningstar bond holdings data, which only starts in 2002.

[12]This database is commonly used in the financial industry for pricing bonds, and used by many major Wall Street firms for marking their books.

2.3 Measures of Reaching for Yield

We next describe how we calculate the extent to which each fund engages in reaching for yield. First, for each fund-quarter, we calculate the value-weighted average (across all corporate bonds held by a fund) of the deviation of a bond's yield in the fund's holding from the average yield of all outstanding corporate bonds. We call this average deviation measure the "total" reaching for yield. Specifically, for each fund i, bond j, and quarter t we calculate

$$RFY_{i,t}^{Total} \equiv \sum_{j} w_{j,i,t}(y_{j,t} - y_t^{AGG}) \tag{1}$$

where $w_{j,i,t}$ is bond j's market weight in fund i's bond holdings, $y_{j,t}$ is the yield of bond j, and y_t^{AGG} is the average yield of all outstanding corporate bonds, weighted by their amounts outstanding.

Since not everyone can hold relatively higher-yielding bonds at the same time, our reaching-for-yield measure in (1) importantly distinguishes the relative yield of bonds held by corporate bond mutual funds compared to the universe of corporate bonds. For example, if a fund holds corporate bonds with a (value-weighted) average yield of 6%, and the average yield of all outstanding corporate bonds is 5%, our measure would define that fund's total reaching for yield measure as +1%. We can similarly also think of funds that engage in negative reaching for yield (or "playing it safe") as those that hold bonds with a lower average yield than the aggregate supply of outstanding bonds.

By doing so, the measure represents how much funds "tilt" their portfolios towards higher yields compared to other bond investors, and thus implicitly controls for any possible confounding effect coming from time-series variation in the supply of bonds (e.g., suppose more risky firms issue bonds in certain times, then all investors on average must also hold riskier holds in those times; but what we measure is whether corporate bond mutual funds tilt their portfolios more or less than other bond investors on average). We thus isolate reaching for yield by mutual funds. By design, we thus do not study the question of whether the aggregate supply of bonds might respond to the interest rate

environment (e.g., if corporate bond issuers might respond by issuing more bonds of a certain kind, as in Greenwood, Hanson, and Stein (2010))

We further decompose the total reaching-for-yield measure in (1) into three components: reaching for rating (RFR), reaching for maturity (RFM), and reaching for yield within a rating and maturity (RFY^{WRM}). Specifically, we decompose (1) as follows:

$$
\begin{aligned}
RFY_{i,t}^{Total} &\equiv \sum_j w_{j,i,t}(y_{j,t} - y_t^{AGG}) \\
&= \sum_j w_{j,i,t}\left((y_{j,t} - y_{j,t}^{R,M}) + (y_{j,t}^{R,M} - y_{j,t}^{R}) + \left(y_{j,t}^{R} - y_t^{AGG}\right)\right) \\
&= \underbrace{\sum_j w_{j,i,t}(y_{j,t}^{R} - y_t^{AGG})}_{\text{Reaching for Rating}} + \underbrace{\sum_j w_{j,i,t}(y_{j,t}^{R,M} - y_{j,t}^{R})}_{\text{Reaching for Maturity}} + \underbrace{\sum_j w_{j,i,t}(y_{j,t} - y_{j,t}^{R,M})}_{\text{RFY within Rating and Maturity}} \\
&\equiv RFR_{i,t} + RFM_{i,t} + RFY_{i,t}^{WRM} \qquad (2)
\end{aligned}
$$

where $y_{j,t}^{R}$ is the weighted average yield of all corporate bonds with the same rating notch as bond j and $y_{j,t}^{R,M}$ is the weighted average yield of all corporate bonds with the same rating notch and maturity bucket (we use five buckets for maturity: <3 years, 3-5 years, 5-7 years, 7-10 years, and >10 years) as bond j, and weights are determined by amounts outstanding.[13] Because we principally use the bid prices from Thomson Reuters to calculate yields, all yields will generally be higher than those implied by average transaction prices. However, because our reaching-for-yield measures are defined as deviations of a bond's yield from the yield of other matched bonds from the same data source, any possible bias due to bid-ask spreads will on average be cancelled out.[14]

Equation (2) thus illustrates three dimensions in which funds can reach for yield: reaching for rating ($RFR_{i,t}$), reaching for maturity ($RFM_{i,t}$), and reaching for yield within

[13]We limit the sample of bonds to all corporate bonds in FISD when constructing the benchmark yield. In other words, we compare each bond yield to bonds within the same universe. As a consequence, this measure captures only reaching for yield among these corporate bonds, and does not capture the risk and yield characteristics of any potential structured bonds, equity holdings, etc.

[14]For example, suppose bid-ask spreads are wider for lower-rated bonds, then the measured yield using bid prices would overstate the actual yields more so for these bonds, but that would not affect the RFY measures because we subtract rating-matched yields that on average would have the same bias between bids and actual prices.

rating and maturity ($RFY_{i,t}^{WRM}$). Bond yields are strongly correlated with both ratings and maturity, and thus a high total reaching-for-yield measure might simply capture that a fund holds lower-rated or longer-maturity bonds. The first component, reaching for rating, captures the higher yield that can be attributed to holding bonds with lower ratings. Naturally, we would expect this measure to be higher for high-yield bond funds than investment-grade funds. The second component, reaching for maturity, captures the yield that can be attributed to holding longer-maturity bonds (keeping the average rating constant). Typically, yields on longer maturity bonds are higher due to term premia. The third component captures investing in bonds with relatively higher yields within a given rating-and-maturity category ($RFY_{i,t}^{WRM}$). Separating out this third dimension from the other two is particularly important, as the investment mandate of corporate bond mutual funds are typically (although loosely) based on credit ratings and maturities. Funds' average rating and the average maturity of their holdings are often reported directly as part of quarterly reports and prospectus. Thus, reaching for yield in the third dimension, $RFY_{i,t}^{WRM}$, is more difficult to observe from quarterly reports and funds have more leeway to freely engage in reaching for yield along this dimension.

2.4 Measures for Active vs. Passive Reaching for Yield

Yields of funds' bond holdings may change not only due to funds' active portfolio choices but also as a result of past performance. Even if a fund makes no changes to its portfolio, its measured reaching for yield will increase if its portfolio suffers poor returns (as bond prices and yields move in opposite direction), and conversely, the fund will appear to reach for yield less if it experiences high returns. To distinguish between a fund's active portfolio choices towards more reaching for yield from the passive effect of past returns on bond yields, we decompose the change in reaching for yield ($\Delta RFY_{i,t}$) into the following

components ($\Delta RFY1_{i,t}$, $\Delta RFY2_{i,t}$, and $\Delta RFY3_{i,t}$):

$$\begin{aligned}
\Delta RFY_{i,t}^{Total} \equiv & \sum_j \Delta \left(w_{j,i,t}(y_{j,t} - y_t^{AGG}) \right) \\
= & \underbrace{\sum_j (\Delta w_{j,i,t}) (y_{j,t-1} - y_t^{AGG})}_{\text{Reaching for Higher Yield}} + \underbrace{\sum_j w_{j,i,t-1} \Delta (y_{j,t} - y_t^{AGG})}_{\text{Poor Returns}} \\
& + \underbrace{\sum_j (\Delta w_{j,i,t}) \Delta (y_{j,t} - y_t^{AGG})}_{\text{Doubling Down/Locking-in Gains}} \\
\equiv & \Delta RFY1_{i,t} + \Delta RFY2_{i,t} + \Delta RFY3_{i,t} \qquad (3)
\end{aligned}$$

The first component, $\Delta RFY1_{i,t}$, captures funds' active change in portfolio holdings towards bonds with relatively high yields ("reaching for higher yield"). The second component, $\Delta RFY2_{i,t}$, is the mechanical change in reaching for yield driven by price changes ("poor returns"): If a fund's holdings suffer relatively poorer returns than the benchmark and the fund continues to hold these bonds, the bonds' yield as well as the fund's reaching-for-yield measure mechanically increases, and vice versa. The third component, $\Delta RFY3_{i,t}$, is the interaction of portfolio changes and yields ("doubling down/locking-in gains"). This component is positive when a fund acts in a contrarian fashion by increasing portfolio weights in bonds that have become less expensive compared with the benchmark, or when a fund reduces the weight in bonds that have become more expensive relative to the benchmark (conversely, the third component is negative if funds sell recent losers or buy recent winners). It is important to decompose the change in reaching for yield into these components particularly to isolate the $\Delta RFY2_{i,t}$: This component is caused mechanically as fund holdings experience negative returns (low returns causes future higher yields). On the other hand, $\Delta RFY1_{i,t}$ is driven by a fund's active change in risk-taking towards bonds with higher or lower yields relative to their benchmarks.

2.5 Summary Statistics

Table 1 presents summary statistics. We report fund-level characteristics after aggregating share class level characteristics, weighted by assets. In Panel A, the average assets across the fund-quarters in our sample is $2.3 billion (median $427 million), average flow is 4%, and average turnover 150%. The mean expense ratio is 0.85% . Funds have an average age of around 11 years with an average manager tenure of 6.6 years.

Panel A further reports statistics on the holdings for these funds. The funds in our sample on average invest 41.9% (median 34.2%) of their assets in corporate bonds. Given that our sample funds are all categorized as corporate bond funds (plus the general fixed income category "I" in CRSP), it is surprising that on average these funds invest less than 50% of their assets in corporate bonds. This result is likely due to the fact that mutual funds' investment mandates are quite loose and thus corporate bond funds are not prohibited from holding many other types of assets. Among corporate bond holdings, the average rating is BBB (equivalent to 13 on the numerical rating scale between 1 and 21), the average remaining time-to-maturity is just over 7 years, and the average yield is 6.27%. In terms of liquidity, these corporate bonds trade on average 12.75 days per month.

Panel A also shows that the funds in our sample on average exhibit negative reaching for yield (both total and within-rating-and-maturity). That is, corporate bond funds on average do not hold higher-yielding securities than the universe of bonds in the same rating and maturity category. There is nevertheless wide dispersion in the degrees of reaching for yield, as shown by the interquartile range of -1.61 to 1.26 for total reaching for yield and -0.39 and 0.03 for within-rating-maturity reaching for yield. Thus, some funds are very conservative (*i.e.*, "play it safe"), whereas other funds strongly reach for yield. In Section 3, we will further investigate the extent to which funds reach for yield (or play it safe) in both the time series and the cross section.

In Panel B, we compare fund-level statistics between investment grade (IG) and high yield (HY) funds, with a split based on the fund's Lipper style.[15] Notably, HY funds re-

[15]IG funds are classified as those with style codes A, BBB, IID, SII, SID, and USO in the CRSP mutual fund database; HY funds as those with style codes HY, GB, FLX, MSI, and SFI.

ceived greater flows during the sample period as the popularity of these funds has grown. The fraction of the fund held in corporate bond is also much higher among HY funds compared to IG funds: HY funds invest on average more than 65% of their assets in corporate bonds, while IG funds invest around 31% of their assets in corporate bonds. The corporate bond holdings by HY funds are more illiquid than those of IG funds based on the average trading days statistic. Both IG and HY funds hold on average 5% of their assets in cash (or "cash-like" assets like certificates of deposits), but IG funds hold significantly more Treasury bonds. As we would expect, HY funds have a higher "total" reaching for yield, driven by investing a larger fraction of their portfolio in lower-rated securities (i.e., the "Reaching for rating" term in Equation (2)). By contrast, IG funds on average have a higher reaching for yield *within* each rating and maturity category. This result is quite intuitive as IG funds are more constrained from holding lower-rated bonds, so to the extent IG funds want to take bonds on higher yields, they need to do so while not walking down ratings.[16]

3 Reaching for Yield in Corporate Bond Mutual Funds

Delegated asset managers may have particularly strong incentives to search for higher-yielding securities in times when interest rates are low as suggested by Rajan (2005), Borio and Zhu (2012), and Rajan (2013) among many others. Feroli et al. (2014) and Acharya and Naqvi (2015) also show theoretically how asset managers incentives and preference might lead to reaching for yield. Empirically, however, whether mutual fund managers actually engage in reaching for yield in low interest rate environments is an open empirical question, as can be seen from Janet Yellen's 2013 remark that there is limited evidence that expansive policies of the Federal Reserve had resulted in reaching for yield.[17]

[16]Because the lower-rated bonds that are held by HY funds tend to be less liquid on average, we would also expect HY funds to be more worried about taking on too much liquidity risk and thus engage in less reaching for yield in terms of capturing possible liquidity risk premia if these funds are worried about having to quickly liquidate bonds in case of high outflows. By contrast, IG bonds on average tend to hold more liquid bonds with a larger base of potential buyers, and these funds may thus be less worried about suffering from a potential fire sale if faced with outflows.

[17]http://blogs.wsj.com/economics/2013/11/14/live-blog-janet-yellens-confirmation-hearing-for-fed-chair/

In this section, we first examine how reaching for yield by corporate bond funds relates to interest rates, or more generally, to the aggregate investment opportunities in bond markets. Once we document time variation in reaching for yield, we then move on to a cross-sectional variation across funds. In particular, we investigate whether funds that reach for yield appropriately manage liquidity and thus are less prone to redemption risk (*i.e*, "runs") and fire sales, since high-yielding corporate bonds can be highly illiquid. In addition, we show other cross-sectional characteristics of the funds that reach for yield, including fund size, age, and expense ratios.

3.1 Reaching for Yield over Time

An important dimension of investment opportunity sets for fixed income investors can be summarized by term structure variables. We thus investigate how reaching for yield varies with term structure variables. In particular, we regress the reaching-for-yield measures defined in (2), RFY^{Total} and RFY^{WRM}, on the level (1 year Treasury rate) and slope (30 year minus 1 year Treasury rate) of the term structure, *Level* and *Slope*, and the default spread (BBB minus AAA), Def. To aid the interpretation of the regression coefficients, all the independent variables are standardized to a mean of 0 and standard deviation of 1.

Table 2 reports results. In column (1) where we use RFY^{Total} as the measure of reaching for yield, we find that mutual funds reach for yield to a greater extent when one-year Treasury rates low. For example, a one-unit standard deviation decrease in the level of the term structure (or 1-year Treasury yield) is associated with a 27 basis point increase in the yields of funds' holdings relative to aggregate yields. The coefficient is highly statistically significant (a t-statistic of -4.85). This result is consistent with the argument that low yields predicate greater risk-taking by asset managers (e.g.,Rajan (2013), Feroli et al. (2014), and Acharya and Naqvi (2015)), and with Greenwood and Hanson (2011) who note that the compensating investment managers based on nominal absolute returns "may encourage risk shifting when interest rates are low."

In addition, we find in column (1) negative association of total reaching for yield with both the slope of the term structure (*Slope*) and the default spread on corporate bonds.

Specifically, a one-standard-deviation decrease in the slope of the term structure and the default spread is associated with 33 and 25 basis point increases in total reaching for yield, respectively. These results thus implies that, when term premia are lower or lower-rated corporate bonds become more expensive, corporate bond mutual funds shift towards buying relatively cheaper (higher-yielding) bonds. In all, the results are consistent with the notion that funds prefer to hold higher-yielding securities when investment opportunities in bond markets in general are scarce.

The results in column (2) where we use RFY^{WRM} as the measure for reaching for yield are similar overall. Funds tilt towards higher-yielding securities within each rating-and-maturity category when interest rates and spreads are low, as can be seen from the negative coefficients on the term structure variables. It may in fact generally be easier for a fund to vary the extent to which it reaches for yield within a rating and category, as doing so is typically unconstrained based on a fund's prospectus.[18]

In columns (3) through (6), we regress reaching-for-yield measures on term structure variables separately for IG and HY funds. IG funds in columns (3) and (4) show that they reach for yield, similar to the results for all funds. In column (5) for HY funds, they do not reach for yield when the slope of the yield curve or the default spread is low. However, from column (6), it is clear that HY funds do reach for yield within rating and maturity, which also highlights the importance of the decomposition of total reaching for yield.

In Figure 1, we show this result graphically by plotting the reaching-for-yield measures and aggregate corporate bond yields over time. The figure shows that high reaching for yield tends coincide with low interest rate episodes, and vice versa. In the earlier and later parts of the sample (2003-2004 and 2009-2011) mutual funds increased their holdings of relatively higher yielding corporate bonds as the Fed's monetary policies drove down interest rates. Interestingly, over the 2003-2007 period total reaching for yield kept in-

[18]Note that the results in column (1) and (2) are not driven by demand for fixed income securities by corporate bond funds. In other words, one might be concerned about "reverse causality", or that corporate bonds in aggregate could become more expensive and the default spread becomes narrower if the demand by corporate bond mutual funds for corporate bonds has an effect on prices. However, our measures of reaching for yield control for any aggregate demand effect, as these measures are defined as a yield *deviation* of mutual funds' holding from that of aggregate yields.

creasing, which might appear counterintuitive with our regression results as the short term interest rates were increasing during this time. However, during this period, the default spread was also decreasing, which is consistent with our regression results.[19] Given the low yields on high yield bonds and thus scarcer investment opportunities in "junk", mutual funds shifted their holdings towards relatively higher-yielding securities. During the financial crisis, particularly in 2008, however, the figure shows how mutual funds sharply switched their holdings into relatively lower-yielding bonds, suggesting that playing-it-safe or flight-to-quality motives become stronger when credit risk is particularly high.

In Figure 2, we further examine the large variation in reaching for yield during the financial crisis period, using the decomposition of changes in reaching for yield in Equation (3). At the peak of the financial crisis (the second half of 2008), the passive component $\Delta RFY2$, or "poor returns", spiked, which shows the relatively poor performance of corporate bond mutual funds (the bonds held by mutual funds performed relatively more poorly than benchmarks). At the same time, the third component $\Delta RFY3$, or "doubling down" decreased substantially, which implies that these mutual funds were selling distressed bonds ("fire sales") or buying recently appreciated bonds ("flight to quality"), or perhaps a combination of both of these. Towards mid-2009, as the corporate bond market calmed down, funds started "actively" increasing reaching for yield, as shown by positive values of $\Delta RFY1$, or "reaching for higher yield."

3.2 Liquidity Management vs. Risk Taking

The previous results show that funds in aggregate reach for yield when investment opportunities are scarce. As shown in Table 1, there is also a substantial variation in reaching for yield across funds. In this section, we examine reaching for yield in the cross section, in particular, by asking whether liquidity management motives and other fund characteristics including fund size, age, and expense ratio are linked to reaching for yield.

Corporate bonds are highly illiquid (Bao, Pan, and Wang (2011)) and a substantial

[19] According to the Bank of America Merrill Lynch High Yield Index available in FRED, from the 2003 to 2007 period, yields on junk bonds fell from approximately 9% to 2.41% on June 1, 2007, near a historic low.

part of bond yields can be attributed to illiquidity (e.g., Longstaff, Mithal, and Neis (2005) and Huang and Huang (2012)). Thus, funds that are engaging in more reaching for yield are also likely exposed to greater illiquidity. In the event that funds are faced with sudden large outflows (potentially fueled by sudden changes in interest rates as during the "Taper Tantrum" in May 2013), funds with low liquidity buffers and illiquid holdings face a particularly high risks of redemptions and fire sales. Liquidity management by bond funds has also receive increasing scrutiny from regulators, and the Securities and Exchange Commission (SEC) has proposed new liquidity management rules for these funds.[20]

If funds are prudent liquidity managers, then funds with high reaching for yield are likely to hold more liquidity buffers or more liquid corporate bonds. For example, we might then expect to see a positive relation between a fund's reaching for yield and its cash position. On the other hand, mutual funds are also limited in how much leverage they can take (the "130/30" rule), and reaching for yield may allow a fund to attain a higher risk profile while not using leverage. If reaching for yield is a sign of greater risk-taking, we would expect a negative relation between reaching for yield and cash. If that is the case, these funds may be particularly vulnerable to redemption risk.

By employing holdings-level data on funds' liquidity, we examine how reaching for yield is associated with liquidity. We employ various proxies for liquidity management. Our first liquidity variable is a measure of funds' liquidity buffer, constructed as cash and Treasury holdings out of total net assets using the Morningstar data. Likewise, we construct equity holdings variables for each fund-quarter. The second liquidity variable is the liquidity of funds' corporate bond holdings, calculated as the average trade days per month of corporate bonds held by each fund-quarter.[21] In addition, we also include in our regressions a measure of redemption risk, as proxied by past eight quarters' minimum flows for each fund-quarter.

We also consider the following fund characteristics that are known in the literature to

[20] http://www.sec.gov/news/pressrelease/2015-201.html

[21] We calculate the average trade days per month based on transactions in TRACE for each bond and month in the Morningstar holdings database. Because the TRACE reporting rule started covering a comprehensive universe of bonds only after Feb 2005, this data is more limited than the rest of our sample.

be related to mutual funds' risk-taking incentives (e.g., Huang et al. (2011)): Fund age, net assets, and expense ratio. For example, young funds may have strong incentives to catch up to more established funds by reaching for yield. Engaging in reaching for yield has risk features that are economically similar to selling out-of-the-money put options (see Section 4.3 for a formal analysis of risk factors), which can result in particularly significant losses if there are major systemic defaults, and young funds might be more willing to take that risk, knowing that they're not sacrificing reputational capital in such an adverse event. The effect of size is theoretically more ambiguous. On the one hand, large funds may be more worried about the risk of possible losses from reaching for yield. On the other hand, larger funds might engage in more reaching for yield if they have difficulty finding sufficiently attractive investment strategies due to decreasing returns to scale (as assumed, e.g., in Berk and Green (2004)). We control for fund style fixed effects (based on Lipper styles), as IG funds tend to reach for yield differently compared to HY funds (e.g., IG funds are on average more likely to reach for yield within a rating-and-maturity, as shown in Panel B of Table 1).

Table 3 reports the panel regression of funds' reaching for yield on liquidity variables and fund characteristics. All regressions control for fund style and year-quarter fixed effects (based on the Lipper fund style category). We find that high reaching-for-yield funds on average do not engage in prudent liquidity management. Cash/Treasury holdings are negatively related to reaching for yield, indicating that high reaching-for-yield funds hold smaller liquidity buffers. One reason could be that these funds' corporate bond holdings are actually liquid. However, we find funds' reaching for yield is actually negatively related to trade days of their holdings. These results indicate that high reaching-for-yield funds are holding illiquid corporate bonds and less liquidity buffer, a result consistent with the idea that reaching for yield is a manifestation of funds' taking on more risk. In addition, we find that high reaching-for-yield funds hold more equity, potentially to generate even higher returns, and thus also consistent with risk-shifting. A bright side of holding equity is that equity securities are generally much more liquid than corporate bonds; but few corporate bond funds hold nearly enough equity to buffer large redemption events (the

average (median) equaty holdings are 1.3% (0.1%)). Large past outflows are negatively related to reaching for yield, which also suggests that high redemption risk funds do not decrease reaching for yield. Taken together, these results show that high reaching for yield by funds is associated with excessive risk rather than prudent liquidity management.

Table 3 also shows how other fund characteristics are linked to reaching for yield. We find that young funds tend to reach for yield more, a relation that is particularly strong for HY funds. This result is consistent with the idea that young funds have stronger incentives for higher returns through taking more risk. We further find that larger funds in the cross-section are more likely to reach for yield. By contrast, we do not find a reliable link between reaching for yield and expense ratios: expense ratios are only marginally related to the degrees of reaching for yield and only for IG funds (significant at the 10% level).

4 Implications for Fund Flows and Returns

The incentives of mutual fund managers to reach for yield differ from those of other large institutional investors in corporate bond markets. In Becker and Ivashina (2014), insurance companies reach for yield to exploit regulatory arbitrage. Unlike insurance companies, mutual funds are not subject to rating-based regulation or capital requirements. Rather, mutual funds are incentivised to attract more flows by showcasing superior returns.[22] If funds can beat benchmarks simply by taking on more risk and if unsophisticated investors do not evaluate performance on a risk-adjusted basis (Sensoy (2009) and Del Guercio and Reuter (2014)), funds have strong incentives to reach for yield. Thus, we examine whether reaching-for-yield funds attract more flows and generate higher returns after risk adjustment.

4.1 Does Reaching for Yield Attract More Flows?

Bond funds regularly report the yield-to-maturity of their bond portfolios, so we ask whether investors reward funds as they increase or decrease their yields. Specifically, we

[22]The body of work that documents the relation between flow and performance, includes, among many other studies, Sirri and Tufano (1998) and Chevalier and Ellison (1997).

employ the decomposition of the change in reaching for yield into the active and passive components, as provided in Equation (3): $\Delta RFY_{i,t} \equiv \Delta RFY1_{i,t} + \Delta RFY2_{i,t} + \Delta RFY3_{i,t}$. If investors respond to funds' active changes in holdings towards higher-yielding bonds, we expect future fund flows to respond positively to the active change of reaching for yield $\Delta RFY1_{i,t}$.

We examine the extent to which future fund flows respond to these active or passive changes in reaching for yield by regressing the next quarter's fund flows on the three components in Equation (3). As additional controls, we include variables commonly employed in the literature in fund flow regressions: fund age, assets under management, turnover, expense ratio, past flows, past returns. We also control for squared past returns to control for any possible nonlinearity in the return-flow relation (Chevalier and Ellison (1997), Sirri and Tufano (1998) and Goldstein et al. (2015)), as well as Fund Style*Quarter fixed effects.

Table 4 (columns (2) through (4)) shows that future fund flows respond positively to active changes in reaching for yield ($\Delta RFY1_{i,t}$). The coefficient estimates on $\Delta RFY1_{i,t}$ are highly statistically significant with t-statistics above 3 across all of the specifications considered. The composition into active and passive changes is important: If we instead only consider the total change in reaching for yield, $\Delta RFY_{i,t}$ (in column (1)), we find no evidence that flows respond. Overall, the coefficient estimates on $\Delta RFY1_{i,t}$ in Table 4 indicate that investor flows into mutual funds respond positively to active changes in reaching for yield.

The passive change in reaching for yield, $\Delta RFY2_{i,t}$, due to bond price changes is negatively related to future fund flows, consistent with the well-known stylized fact that fund flows respond negatively to fund performance. When the bonds held by funds experience low returns compared with benchmarks, the measure $\Delta RFY2_{i,t}$ is positive, which in turn predicts lower future flows. The third component, the interaction of holdings changes with changes in yields ($\Delta RFY3_{i,t}$) tends to be positively related to flows, although not statistically significantly so.[23]

[23] Among our control variables, past flows and past returns enter as expected, but we particularly note that squared returns are negatively linked to future fund flows, which is consistent with the result documented for corporate bond funds in Goldstein et al. (2015).

The overall results indicate that fund investors tend to respond to changes in reaching for yield and direct more flows towards funds that have actively changed their portfolio towards relatively higher-yield bonds. These results are quite intuitive. Bond funds advertise current yield-to-maturity of their investments. Fund investors will take both past performance and also current yields into account, because the latter might capture future expected returns (other things being equal). High promised yields are particularly attractive if a fund's risk profile does not look any riskier based on average ratings and maturities, which is precisely what the within-rating-and-maturity reaching-for-yield measure captures. Table A.2 in the Appendix shows results using the decomposition of changes in total reaching-for-yield; results are broadly similar.

4.2 Does Reaching for Yield Result in Higher Returns?

The previous section showed that funds are rewarded with increased flows when they increase their active reaching for yield. The natural question is whether investors are correct in directing their money towards funds that engage in reaching for yield; or in other words, whether reaching for yield is a source of superior returns. In this section, we analyze and compare the raw return performance of funds that engage in reaching for yield to a greater extent with those that reach for yield to a lesser extent. In the next section, we then analyze whether any performance differences are due to beta (risk) or alpha (risk-adjusted excess returns).

In Table 5, we begin by performing Fama-MacBeth regressions of monthly returns on the fund's (lagged) reaching for yield. In each specification, we control for fund characteristics that might be correlated with returns such as expense ratio, age, total net assets, flow, and fund style fixed effects (based on Lipper style codes). In these regressions, we limit the sample to include only fund-months in which over 75% of the portfolio is held in corporate bonds. We limit the sample this way because we do not want returns on other types of securities these funds may hold to unduly influence the fund-level returns.

The Fama-MacBeth regression results show that, perhaps not surprisingly, higher reaching for yield does predict higher future returns. In column (1), total reaching for

yield positively predicts future fund returns with a t-statistics of 2.65. The magnitude of the coefficient estimate indicates 7bp (84bp per year) higher monthly returns for one percent increase in total reaching for yield. In column (2), we also find that the within-maturity-and-rating reaching-for-yield measure is also positively associated with higher fund returns with a t-statistics of 1.76. The economic magnitude is still quite sizable: A one-percent reaching-for-yield measure for a fund (above the bond-by-bond rating-matched benchmark yield) predicts around a 6.1bp higher return per month, *i.e.*, around 73bp per year. This result suggests that each unit of reaching for yield corresponds with almost-as-great higher returns on an annual basis.

We next analyze the relation between reaching for yield and returns using the calendar-time portfolio method. At the end of each quarter, we sort IG and HY funds separately into three terciles based on each fund's within-rating-and-maturity reaching for yield (RFY^{WRM}). Within these two-by-three sorts of funds, we equal-weight the funds into portfolios that we hold for the three months over the following quarter.

Table 6 Panel A reports the average monthly returns on high-minus-low portfolios for IG and HY funds. The right-most column further reports the monthly returns on high-minus-low portfolios using all funds. We find that higher reaching for yield tends to be related to future returns. Although statistically not significant at conventional levels, the returns on high-minus-low portfolios are all positive for both IG and HY funds. In column (3) when we use all funds, the average high-minus-low portfolios return becomes statistically significant at the 10% level. Overall, funds in the highest reaching-for-yield tercile tend to outperform funds in the lowest tercile by average 14.8bp per month, *i.e.*, around 1.8% on an annualized basis.

Reaching for yield results in higher performance and thus is a relatively easy-to-implement way of enhancing returns to investors. These positive returns are nevertheless raw returns, and not adjusted for potential risk factors. In the next section, we therefore control for common bond risk factors, and analyze whether or not reaching for yield also results in risk-adjusted outperformance.

4.3 Is This Alpha or Beta?

The results thus far show that funds may reach for yield due to an incentive to boost performance and attract more flows. Many bond funds claim to be superior bond pickers. If they pick bonds with high yields (low prices) but with low risk, it is a sign of such skill. That is, higher-yielding bonds are not necessarily riskier than otherwise similar bonds, they may just represent better deals (e.g., because they have been overlooked by other money managers). Thus, it is plausible that at least part of the performance from reaching for yield could be due to such picking of cheaper-but-not-riskier bonds, and thus a sign of skill. But if, on the other hand, the higher returns are simply due to funds loading up on risk factors (or more precisely, because we employ the within-rating-and-maturity reaching for yield, factors that are not perfectly captured by the distribution of ratings and maturities in a portfolio), these fund managers may not have superior bond-picking skills. Thus, it is an empirical question as to whether reaching for yield is simply an easy way of boosting performance by taking on more risk or a sign of true skill.

To analyze whether the raw outperformance of reaching for yield is due to risk (beta) or superior bond-picking skill (alpha), we take the high-minus-low calendar time portfolios analyzed in the previous section and regress these monthly returns on common bond risk factors. As described in the previous section, these high-minus-low portfolios are sorted on within-rating-and-maturity reaching for yield for IG, HY, and all sample funds. The bond risk factors we consider are a market factor (the CRSP value-weighted stock return minus T-bill rate), a term factor (30-year Treasury minus 1-year Treasury bond return), and a default factor (value-weighted corporate bond return minus T-bill rate).

Table 6 presents the estimation results of the factor loadings and alphas of the high-minus-low portfolios. We find that controlling for common risk factors dramatically reduces the excess returns of the high-minus-low portfolios formed on reaching for yield, compared with raw returns reported in Panel A. For the IG funds in particular, the alpha is even negative, -0.13% monthly, and statistically significant at the 10% level (column (1)). For the other portfolios, the alphas are economically smaller than the raw excess returns in Panel A and statistically insignificant from zero (columns (2) and (3)).

This reduction in performance is mainly because high reaching for yield funds load more heavily on the risk factors considered. The main risk-loading is on the default factor (Def), which is to be expected if reaching for yield involves exposure to higher corporate default risk (specifically, default risk that is manifested in yields but not captured by each bond's rating). For the high-rated portfolio in column (1), we find that the portfolio also has exposure to the term factor, while the term factor does not show up in the HY portfolio in column (2).

In addition to the usual factor risks analyzed above, corporate bond funds are also potentially particularly sensitive to downside risk, since holding corporate bonds might have similar exposure as selling out-of-the-money put options. Also, corporate bonds are illiquid, and under severe market conditions and subsequent outflows, these funds might experience inefficient liquidation, as is suggested by Goldstein et al. (2015), which also implies that corporate bond funds can be particularly vulnerable to downside risk. To account for this possibility, we also add the put option factor by Agarwal and Naik (2004) in our factor regressions.

Panel C of Table 6 shows that high reaching-for-yield funds are indeed more sensitive to the downside risk, especially among IG funds. The loading on the factor is -0.25 (statistically significant at the 10% level), indicating that when the market crashes and put option returns are high, these high reaching-for-yield IG funds perform poorly. More importantly, the alphas are more negative in columns (1) and (3), which are also statistically significant at the 5% and 10% levels, respectively. These results show that high raw returns by these high reaching-for-yield funds are at least partially due to greater downside risk.

In summary, the higher returns of funds that engage in reaching for yield can thus be explained by common risk factors and, as a result, are not consistent with superior bond-picking skills on the part of these funds.

5 Conclusion

In this paper, we document the extent to which corporate bond mutual funds engage in reaching for yield. Our results thus speak to the growing literature on reaching for yield, and is the first to examine risk-taking incentives by corporate bond mutual funds. We show that funds engage in more reaching for yield when the level and slope of the yield curve are low and when the default spread is narrow. These results are consistent with greater risk-taking by delegated money managers in low-interest-rate environments.

The funds that reach for yield do not compensate for their greater risk-taking with stronger liquidity management, but rather tend to be exposed to greater liquidity concerns and thus exposed to greater risks of large-scale redemptions and fire sales. We also show that younger and larger funds on average engage in more reaching for yield.

We then show the implications of reaching for yield for investors by examining flows and performance. When funds make active portfolio changes towards higher-yielding bonds, they receive higher inflows. The funds that engage in reaching for yield also tend to generate higher raw returns. But after adjusting for common risk factors, there is no evidence that these funds have superior skill.

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Figure 1

Average corporate bond yields and reaching for yield by mutual funds

This figure shows the time series of the value-weighted average corporate bond yield (solid line), the average total reaching for yield across corporate bond mutual funds (dotted line), and the average reaching for yield within rating and maturity (dashed line). The sample of bond funds include all bond funds in the CRSP Mutual Funds database categorized as either corporate or general bond funds (*i.e*, CRSP style categories I, ICQH, ICQM, ICQY, ICDI, ICDS, or IC) and that at least at one point during the sample period have held at least some securities identifiable as corporate bonds in FISD. The reaching-for-yield measure for a particular *bond*-date is calculated as the bond's yield less a benchmark yield (the benchmark is the average corporate bond yield for the "total" reaching for yield, or a rating- and maturity-matched average bond yield for the "within rating and maturity" reaching for yield). To compute a reaching-for-yield measure at the fund-quarter level, we then value-weight the reaching for yield across all bonds held by the fund at a particular date. These reaching-for-yield measures are defined in Equations (1) and (2).

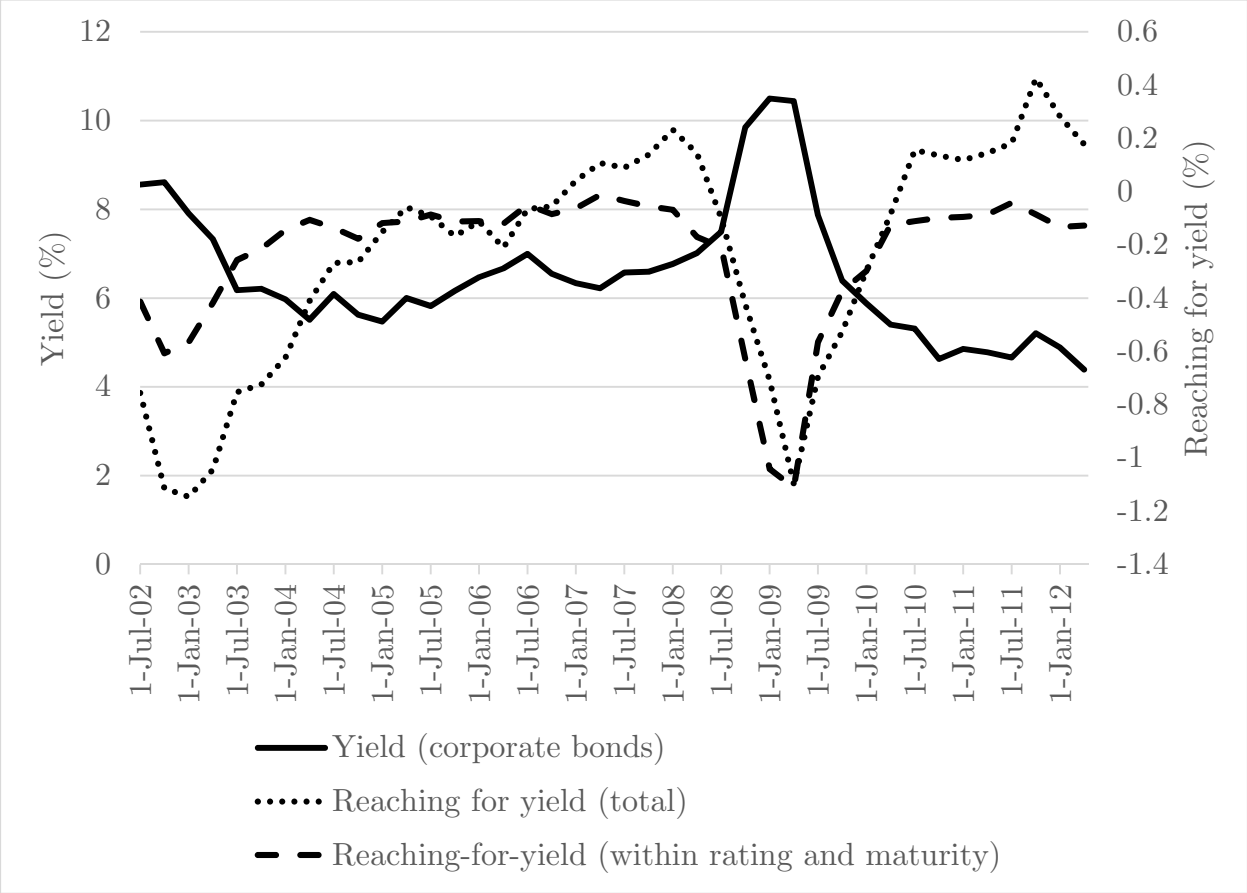

Figure 2

Change in reaching for yield: decomposition

This figure shows the changes in the components of a change in total reaching for yield over time for corporate bond mutual funds. These components are active portfolio changes towards higher yielding bonds ("reaching for higher yield") plotted in a solid line, a passive change in reaching for yield due to bond price changes ("poor returns") plotted in a dotted line, and an interaction ("doubling down") plotted in a dashed line. These three components of changes in reaching for yield are described in Equation (3).

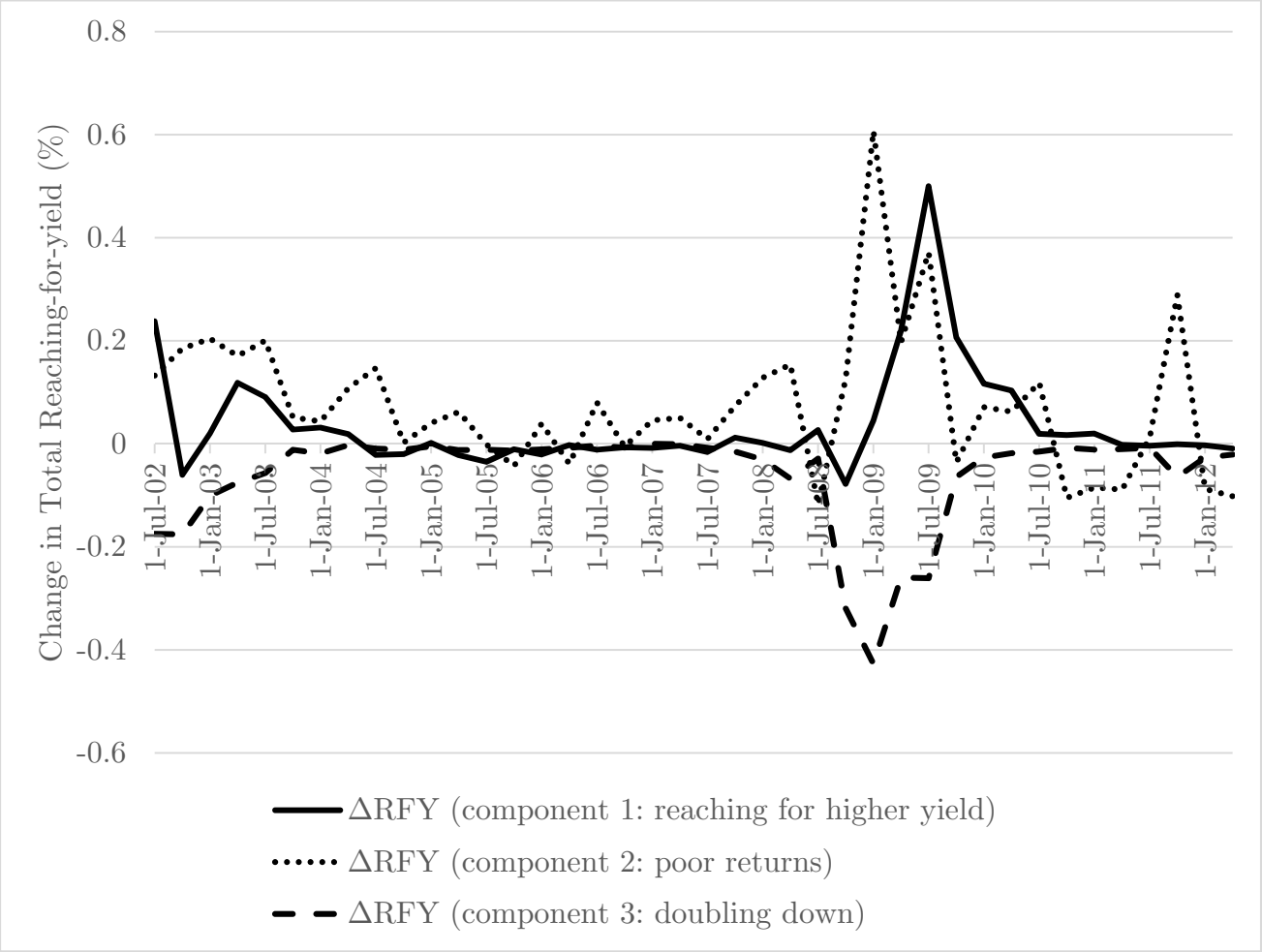

Table 1

Summary Statistics

This table reports summary statistics. The sample of mutual funds consists of all bond funds in the CRSP Mutual Funds database categorized as either corporate or general bond funds (*i.e*, CRSP style categories I, ICQH, ICQM, ICQY, ICDI, ICDS, or IC) and that at least at one point during the sample period have held at least some securities identifiable as corporate bonds in FISD. The sample period is from January 2002 through June 2012. The observations are at the fund-quarter level. If there are multiple share classes for the same fund, the portfolio characteristics are calculated as the asset-weighted average across share classes. Panel A reports average fund characteristics, and Panel B shows the differences between Investment-grade (IG) and High-yield (HY) funds. IG funds are classified as those with a Lipper style code of either A, BBB, IID, SII, SID, or USO and HY funds are those with code of HY, GB, FLX, MSI, or SFI. The quarterly *return*, *total net assets*, *flow*, *turnover*, *expense ratio*, *fund age*, and *tenure* are calculated based on CRSP data. *Weight in corporate bonds* is the fraction of the fund's assets held in corporate bonds (based on Morningstar holdings data); *weight in cash* (also including commercial paper, CDs), *weight in Treasuries*, and *weight in equities* are defined analogously. *Rating* and *Time-to-maturity* are calculated as the value-weighted average within a fund-quarter, and based on the corporate bonds that are matched to FISD. *Yield* is the value-weighted yield based on Thomson-Reuters quotes or TRACE transactions where available. *Trading days per month* is calculated based on the number of days that a transaction is recorded in TRACE; this data starts in October 2004. The reaching for yield, reaching for maturity, and reaching for rating measures are defined in Equations (1) and (2). All variables are winsorized at the 1% level.

PANEL A: Portfolio characteristics

	mean	sd	p1	p25	p50	p75	p99	N
Return (%, quarterly)	1.4	3.1	-10.4	0.0	1.3	2.7	12.4	23,585
Total net assets ($M)	2,308	6,069	2	115	427	1,610	44,471	24,308
Flow	0.04	0.20	-0.31	-0.04	0.00	0.05	1.38	22,081
Turnover	1.5	1.6	0.1	0.5	0.9	1.9	8.3	22,917
Expense ratio (%)	0.85%	0.35%	0.17%	0.60%	0.81%	1.08%	1.87%	23,041
Fund age (years)	11.3	7.5	0.6	5.7	10.1	15.2	37.6	23,673
Tenure (years)	6.6	4.4	0.7	3.2	5.7	9.1	20.2	15,567
Weight in corporate bonds	46.7%	28.1%	1.8%	24.2%	39.2%	71.5%	98.3%	21,845
Weight in cash	4.9%	6.6%	0.0%	1.1%	3.0%	6.3%	29.3%	21,845
Weight in Treasuries	10.9%	11.9%	0.0%	0.4%	7.6%	17.1%	51.0%	21,845
Weight in equities	1.3%	4.6%	0.0%	0.0%	0.1%	1.0%	16.6%	21,845
Rating	13	3	6	9	14	15	18	23,424
	BBB	CCC-	B-	BB-	BBB+	A-	AA-	
Time-to-Maturity (years)	7.17	3.60	0.75	4.93	7.15	9.07	21.33	23,426
Yield (%)	6.27	2.55	1.39	4.62	5.86	7.73	15.58	23,426
Trading days (per month)	12.75	3.42	4.47	10.26	12.69	15.21	20.47	17,669
Reaching for yield (total)	-0.23	2.26	-5.10	-1.61	-0.62	1.26	6.51	23,426
Reaching for yield (within rating and maturity)	-0.23	0.63	-3.06	-0.39	-0.12	0.03	1.61	23,424
Reaching for maturity	-0.15	0.50	-1.76	-0.29	-0.06	0.10	1.17	23,424
Reaching for rating	0.15	2.31	-3.76	-1.25	-0.61	1.46	7.99	23,424

Table 1, continued

PANEL B: Portfolio characteristics – investment-grade vs. high-yield funds

	Investment-grade funds (N=16,270)			High-yield funds (N=7,436)			Diff. in means
	mean	sd	median	mean	sd	median	
Return (%, quarterly)	1.2	2.2	1.1	1.9	4.4	2.0	-0.74***
Total net assets ($M)	2,180	6,057	405	2,245	5,254	444	-64.79
Flow	0.03	0.19	0.00	0.05	0.23	0.00	-0.021***
Turnover	1.7	1.8	1.0	1.0	1.1	0.7	0.72***
Expense ratio (%)	0.75%	0.30%	0.72%	1.09%	0.35%	1.08%	-0.003***
Fund age (years)	11.7	7.4	10.6	10.5	7.8	8.7	1.20***
Tenure (years)	6.9	4.4	6.2	5.9	4.2	4.7	1.05***
Weight in corporate bonds	35.8%	20.6%	31.7%	72.8%	25.9%	84.8%	-0.370***
Weight in cash	5.0%	6.8%	2.9%	4.8%	6.3%	3.3%	0.002*
Weight in treasuries	12.8%	11.3%	10.7%	5.0%	10.0%	0.0%	0.077***
Weight in equities	0.7%	3.7%	0.0%	2.7%	6.0%	1.0%	-0.020***
Rating	15	2	15	8	2	8	6.2***
Time-to-Maturity (years)	6.96	4.04	7.00	7.45	2.16	7.13	-0.49***
Yield (%)	5.20	1.76	5.28	8.74	2.34	8.29	-3.54***
Trading days (per month)	13.63	3.23	13.76	10.58	2.76	10.37	3.06***
Reaching for yield (total)	-1.33	1.47	-1.10	2.27	1.72	2.17	-3.60***
Reaching for yield (within rating and maturity)	-0.10	0.46	-0.07	-0.54	0.85	-0.37	0.45***
Reaching for maturity	-0.20	0.56	-0.08	-0.05	0.31	-0.04	-0.15***
Reaching for rating	-1.04	1.05	-0.94	2.88	2.07	2.73	-3.92***

Table 2

Reaching for yield: Time series determinants

This table reports the time-series determinants of reaching for yield among corporate bond funds. The observations are at the fund-quarter level; fund characteristics are calculated as the asset-weighted average across share classes. The dependent variables are reaching for yield for a fund-date, either measured as total reaching for yield or as reaching for yield within rating and maturity, as defined in Equations (1) and (2). The independent variables are the yield *level* (one-year Treasury yield), *slope* (the difference between the 30-year and one-year Treasury yields), and *default spread* (the yield difference between BBB- and AAA-rated corporate bonds). All independent variables are standardized to a mean of 0 and standard deviation of 1. Columns (1) and (2) present results for all funds, while Columns (3)-(6) present results separately for IG (investment grade) and HY (high yield) funds. All regressions include fund fixed effects to control for possible differences in the composition of funds over time. Standard errors are two-way clustered at the fund- and quarter-levels. t-stats are presented in parentheses; *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

	All funds		IG funds		HY funds	
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Reaching for yield (total)	Reaching for yield (within rating and maturity)	Reaching for yield (total)	Reaching for yield (within rating and maturity)	Reaching for yield (total)	Reaching for yield (within rating and maturity)
Yield (level)	-0.27***	-0.10***	-0.13*	-0.05*	-0.62***	-0.21***
	(-4.85)	(-4.57)	(-1.96)	(-1.86)	(-4.06)	(-3.39)
Yield (slope)	-0.33***	-0.12***	-0.43***	-0.05**	-0.10	-0.27***
	(-6.41)	(-5.39)	(-6.93)	(-2.17)	(-0.77)	(-4.16)
Default spread	-0.25***	-0.23***	-0.44***	-0.13***	0.22*	-0.47***
	(-4.67)	(-9.69)	(-10.48)	(-6.60)	(1.90)	(-10.86)
Constant	-0.23***	-0.23***	-1.33***	-0.10***	2.25***	-0.54***
	(-6.88)	(-15.43)	(-29.26)	(-10.98)	(44.00)	(-13.61)
Fund fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.799	0.465	0.670	0.342	0.712	0.567
N	23,426	23,424	15,692	15,690	7,143	7,143

Table 3

Reaching for Yield and Liquidity Management

This table reports results from the regressions of reaching for yield on fund characteristics. The observations are at the fund-quarter level. The dependent variable is reaching for yield (within rating and maturity) as defined in Equation (2). The main independent variables are the portfolio weight in *cash/Treasuries*, the portfolio weight in *equities*, *trade days* (value-weighed across bonds based on the number of transactions in TRACE), and the minimum of flows over the last eight quarters. Control variables include fund age, assets, expense ratio, fund-style fixed effects (based on Lipper styles), and year-quarter fixed effects (the year-quarter fixed effects non-parametrically control for the time-series determinants analyzed in Table 2). Column (1) presents results for all funds, while Columns (2) and (3) present results separately for Investment-grade (IG) and High-yield (HY) funds. The constant term is omitted. Standard errors are clustered at the fund level. t-stats are presented in parentheses; *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable: Reaching for yield (within rating and maturity)	(1) All funds	(2) IG funds	(3) HY funds
Cash/Treasury weight	-0.282***	-0.196**	-0.438**
	(-3.10)	(-1.99)	(-2.07)
Equity weight	3.303***	3.196*	2.385***
	(3.85)	(1.70)	(3.32)
Trade days per month	-0.017***	-0.015***	-0.026**
	(-3.77)	(-3.40)	(-2.10)
Lowest flow (past 8 quarters)	-0.342***	-0.303***	-0.226
	(-4.20)	(-3.25)	(-1.56)
Fund Age (log)	-0.073***	-0.032	-0.137***
	(-3.84)	(-1.62)	(-3.79)
Total Net Assets ($M, log)	0.015***	0.015**	0.011
	(2.63)	(2.43)	(0.96)
Expense Ratio (%)	-0.944	-6.819*	8.500
	(-0.27)	(-1.78)	(1.36)
Fund style fixed effects	Yes	Yes	Yes
Year-Quarter FE	Yes	Yes	Yes
R^2	0.361	0.172	0.589
N	14,470	10,036	4,434

Table 4

Reaching for Yield and Fund Flows

This table reports results from the regressions of future fund flows on active vs. passive changes in reaching for yield. The observations are at the fund-quarter level. The dependent variable is the quarterly fund flows. The main independent variables are the components of a decomposition of a change in reaching for yield ΔRFY within rating and maturity into (i) an active portfolio change $\Delta RFY1$ ("reaching for higher yield"), (ii) a passive change due to poor returns $\Delta RFY2$, and (iii) an interaction $\Delta RFY3$ ("doubling down"). This decomposition is described in Equation (3). All regressions further include the following fund level controls: fund age (log), assets under management (log), turnover, and expense ratio, as well as Time (year-quarter) fixed effects, and FundStyle*Time fixed effects. The control variables are lagged by one quarter. Column (3) and (4) further controls for a lagged flow (the average over the last four quarters), and Column (4) additionally controls for a lagged return (the cumulative return over the past four quarters) as well as the square of the return. The constant term is omitted. Standard errors are clustered at the fund level. t-stats are presented in parentheses; *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable: Fund Flow All independent variables are lagged by one quarter	(1)	(2)	(3)	(4)
ΔRFY	0.003			
(within rating and maturity)	(0.71)			
ΔRFY1		0.113***	0.094***	0.074***
("reaching for higher yield")		(5.29)	(3.97)	(3.28)
ΔRFY2		-0.008	-0.006	-0.010*
("poor returns")		(-1.53)	(-1.05)	(-1.76)
ΔRFY 3		0.035	0.017	-0.008
("doubling down")		(1.60)	(0.69)	(-0.34)
Flow (past year average)			0.157***	0.143***
			(10.18)	(9.32)
Return (past year)				0.707***
				(9.95)
Return (past year)^2				-1.234***
				(-5.97)
Fund controls	Yes	Yes	Yes	Yes
Year-Quarter fixed effects	Yes	Yes	Yes	Yes
Fund Style*Year-Quarter fixed effects	Yes	Yes	Yes	Yes
R^2	0.089	0.093	0.113	0.126
N	19,786	19,786	15,898	15,898

Table 5

Reaching for Yield and Returns: Fama-MacBeth Regressions

This table reports results from the Fama-MacBeth regressions of monthly fund returns on reaching for yield and other fund characteristics. The observations are at the fund-month level. For these return regressions, we limit the sample to fund-quarters that have at least 75% of the portfolios invested in corporate bonds. Column (1) reports the result for total reaching for yield (Equation 1), and Column (2) reports the result for reaching for yield within rating and maturity (first component in the decomposition in Equation 2); these variables are lagged by one quarter. We control for a lagged flow and the other fund characteristics described in Table 4 (age, assets under management, turnover, expense ratio), as well as Fund-style fixed effects (based on Lipper style). t-stats are presented in parentheses; *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Fama-MacBeth regressions Dependent variable: Monthly fund return (%)	(1)	(2)
Reaching for yield (total)$_{t-1}$	0.070***	
	(2.65)	
Reaching for yield (within rating and maturity) $_{t-1}$		0.061*
		(1.78)
Flow $_{t-1}$	0.002	-0.016
	(0.05)	(-0.52)
Fund controls	Yes	Yes
Fund Style fixed effects	Yes	Yes
R^2	0.512	0.451
N	19,674	19,674

Table 6

Reaching for Yield and Returns: Alpha or Beta?

This table reports alphas and betas of monthly high-minus-low calendar-time portfolios sorted on the reaching-for-yield measure (within rating and maturity). For these return regressions, we limit the sample to fund-quarters that have at least 75% of the portfolios invested in corporate bonds. The funds are double-sorted into portfolios, first on whether the fund style is investment-grade or high-yield (these styles are based on Lipper codes as described in Table 1), and, second, into terciles based on the fund's reaching for yield within rating and maturity (Equation 2). We then calculate the high-minus-low difference (*Hi-Lo*) between the highest tercile and lowest tercile reaching-for-yield portfolios. Panel A reports average excess returns on these *Hi-Lo* portfolios. Panel B and C report results from the time-series regressions of the high-minus-low portfolio returns on common risk factors. The risk factors are *Market* (Rm – Rf), *Term* (30-year bond return – 1-year bond return), *Def* (equal-weighted corporate bond return–Rf), and *Put* (put option return) by Agarwal and Naik (2004). Standard errors are reported in parentheses; *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

PANEL A: AVERAGE RETURNS ON HIGH-MINUS-LOW REACHING-FOR-YIELD PORTFOLIOS

Fund style:	Investment grade	High yield	All funds
	(1)	(2)	(3)
Average excess return	0.2171	0.0796	0.1484*
	(0.1345)	(0.0502)	(0.0818)
N	120	120	120

PANEL B: ALPHAS AND BETAS OF HIGH-MINUS-LOW REACHING-FOR-YIELD PORTFOLIOS

	Hi-Lo Reaching-for-yield portfolios		
Fund style:	Investment grade	High yield	All funds
	(1)	(2)	(3)
β^{Mkt}	0.01	0.02	0.02
	(0.02)	(0.01)	(0.01)
β^{Term}	0.18***	0.00	0.09***
	(0.02)	(0.01)	(0.01)
β^{Def}	0.40***	0.12***	0.26***
	(0.04)	(0.03)	(0.03)
Alpha	-0.13*	0.01	-0.06
	(0.07)	(0.04)	(0.05)
R^2	0.732	0.327	0.710
N	117	117	117

Table 6, continued

PANEL C: EXPANDED FACTOR REGRESSIONS

	Hi-Lo Reaching-for-yield portfolio returns		
Fund style:	Investment grade	High yield	All funds
	(1)	(2)	(3)
β^{Mkt}	-0.02	0.01	-0.00
	(0.03)	(0.02)	(0.02)
β^{Term}	0.19***	0.00	0.09***
	(0.02)	(0.01)	(0.01)
β^{Def}	0.39***	0.12***	0.26***
	(0.04)	(0.03)	(0.03)
$\beta^{\text{Put option}}$	-0.25*	-0.05	-0.15*
	(0.14)	(0.08)	(0.09)
Alpha	-0.17**	-0.00	-0.09*
	(0.08)	(0.05)	(0.05)
R^2	0.739	0.329	0.718
N	117	117	117

APPENDIX

Table A.1

Reaching for ratings

This table analyzes the portfolio tilt of corporate bond mutual funds across ratings, relative to the aggregate supply of corporate bonds. *Corporate bond fund weight* is the average fraction of the aggregate holdings of corporate bond funds across corporate bond funds in each rating class, and *Aggregate supply* is the fraction of total outstanding corporate bonds in each rating class. Panel A also reports the difference between corporate bond fund holdings and the aggregate supply. Panel B reports results of time series regressions of the difference between corporate bond fund holdings and aggregate supply across ratings as the dependent variable. The independent variables in Panel B are similar to Table 2.

PANEL A: Portfolio deviations - Average

	(1) C-CCC	(2) B	(3) BB	(4) BBB	(5) A	(6) AA	(7) AAA	(8) HY (C-BB)	(9) IG (BBB-AAA)
Corporate bond fund weight	0.057	0.160	0.125	0.296	0.241	0.086	0.034	0.342	0.658
Aggregate supply	0.052	0.087	0.091	0.296	0.308	0.118	0.049	0.229	0.771
Difference	0.006***	0.073***	0.034***	0.001	-0.067***	-0.031***	-0.015***	0.113***	-0.113***
(t-stat of diff.)	(8.47)	(50.24)	(38.13)	(0.48)	(-49.00)	(-41.67)	(-30.75)	(43.72)	(-43.72)

Table A.1, continued

PANEL B: Time series determinants of rating deviations

Dependent variable: Difference in mutual fund holdings and aggregate supply of bonds within rating class									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	C-CCC	B	BB	BBB	A	AA	AAA	HY (C-BB)	IG (BBB-AAA)
Yield (level)	-0.612***	0.022	-0.546*	-1.143***	1.491***	0.263	0.525***	-1.136**	1.136**
	(-3.03)	(0.10)	(-1.79)	(-4.03)	(5.62)	(1.21)	(3.74)	(-2.54)	(2.54)
Yield (slope)	-0.956***	-0.183	-0.629	-1.539***	1.684***	1.094***	0.531***	-1.769***	1.769***
	(-3.36)	(-0.76)	(-1.56)	(-5.06)	(5.16)	(3.81)	(3.25)	(-3.50)	(3.50)
Default spread	-1.312***	-0.869	-0.207	-1.231***	1.767***	0.773***	1.079***	-2.388***	2.388***
	(-4.33)	(.)	(-0.49)	(-3.28)	(5.37)	(2.84)	(4.94)	(-4.45)	(4.45)
N	11,819	14,235	17,772	21,215	17,950	15,355	23,709	18,318	21,957

Table A.2

Reaching for yield and Fund Flows – Total reaching for yield

This table reports replicates Table 4, but uses a decomposition of changes in *total* reaching for yield instead of changes in reaching for yield *within rating and maturity*.

Dependent variable: Fund Flow				
All independent variables are lagged by one quarter				
	(1)	(2)	(3)	(4)
ΔReaching-for-yield (total)	-0.001			
	(-0.38)			
ΔReaching-for-yield 1		0.026***	0.026***	0.018**
("reaching for higher yield")		(3.65)	(3.28)	(2.36)
ΔReaching-for-yield 2		-0.016***	-0.019***	-0.022***
("poor returns")		(-3.60)	(-3.92)	(-4.50)
ΔReaching-for-yield 3		0.011	-0.001	-0.018
("doubling down")		(0.65)	(-0.04)	(-0.97)
Flow (past year average)			0.157***	0.143***
			(10.27)	(9.40)
Return (past year)				0.711***
				(10.14)
Return (past year)^2				-1.251***
				(-5.99)
Fund controls	Yes	Yes	Yes	Yes
Year-Quarter FE	Yes	Yes	Yes	Yes
Fund Style*Year-Quarter FE	Yes	Yes	Yes	Yes
R^2	0.089	0.092	0.114	0.123
N	19,787	19,787	15,899	15,899