The Use of Credit Ratings in Financial Markets

Finance Working Paper N° 612/2019
August 2020

Ramin P. Baghai
Stockholm School of Economics, CEPR, Swedish House of Finance and ECGI

Bo Becker
Stockholm School of Economics, CEPR, Swedish House of Finance, and ECGI

Stefan Pitschner
Uppsala University

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Abstract

Fixed income markets rely on delegated asset management, where fund managers' portfolio decisions are directed and restricted by investment mandates. We use textual analysis to classify fixed income funds' mandate contents. Credit ratings are used by a large majority of these funds to delineate which assets may be held. Despite the shortcomings of ratings revealed by the global financial crisis, their use in mandates has steadily increased over the 1999—2018 period. This continued reliance on credit ratings suggests that ratings are an integral feature of contracting in financial markets and points to a lack of practically useful alternatives.

Keywords: Credit ratings, investment mandates, delegated asset management, financial crisis

JEL Classifications: G24, G23, G01

Ramin P. Baghai
Associate Professor
Stockholm School of Economics, Department of Finance
Sveavägen 65
113 83 Stockholm, Sweden
phone: +46 873 692 96
e-mail: Ramin.Baghai@hhs.se

Bo Becker*
Gösta Olsson Professor of Financial Economics
Stockholm School of Economics, Department of Finance
Sveavägen 65
113 83 Stockholm, Sweden
phone: +46 873 691 11
e-mail: bo.becker@hhs.se

Stefan Pitschner
Researcher
Uppsala University, Department of Economics
Kyrkogårdsgatan 10
753 13 Uppsala, Sweden
phone: +46 184 715 127
e-mail: stefan.pitschner@nek.uu.se

*Corresponding Author

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Ramin P. Baghai, Bo Becker, and Stefan Pitschner *

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Fixed income markets are large and of central importance to the financial system. They provide most of the external financing of corporations and financial institutions, as well as virtually all financing of sovereign entities and other public issuers.[1] The value of outstanding U.S. debt securities rose from 57 percent of GDP in 1980 to 182 percent of GDP in 2007 (Greenwood and Scharfstein 2013). Fixed income securities also account for a large part of household wealth, as well as the assets of many financial institutions, and they are the main channel through which central banks have been conducting unconventional monetary policy (Krishnamurthy and Vissing-Jorgensen 2011).

An important feature of fixed income markets is that most investment decisions are not made by the assets' beneficial owners (e.g., households and governments), but rather by agents such as mutual funds, exchange-traded funds ("ETFs"), and pension funds (OECD 2020). In 2019, regulated open-end bond and money market mutual funds managed $19tn of assets globally, with U.S. funds managing $8.3tn (Investment Company Institute 2020).[2] Given this vast amount of delegation, understanding fixed income markets requires understanding the interaction between these financial institutions and ultimate asset owners. A key determinant of this relationship is the investment mandate, which stipulates how assets of a fund are to be managed. For example, a mandate may define a fund's investment strategy, dictate which types of assets a fund manager can purchase, or that holdings should be limited to a certain risk category.[3]

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[1] For example, fixed income markets provide most new external financing for corporate investment in the U.S. (Board of Governors of the Federal Reserve System 2019).

[2] U.S. bond mutual funds have experienced net inflows through most of the past decade; net inflows were $2.2tn in 2019, up from $1tn in 2013 (ICI 2020).

[3] In equity mutual funds, investment policy restrictions are a common feature of the contracts that define the interactions between fund portfolio managers and their investors (Almazan, Brown, Carlson, and Chapman 2004).

We use textual analysis of mandates of U.S. fixed income mutual funds to study how asset allocation decisions are delegated, in particular with respect to limiting risk taking. We document that credit ratings are the main risk measure in the mandates of fixed income funds. Over the 2010—2018 period, 93% of mandates refer to credit ratings.[4] References to credit ratings are implemented in many different ways: some mandates specify that assets will be invested "primarily" in investment grade securities; some require ratings from a particular agency, while others allow the ratings of any agency certified by regulators. Mandates also differ in their amount of leeway (e.g., allowing 10% of assets to be outside the target rating range). We combine all kinds of references to ratings for our main tests and separate them in further analyses. Combining mandate information with security holdings data, we find that portfolios closely conform to mandates: the credit ratings of fund assets match mandates closely, highlighting the importance of mandates.[5]

The use of ratings in mandates extends to funds marketed to retail as well as to institutional investors, to ETFs as well as open-ended mutual funds, and across all large categories of fixed

[4] Cantor, Gwilym, and Thomas (2007) survey 50 fund managers and 50 pension plan sponsors in the U.S. and in Europe regarding the guidelines in the conduct of their investment activities. Ratings are widely used in this smaller sample as well.

[5] In contrast, Chen, Cohen, and Gurun (2019) report that some fixed income mutual funds strategically misreport key risk metrics (such as the fraction of AAA securities held) to private information intermediaries such as Morningstar. The difference between our observation that fund portfolios match mandates and the evidence in Chen et al. may be due to the status of the fund prospectus as a legally binding document. Discrepancies between investment mandates and portfolio holdings have previously resulted in class action lawsuits. For example, in 2008, investors in Schwab's YieldPlus Fund filed a putative class action suit against Charles Schwab Corporation for deviating from investment and concentration policies stated in their SEC filings, which had led to large losses. The defendant paid $119 million to settle the charges (Laisse 2011). Similarly, in 2012, Evergreen Investment Management Company paid $25 million to settle a class action claiming it misled investors about one of its fund's exposure to MBS (Reuters 2012).

income funds (e.g., municipal bond funds and corporate bond funds). Younger funds, funds with more assets under management, and ETFs are more likely to use ratings, while index funds are less likely to do so.

The widespread use of ratings points to some advantage of ratings over conceivable alternatives, which may include market prices (e.g., "we invest in bonds with a yield below x%"), external evaluations other than credit ratings, or internal metrics. Given the context of delegation, it seems natural that one determinant of ratings use would be the faith which (potential) investors in a fund place in credit ratings. If investors trust ratings, their use in mandates would be expected. This intuition suggests a puzzle related to the global financial crisis, in which credit rating agencies played a central role. During the financial crisis, banks and investors sustained large losses, in many cases on securities that had been rated in the highest categories.[6] This resulted in widespread criticism of rating agencies' methods, business models, and market power.[7] Figure 1 provides an illustration of this view, based on the tone of news coverage of credit ratings and rating agencies in the financial press during the 2000 – 2019 period: the tone of news articles became significantly more negative following the financial crisis. Regulatory reforms after the crisis were aimed at reducing the risk of ratings inflation and limiting the impact of flawed ratings

[6] See Benmelech and Dlugosz (2009a), Griffin and Tang (2011) and Gordy and Willeman (2012).

[7] For example, on October 22, 2008, U.S. Congressman Henry Waxman stated (see, e.g., Morgenson 2008): "The story of the credit rating agencies is a story of colossal failure. […] Millions of investors rely on them for independent, objective assessments. The rating agencies broke this bond of trust, and federal regulators ignored the warning signs and did nothing to protect the public."

in the future.[8] There was broad agreement that the financial system's reliance on credit ratings should be reduced; references to credit ratings were removed from many regulations.[9]

Given the backlash against rating agencies after the financial crisis, a drop in the use of credit ratings by private parties, including in mandates, could be expected. Instead, our data point to a small but persistent increase in the reliance on ratings in fixed income markets over the last two decades, with no reversal of the positive trend after the crisis. For example, in 2010, only ten percent of funds did not rely on ratings in any way; by the end of our sample, in 2018, only one in seventeen funds did not use ratings at all according to their investment mandates. The increase in use is due to exiting funds using ratings less, new funds using ratings more, and continuing funds adding ratings in mandates over time.[10]

We conclude that fixed income funds remain heavily reliant on credit ratings, and that the financial crisis did not discourage the use of ratings in investment mandates. There are at least three possible explanations for the persistence in the use of ratings, which are not mutually exclusive. First, despite the popular and regulatory backlash against credit rating agencies, the financial crisis may not have changed sophisticated investors' perceptions of ratings quality much, at least for asset classes not associated with major losses during the financial crisis. The

[8] Reforms include several provisions in the Dodd-Frank Wall Street Reform and Consumer Protection Act, approved by the U.S. Congress in 2010. Both in the U.S. and Europe new agencies were instituted: the European Securities and Markets Authority (ESMA) and the SEC's Office of Credit Ratings.

[9] See, e.g., Opp, Opp, and Harris (2013), SEC (2013), Sangiorgi and Spatt (2017), FDIC (2018), and Becker, Opp, and Saidi (2019).

[10] Over the 2010—2018 period, 10% of exiting funds do not use ratings at all, while only 8% of new entrants do not use ratings; rating references by continuing funds increase by up to 0.6 percentage points per year (depending on the specification, see Table 5).

most serious losses were sustained in structured assets, which most funds do not hold: fixed income mutual funds largely invest in corporate and municipal bonds, and in treasury securities.

Second, there may be no viable alternatives to ratings, even if investors find them flawed. Under this view, low quality ratings generate a negative externality on the financial system, given that they are effectively irreplaceable. Such externalities constitute a legitimate motivation for policies designed to protect the quality of credit ratings.[11]

Finally, ratings use in fixed income mandates and other private, non-regulatory settings may be "sticky," so that the use of ratings remains the market convention even if better alternatives exist. For example, contracting conventions may lead to the ubiquity of ratings.[12] Further, network externalities may result in persistent and increasing use of ratings through market participants' desire for consistency and comparability of credit risk metrics; thus, increasing ratings use may increase the utility of ratings to investors, issuers, and intermediaries.[13] This view implies that there may be multiple equilibria (e.g., all funds use ratings or all funds use market prices) and raises the possibility of welfare losses associated with the current equilibrium.

The widespread and increasing private use of ratings has implications for financial regulation. Credit ratings fulfill the same function in regulation as in private contracting: measuring credit

[11] Possible externalities include fire sales of illiquid assets, as suggested by Goldstein, Jiang, and Ng (2017). Ellul, Jotikasthira, and Lundblad (2011) document fire sales of downgraded corporate bonds induced by regulatory constraints imposed on insurance companies.

[12] The persistent use of simple, standardized, and potentially "sub-optimal" (relative to the predictions of standard principal-agent models) contract terms across firms has been documented in a variety of settings, such as sharecropping and franchising (Bhattacharyya and Lafontaine 1995 review some of the early literature). Lafontaine and Shaw (1999) document "stickiness" of franchise contract terms within firms over time.

[13] Network externalities have been used to explain the establishment and persistence of inferior technologies in other contexts, such as the QWERTY keyboard (David 1985) and the VHS standard (Park 2004).

risk. They have well-understood scales (especially the investment grade and high yield categories), they have a long track record, and they are available for many securities free of charge to investors. Having a well-understood risk measure available broadly and at zero marginal cost to contracting parties allows regulators to make capital requirements of financial institutions dependent on the risk of their assets in a transparent manner, just as it allows mutual fund clients to allocate funds across risk categories. Given this similarity between the private and public uses of ratings, a lack of alternatives for one is likely informative about a lack of alternatives for the other. Among recent rulemaking in the U.S., the Dodd-Frank Act instructed federal agencies to remove references to ratings wherever possible.[14] Our findings suggest that contracting on credit risk without ratings may be infeasible, and replacing them difficult. For countries that have less developed fixed income markets, our results suggest that increased reliance on credit ratings may be unavoidable, since delegated asset management in this area seems to require it.

1. Data and main samples

A. General aspects of the textual analysis

We construct a dataset that quantifies textual information related to investment mandates in U.S. fixed income mutual funds. This information is extracted from archived prospectuses of U.S. investment companies. The source of these documents is the EDGAR database of the SEC. Our primary sample comprises fund-specific summary prospectuses (filing type 497K) filed between

[14] Apart from removing references to ratings, rulemaking in Dodd-Frank related to credit ratings included: sales and marketing practices of agencies, disclosure of performance statistics, as well as staff training and monitoring. As Partnoy (2017) points out, Dodd-Frank did not require removal of references to ratings in state legislation and regulation, much of which continues to reference credit ratings.

2010 and 2018 pursuant to rule 497(k) of the Securities Act of 1933.[15] Summary prospectuses are typically short (2 – 3 pages), have standardized headings, and were specifically designed by the SEC with retail investors in mind.[16] Because these documents describe specific funds, we can link them to observable portfolio characteristics from CRSP such as investment style classifications and holdings.

In addition to fund-specific summary prospectuses, we also consider prospectuses filed at the level of fund groups (filing types 485APOS and 485BPOS).[17] Such groups of funds are typically a subset of an investment company's funds that were launched on the same date. While most of these fund group-prospectuses encompass more than one fund, making cross-sectional comparisons across funds less clear-cut, they allow for an analysis of trends over a longer sample

[15] The Securities Act of 1933 was amended with rule 497(k) in early 2009, with mandatory compliance starting on January 1, 2010.

[16] Before its introduction, the SEC contracted with Abt SRBI Inc. to conduct focus groups to assess and incorporate retail investor views on a mutual fund summary prospectus. In its Summary Prospectus Adopting Release (Release Nos. 33-8998; IC-28584; File No. S7-28-07), the SEC wrote that it is *"adopting an improved mutual fund disclosure framework that […] is intended to provide investors with information that is easier to use and more readily accessible, while retaining the comprehensive quality of the information that is available today. The foundation of the improved disclosure framework is the provision to all investors of streamlined and user-friendly information that is key to an investment decision."*

[17] SEC Form N-1A is the registration form for investment companies, used for registering mutual funds and exchange-traded funds (ETFs). The form encompasses information from the prospectus as well as additional information. Form N-1A is used for both initial registration (first filing) and subsequent amendments (i.e., updates). A fund must update its Form N-1A registration statement annually. These filings appear in the EDGAR database as filing types 485APOS and 485BPOS, which are prepared according to SEC rules 485(a) and 485(b), respectively. The main difference between these two filing types is that 485APOS filings are used when the changes relative to the previous filing are more substantial. However, in terms of general structure and content, they are largely identical.

that covers both the pre- and post-financial crisis periods. We consider group prospectuses filed between 1999 and 2018.[18]

From our basic sample, we remove filings which contain no text that is useful for our analysis.[19] We use Series IDs in the case of 497K filings and Central Index Keys (CIKs) in the case of 485 filings to identify funds and fund groups, respectively. The CIK is a unique identifier for fund groups, and the Series ID is the unique identifier at the fund level. Each filing is associated with the date on which it was filed with the SEC. Whenever we are left with more than one filing at the CIK or Series ID level in a given year, we use the one that contains the largest number of sentences.

To construct text-based variables from the prospectuses, we first perform some basic cleaning steps and remove formatting and html code. Next, we identify and extract text passages that explicitly describe the reporting funds' investment mandates. Finally, using dictionaries that we develop for this purpose, we perform text searches that capture references to credit ratings and several related concepts. For example, we record whether a given fund's mandate explicitly refers to specific agencies, and whether it mentions the terms "investment grade" and "high yield".

[18] While these documents are in principle available on EDGAR from 1997 onward, the SEC made significant changes to the underlying Form N-1A that became effective in June 1998. Furthermore, Lipper objective codes, which we use to identify and categorize fixed income funds, are available starting in 1998. To ensure a consistent sample of filings with similar informational content over time, we thus start the sample in 1999.

[19] First, we remove all filings that contain an XBRL attachment and fewer than 100 sentences; typically, they are filed for the sole purpose of submitting additional exhibits for a previously filed prospectus. We also remove supplements and incomplete filings. We remove 497K filings with fewer than 10 sentences as well as 485APOS and 485BPOS filings with fewer than 25 sentences. Supplements and incomplete 497K filings are identified using a list of supplement expressions as well as the absence of a mandatory disclaimer sentence required by rule 497(k).

In the case of 497K filings, we identify the relevant passages by focusing on the mandatory section "Principal Investment Strategies". Following SEC regulation, this section contains the rules according to which the reporting funds invest.[20] Fund group filings of the types 485APOS and 485BPOS tend to have a more idiosyncratic structure than 497K summary prospectuses, which are standardized. However, we can extract the same type of information from group prospectus filings by focusing on sentences that contain the following elements: (i) a relevant fund word (e.g., "we", "fund", "portfolio"); (ii) a relevant action word (e.g., "invest", "hold", "purchase"); (iii) a mandate phrase (e.g., "we may", "up to XX% of the portfolio").[21]

Finally, for both filing types, we exclude examples and consider only statements about credit quality.[22] This ensures that we do not capture references that are unrelated to credit ratings (for example, references to S&P indices). Given the selected passages and the dictionaries we develop, we are able to run fully automatic searches that achieve a high classification accuracy and yield all the main text-based variables employed in the analysis of Section 2.[23] We report these variables together with the corresponding dictionaries and exclusion lists in Table 1.

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[20] Table A1 in the appendix shows several excerpts to illustrate the type of information these sections contain.

[21] The full lists of expressions used for each of these three criteria are reported in Table A2 in the appendix. Sentence boundaries are discovered using the algorithm of Kiss and Strunk (2006), trained on texts from the Wall Street Journal.

[22] These statements must contain at least one term directly related to the concept of credit quality, and they may not refer to equity indexes. Examples are defined as statements that follow "for example", "i.e.", and "such as", or that contain a boilerplate expression. The exact terms used for these filters are shown in Table A3.

[23] We perform a manual validation exercise on the mandate passages of 100 randomly drawn debt-fund summary prospectuses. For 97% of these documents, all the rating variables used in the analysis are correctly classified. Thus, while some measurement error does exist in the data, its magnitude is small.

B. Sample of summary prospectuses

Our main sample consists of fund-specific summary prospectuses (filing type 497K). Using the EDGAR – CRSP linking file, we combine information from the CRSP mutual fund database with information from funds' SEC filings on EDGAR. Using this link, we add the funds' Lipper objective codes from CRSP to the funds' summary prospectuses. In our main tests, we retain the 497K filings of fixed income mutual funds according to the Lipper classification. We exclude from our main sample filings of money market mutual funds, because the investment opportunity set of such funds was circumscribed by ratings-based regulation until the end of 2016 (Rule 2a-7 of the Investment Company Act of 1940). We also exclude fixed income funds that only invest in U.S. government securities, as those assets de facto all carry the highest credit ratings. The fund categories in the sample thus comprise municipal debt funds, fixed income funds focusing on debt from international issuers, corporate debt funds, funds investing in mortgage-backed securities, and "other" fixed income funds. Table A4 in the appendix lists the main fixed income categories examined by us, along with the constitutive Lipper objective codes.

Table 2, Panel A, reports the number of summary prospectus filings by fund category; a given fund is represented at most once per year. The sample includes 15,214 filings by 2,346 fixed income mutual funds. The number of summary prospectus filings has increased over time, reflecting a rising number of reporting funds. The two largest fund categories in terms of filing volume are corporate debt funds (5,824 filings) and municipal debt funds (4,573), followed by "other" fixed income mutual funds (3,088). Fixed income funds primarily investing in foreign debt securities and those primarily investing in MBS contribute 1,590 and 139 filings, respectively.

Since 2010, funds have been required to include a separate summary section in their fund group prospectuses (filing type 485). However, they can also release these summary sections as separate filings (497K). Therefore, the number of 497K filings in any given year does not necessarily reflect the number of active U.S. funds. In fact, based on our analysis of CRSP data,

the number of fixed income mutual funds (defined using Lipper objective codes) with at least one million dollars in total net assets was 2,025 in 2011, increasing monotonically to 2,480 funds in 2018 (there were 3,148 unique funds over that period). In contrast, the number of fixed income funds filing summary prospectuses increased from 1,238 in 2011 to 2,068 in 2018. We consider possible changes in the composition of the sample over time by including fund fixed effects in some of the regression specifications (see Section 2).

Panel B of Table 2 presents summary statistics. We report various variables derived from the investment mandate passages extracted from the 497K filings. The construction of these variables is discussed in Table 1. We also report portfolio characteristics of the funds in our sample using data from the CRSP Mutual Fund database.

C. Sample of fund group prospectuses

Filings of the types 485APOS and 485BPOS encompass entire fund groups (which can include both equity and fixed income funds), and they are available for a longer period than the 497K summary prospectuses, namely from 1999 to 2018. We match the fund group's CIK from the 485 filing to the CRSP Mutual Fund database using the EDGAR – CRSP linking file. We then determine if the fund group includes a fund that is classified as a debt fund using Lipper objective codes (see Table A4 in the appendix). We retain in the sample those 485 filings that contain at least one debt fund.[24] The resulting sample contains 9,499 prospectuses filed by 712 different fund

[24] As in Section 1.B, debt funds comprise municipal debt funds, fixed income funds focusing on debt from international issuers, corporate debt funds, funds investing in mortgage-backed securities, and "other" fixed income mutual funds.

groups over the period 1999 – 2018. Panel C of Table 2 reports summary statistics for this sample. It shows the (dummy) variables derived from the extracted investment mandate passages.

2. Empirical analysis

A. Proof of concept

In this section, we verify that the textual data extracted from mutual fund investment mandates have real economic content. First, we provide some time-series evidence on the plausibility of the measures. Second, we study funds' investment portfolios to assess if the mandate prescriptions match the actual holdings of funds.

For the first part of this analysis, we exploit a regulatory reform that affected money market mutual funds. As discussed in Section 1.B, we exclude money market mutual funds from our main analysis, because the investment opportunity set of such funds was circumscribed by ratings-based regulation until 2016. Specifically, to ensure that money market fund assets are sufficiently low in risk, Rule 2a-7 of the Investment Company Act of 1940 used to require that such funds invest only in securities that have received one of the two highest short-term ratings from an NRSRO (or, if unrated, are of comparable quality). In July 2014 (effective October 2016), this rule was changed to comply with the Dodd-Frank Act, which requires federal agencies to remove references to credit ratings from regulations. The amended rule no longer defines an "eligible security" with reference to credit ratings, but rather as a security that the money market fund's board determines to have "minimal credit risk." We expect money market funds to be less likely to refer to credit ratings in their prospectuses after the implementation of the reform.

In Table 3, we report the annual averages of the dummy variables *NRSRO, Big 3*, and *All ratings references* for money market mutual funds (funds are classified as money market funds using Lipper objective codes, see Table A4 in the appendix). As expected, the fraction of money market funds that refer to credit ratings falls considerably following the implementation of the

reform: for example, the share of money market funds referring to the term "NRSRO" drops from 18% in 2015 to 1% in 2018.[25]

Next, we examine whether the content of the investment mandates and our text-based measures match the actual portfolio holdings of fixed income funds. We obtain quarterly data on fixed income funds' security holdings from CRSP and bond credit ratings from Mergent-FISD. We match this dataset with 497K filings for each fund and quarter using the EDGAR – CRSP linking file. We then classify funds into high yield funds and investment grade funds using the text-based analysis of the investment mandates.[26] The resulting sample contains 29,286 rated securities pertaining to 357 fund portfolios over the period from 2010 to 2018.[27]

Figure 2 plots the distribution of credit ratings of debt instruments contained in the fund portfolios of fixed income funds classified as "high yield", and of those classified as "investment grade". The observations are weighted by the market value of the investment in a given security by a given fund. Consistent with their investment mandates, funds classified as high yield hold mostly lower-rated debt securities (below BBB-), while investment grade funds hold mostly high-rated securities. This analysis illustrates that our text-based classification procedure produces data with meaningful cross-sectional properties.

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[25] In the Online Appendix, Section B and Table B1, we present another test aimed at examining the plausibility of the time-series properties of our text-based measures. We identify references to environmental, social, and governance (ESG) criteria in mandates. Given the rising interest in ESG issues in recent years, a positive trend would seem natural. As expected, only few fixed income funds discuss such matters. However, we also observe the expected increase in ESG references over the 2010 – 2018 period.

[26] Fund types are identified using investment mandate restrictions that apply to 80% or more of portfolio assets. A fund is classified as investment grade if its mandate refers to investment grade securities and does not contain any references to high yield instruments. Similarly, a fund is classified as high yield if its mandate refers to high yield securities and does not contain any references to investment grade instruments.

[27] Note that many funds are not strictly set up as "high yield" or "investment grade" funds.

In the Online Appendix (Section B), we perform two additional tests to illustrate that the measures derived from the text analysis of fixed income fund investment mandates are reliable and are related to the portfolios of funds. First, we analyze the use of specific credit rating symbols (such as "A+") in mandates, which funds use to commit to certain risk levels, and the corresponding portfolio holdings of funds. We find that funds that refer to a given alphanumeric rating in the mandate tend to hold a significantly higher fraction of securities rated up to that level than funds that do not refer to that rating in their mandate, suggesting that the rating in the mandate indeed serves as an upper bound for the portfolio risk. Second, we consider security sales and purchases by funds with different investment mandates. These tests show that high yield funds are significantly more likely to buy newly issued high yield securities, while investment grade funds are significantly less likely to do so. Further, securities that are downgraded to high yield are less likely to be sold by high yield funds and are more likely to be sold by investment grade funds.

In sum, the analyses discussed in this section confirm that funds not only refer to credit ratings in their investment mandates, but that the ratings-based investment restrictions of the mandates are also reflected in funds' actual portfolio holdings.

B. Trends in the use of credit ratings in investment mandates, 2010 – 2018

How has the use of credit ratings in mandates evolved over time? Has the financial crisis affected the private use in financial markets, mirroring regulatory efforts to pull back on the reliance on ratings? Table 4 reports the annual fraction of funds that make various ratings-related references in their investment mandates over the 2010 to 2018 period. 88% of fixed income mutual funds refer to the investment grade threshold (i.e., cases where the mandates refer to "investment grade" or "high yield," or both); this fraction has increased from 84% in 2010 to 90% in 2018. We interpret a mention of the investment grade threshold as an indirect reference to credit ratings. About 22% of debt funds refer to the term "NRSRO". 56% of funds refer to specific alphanumeric

ratings or agencies (variable *Direct ratings reference* in the table) in 2010, rising to 61% in 2018. At the end of our sample, 94% of the fixed income funds contain a ratings reference (direct or indirect), up from 90% in 2010. Overall, Table 4 suggests that both direct and indirect references to ratings in fixed income mandates have modestly increased over the 2010 – 2018 period.

Investment mandates of fixed income funds regularly refer to specific rating agencies. Do trends differ across these different raters? Are there reversals in trends, perhaps due to reputational damage suffered by specific rating agencies in relation to the financial crisis? For example, in 2015 (2017), S&P (Moody's) settled a collection of lawsuits filed by the U.S. government related to S&P's (Moody's) structured finance ratings prior to the financial crisis. It is conceivable that S&P or Moody's suffered reputational damage related to the quality of ratings produced in the run-up to the financial crisis. Consequently, fixed income funds may have switched to other raters in their investment mandates for the purposes of defining the investment opportunity set.

Table 4 also sheds some light on this question. The table reports the unconditional averages of the variables *S&P*, *Moody's*, and *Fitch* over the 2010 – 2018 period. S&P is referred to most often (on average, 29% of the funds refer to S&P), Moody's only slightly less frequently. Fitch is mentioned by around 16% of the funds. The table also shows that no specific rater has significantly changed its standing in mandates over the 2010 – 2018 period. In sum, our analysis suggests that ratings use in mandates is wide-spread and that there has been no substantial revision of the view of individual agencies since the financial crisis.[28]

[28] In untabulated tests, we also analyze whether funds refer to other credit rating agencies such as Dominion, Duff & Phelps, Morningstar, or Kroll. During the 2010 – 2018 sample period, Kroll is mentioned in only three filings, while Dominion is mentioned in two filings. Otherwise only S&P, Moody's, and Fitch are referenced in mandates.

The aggregate time trends documented so far suggest a stable, or somewhat increasing, use of credit ratings in investment mandates. However, other variables may be changing over time, and this may make a clear interpretation of the findings in Table 4 difficult. To avoid drawing conclusions from time trends that may be affected by omitted variables bias, we introduce controls for key characteristics that are potentially related to ratings use. Perhaps most critical in this regard are entry and exit from the universe of reporting funds. The aggregate trend toward (moderately) increased use of ratings indicates some combination of (i) new funds using ratings more than the existing population, (ii) exiting funds using ratings less, and (iii) continuing funds changing their mandates from year to year.

To address these issues, we estimate OLS regression models of the following type:

$$Y_{f,t} = \alpha + \beta \cdot Linear\ trend_t + \gamma_f + \varepsilon_{f,t} \quad (1)$$

where *f* denotes the fund and *t* the year. γ_f is a vector of fund fixed effects, which we include in some of the specifications; these eliminate the impact of fund turnover on the time trend, isolating the effect of changes in mandates of continuing funds. *Linear trend* takes the value of 0 in the year 2010; it is 1 in 2011, 2 in 2012, 3 in 2013 etc. The coefficient β therefore captures trends in rating references by fixed income funds. Y denotes the dependent variables, of which we report two in Table 5: *All ratings references* (columns 1 – 4), which captures any type of reference to a credit rating or rating agency, and *Big 3* (columns 5 – 8), which captures references to at least one of the three main rating agencies (S&P, Moody's, Fitch).

Column 1 of Table 5 reports the coefficients on *Linear trend* from regressions without controls and fixed effects. Columns 2 and 3 report coefficients from regressions that include various fund-level control variables: assets under management; fund age; indicator variables for the existence

of institutional or retail share classes; dummy variables for index funds and ETFs;[29] the fund's annual expense ratio; and a variable denoting the fraction of other funds of the same management company having the respective rating reference in their mandates. Finally, column 4 reports a specification with fund fixed effects.[30] Columns 5 – 8 report coefficients from similar specifications studying the trend in references to the main credit rating agencies (dependent variable *Big 3*).

Consistent with the simple averages reported in Table 4, the regressions reported in Table 5 suggest that there has been a moderate increase in various rating references in fixed income investment mandates between 2010 and 2018. For example, considering the variable *All ratings references*, the coefficients on *Linear trend* range from 0.003 in column 4 to 0.006 in columns 1 – 3. This implies that the incidence of mandate use of ratings has increased by 0.3 to 0.6 percentage points per year over the period 2010 – 2018, and that about half of the increase is attributable to continuing funds adding references, the rest to entry and exit. A similar moderate, positive trend can be observed for the variable *Big 3*. In the Online Appendix (Table C1), we report coefficients from regressions using several additional ratings-related dependent variables, such as references to the term "NRSRO", to specific alphanumeric credit ratings (e.g., "A+" or "BB-"), and to the investment grade threshold (e.g., "BBB-" in the case of S&P). In all specifications that we have examined we find a moderate but significant positive trend over the 2010 – 2018 period.

[29] Table C2 in the Online Appendix reports similar regressions as in Table 5, but the sample excludes ETFs and index funds. We exclude these funds for robustness purposes because the portfolio choice decisions of these funds are mechanically tied to indices. Therefore, whether or not their mandates refer to ratings is largely irrelevant for their actual investment decisions. We find that the results in Table C2 are similar to those documented in Table 5.

[30] In the specifications with fund fixed effects, we exclude some variables from the regression because they do not exhibit any within-fund variation (*Index fund*, *ETF*) or because the variation is not meaningful in these specifications (*Ln(Fund age)*). We note that our inference regarding the trend is unaffected by this cosmetic change in the specification.

Which characteristics explain ratings use in fixed income funds? Table 5 (together with Appendix Table C1) sheds some light on this question. Overall, younger funds, funds with more assets under management, and ETFs are more likely to use ratings, while index funds are less likely to do so. Furthermore, ratings use is correlated across funds within management companies.

Do trends in the use of ratings differ across mutual fund categories? While we do not have a strong hypothesis why the use of ratings should differ across categories, we want to ascertain that the trends documented in Table 5 are not driven by only a limited set of fixed income fund types. Table 6 sheds light on this issue. We estimate trend regressions in sub-samples consisting of specific debt fund categories: fixed income funds focusing on debt from international issuers (columns 1 and 2), corporate debt funds (columns 3 and 4), municipal debt funds (columns 5 and 6), funds investing primarily in mortgage-backed securities (columns 7 and 8), and "other" fixed income funds (columns 9 and 10). Moderate increases in ratings use over the 2010 – 2018 period can be observed in all fund categories, except in the category of "other" fixed income funds, in which we cannot reject a flat trend.

C. The use of ratings in investment mandates over the 1999 – 2018 period

The sample employed in Section 2.B is based on annual summary prospectuses (filing type 497K). The advantage of this sample is that each filing is fund-specific, and that all filings contain standardized sections for funds' investment mandates. Furthermore, using the unique Series ID identifier from the SEC for each fund, together with the EDGAR – CRSP linking file, we can match the summary prospectuses to the CRSP mutual fund database and retrieve additional information on the funds. This permits us, for example, to classify funds as fixed income funds using Lipper objective codes. A disadvantage is that 497K filings are available only from 2010 onward, the post-financial crisis period. However, it is conceivable that the use of ratings by mutual funds differed prior, during, or after the financial crisis. To shed light on this issue, we extend our analysis to the

pre-2010 period using fund group prospectuses (filings of the type 485, see Section 1). Each of these filings typically encompasses a group of funds rather than a single fund, and each filing may contain various types of funds (fixed income, equity, etc.). Furthermore, given the lack of common structure of the documents, it is not always possible to link discussions of investment mandates to specific funds within the filing. We describe the construction of the sample of fund group prospectus filings in Section 1.C.

In our sample based on fund group prospectuses, the average of the variable *All ratings references* is 0.985 (sample period 1999 – 2018). This implies that most fund groups that contain at least one fixed income mutual fund have at least one fund that refers to credit ratings in its investment mandate. Table 7 provides evidence on trends in the use of ratings in investment mandates over 1999 – 2018, using annual fund mandates from group prospectuses. We report coefficients from regressions of the following type:

$$Y_{g,t} = \alpha + \beta \cdot Linear\ trend_t + \gamma_g + \varepsilon_{g,t} \quad (2)$$

where g denotes the fund group and t the year. γ_g is a vector of fund group fixed effects. *Linear trend* takes the value of 0 in the year 1999; it is 1 in 2000, 2 in 2001, etc. *Y* is the dependent variable; as in Table 5, we employ *All ratings references* in columns 1 – 4 and *Big 3* in columns 5 – 8. While the specification reported in column 1 does not contain any fixed effects, the coefficients reported in column 2 are from a regression that contains fund group fixed effects. Based on the estimate of the coefficient on the variable *Linear trend* in column 2, we infer that ratings references in fixed income investment mandates have increased by about 0.2 percentage points per year over the 1999 – 2018 period.

This trend estimate is slightly lower than the one based on summary prospectuses reported in Table 5. This is because the level of ratings use implied by the group prospectuses, given that they

typically encompass several funds,[31] is somewhat higher than in the sample of fund-specific prospectuses, leaving less scope for a positive trend over time: for the period 2010 – 2018, the average of the variable *All ratings references* is 0.93 in the 497K sample, while it is 0.99 in the sample of 485 filings. The regressions support the conclusion that rating use has moderately increased over the 1999 – 2018 sample period, from a high initial level.

Finally, we investigate if trends in ratings use differed before and after the financial crisis of 2008. To do this, we modify regression model (2) by estimating separate trends for the 1999 – 2007 and the 2008 – 2018 periods, respectively. Results are reported in columns 3 and 4 of Table 7. We find that the trend in ratings use has been positive both in the pre- as well as in the post-crisis period; the coefficients on the pre- and post-crisis trend variables are not statistically different from each other. Trends in references to the big three credit rating agencies (specifications reported in columns 5 – 8 of Table 7, using the dependent variable *Big 3*) are similar. Overall, our analysis supports the conclusion that over the period from 1999 to 2018, the use of credit ratings in investment mandates has not decreased. In fact, the trend has been slightly positive.

D. Changing contract terms: adding or removing rating references in investment mandates

Asset managers may change their contract terms, including their investment strategies and how they demarcate their investment opportunity set. Funds that refer to ratings in their investment mandate in one year may cease to do so in the following year, and vice versa.[32]

[31] The median filing underlying the sample used in Table 7 contains five funds.

[32] For example, the Harbor Bond Fund referred to credit ratings in its 2016 summary prospectus filing when defining the type of securities it invests in: *'The Fund invests primarily in investment-grade debt securities, but may invest up to 15% of its total assets in below investment-grade securities, commonly referred to as "high-yield" or "junk" bonds. For all securities other than mortgage-related securities, the Fund may invest in below investment-grade securities only if they are rated B or higher by Moody's, S&P or Fitch, or, if unrated, determined to be of comparable quality. For mortgage-related securities, the Fund may invest in securities of any credit quality, including*

How persistent are contract terms in fixed income funds? Do funds frequently add and remove credit rating references in their investment mandates? Do new funds tend to use ratings? We examine these questions in Table 8, in which we report transition frequencies for funds with respect to their use of credit ratings. We classify funds into four categories: (i) funds that do not refer to any ratings-related term in their investment mandate; (ii) funds that refer only to the investment grade threshold (i.e., the dummy variable *Direct ratings reference* is zero, while *HY / IG* takes the value of one); (iii) funds for which *Direct ratings reference* is one; or (iv) new funds, i.e., funds that file a summary prospectus (497K) for the first time. We observe that rating references are rather "sticky." Funds that refer to credit ratings in a given year (either directly, or indirectly by referring to the investment grade threshold) have a likelihood of more than 95% to do the same in the next year. Only 0.4 percent of the funds that use ratings in their investment mandates in a given year stop doing so in the following year. We also find that more than 90% of the new funds make a direct or indirect credit ratings reference in their investment mandates.

Table 8 suggests that funds do not change rating references in mandates often. However, over time, individual funds may add or remove certain types of rating references in mandates. Table 9 investigates the observable characteristics of funds that add (columns 1 and 2) or remove (columns 3 and 4) references to credit ratings in the investment mandate. We estimate OLS regression models of the following type:

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those rated below B.' In the following year, the same fund no longer used specific credit rating terms to define what it considers to be its investment opportunity set, but rather referred to the investment grade threshold in more general terms: *'The Fund invests primarily in investment-grade debt securities, but may invest up to 20% of its total assets in below investment-grade securities, commonly referred to as "high-yield" or "junk" bonds."'* This change is captured via our text-based variables in the following way. The indicator variable *HY/IG* takes the value of one in both 2016 and 2017, while the variables *Letter rating* and *Big 3* take the value of one in 2016 only (they are zero in 2017).

$$Y_{f,t} = \alpha + X'\beta + \varepsilon_{f,t} \quad (3)$$

The explanatory variables in the regressions, matrix X, are the same as in our main trend regressions reported in Table 5. The dependent variables, Y, are variables that capture whether a given fund adds or removes a rating reference in the mandate. In Table 9 we focus on dummy variables that capture whether funds add or remove a reference to any ratings, or a reference to one of the big three ratings agencies; in Appendix Table C3 we also examine other rating reference changes in the mandate (such as adding or removing the reference to a specific alphanumeric rating).

The sample in specification 1 of Table 9 consists of funds that do not refer to ratings in their mandate at all in a given year *t*, that is, observations for which *All ratings references* is zero in *t*. The dependent variable in specification 1, *Add(All ratings references),* is a dummy variable that takes the value of one in year *t* if *All ratings references* is zero in year *t* but one in year *t+1*. We proceed analogously for the regression reported in column 2. Columns 3 and 4 report coefficients from regression models studying funds that remove a certain ratings reference from the investment mandate. The sample in specification 3 consists of funds that refer to ratings in their mandate in a given year *t*, that is, observations for which *All ratings references* is one in *t*. The dependent variable in specification 3, *Remove(All ratings references),* is a dummy variable that takes the value of one in year *t* if *All ratings references* is one in year *t* but zero in year *t+1*. We proceed analogously for the regression reported in column 4.

Several interesting patterns emerge (see also Appendix Table C3). Funds with higher expense ratios appear to be more active in adjusting their mandates over time, both with respect to adding and removing rating references, while retail funds are less likely to do so. Younger funds and funds with more assets under management appear somewhat more likely to add rating references to the mandate than other funds. Index funds are more likely to remove and less likely to add ratings references. Finally, we find that changes to mandates appear to be coordinated at the fund

family level: funds with the same management company are likely to add or remove references in lockstep. In sum, changes in the use of ratings in investment mandates appear to be associated with certain fund characteristics, which suggests that these changes are deliberate decisions made at the fund- and fund-family level.

3. Conclusions

Fixed income securities constitute a large component of the financial system, of investor financial wealth, and of financial institutions' assets. These markets are of critical importance to monetary policy, and to the financing for governments and firms. Overwhelmingly, investment decisions for these assets are delegated to professional managers. How are principal-agent conflicts in this market overcome? We use textual analysis to classify the mandates of U.S. fixed income mutual funds to shed light on the features of contracts between portfolio managers and investors. The most striking pattern is that credit ratings are almost universally used in mandates. Ratings fulfill a unique role as an ex-ante constraint on the level of risk taking by funds.[33]

Not only is the frequency of ratings references in mandates high throughout our sample, it has also moderately increased over the recent two decades. The use of ratings went from very common (nine in ten funds in 2010) to almost universal (sixteen in seventeen funds in 2018). This pattern of high and rising use contrasts with the negative view of ratings that emerged after the financial crisis.

[33] This use is consistent with theoretical work by He and Xiong (2013) and Parlour and Rajan (2020), who point out that public signals of asset quality can help mitigate agency problems in the delegation of portfolio management.

Even if credit ratings have important flaws, as the academic literature convincingly suggests,[34] they remain critical to fixed income investors, the health of financial markets, and to the funding that flows through these markets. The continued and widespread private use of credit ratings may reflect, either, that financial market participants find them reliable enough, or that there is a lack appropriate substitutes. This has important implications for the ability to replace ratings. Any regulatory effort to curb the usage of ratings therefore needs to recognize as a first-order challenge the need for viable alternatives.

[34] See, for example, Cornaggia, Cornaggia, Hund (2017); Benmelech and Dlugosz (2009a, 2009b); Griffin and Tang (2011); Gordy and Willeman (2012); Baghai, Servaes, and Tamayo (2014); He, Qian, and Strahan (2014); Flynn and Ghent (2017); Baghai and Becker (2020).

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Figure 1. Analysis of tone in news articles mentioning credit rating agencies, 2000 – 2019

We analyze sentiment about credit rating agencies using news articles from the Financial Times and the Wall Street Journal (from January 2000 to December 2019). We consider articles about credit rating agencies and, for each article, calculate the fraction of words with negative tone; negative tone words are defined using the Loughran-McDonald sentiment dictionary (we use the updated 2018 version of the sentiment word list obtained from the website of Bill McDonald at sraf.nd.edu). Following Nimark and Pitschner (2019), we use text snippets from the beginning of each article, which capture the main topic and sentiment of a story. News articles about credit rating agencies are those that discuss these firms either in their headlines or in their lead paragraphs. To identify the relevant articles, we use the key words "rating agencies", "rating(s) industry", "rating companies", "rating firms", "rating organizations", and "credit ratings". We also include articles with the words "rating" or "credit" as well as the name of at least one of the three big rating agencies (S&P, Moody's, and Fitch). Texts that make references to ESG ratings or specific rating decisions (e.g., "downgrade", "upgrade", "slash", "cut", "notch", "affirm", "credit watch", "outlook") are removed. 4,241 articles are used in the analysis. The figure plots the average fraction of words with negative tone per quarter. It also shows the moving average of the fraction of negative words over the current and the past eight quarters (grey dashed line). The shaded area indicates the duration of the Great Recession according to the NBER (December 2007 to June 2009).

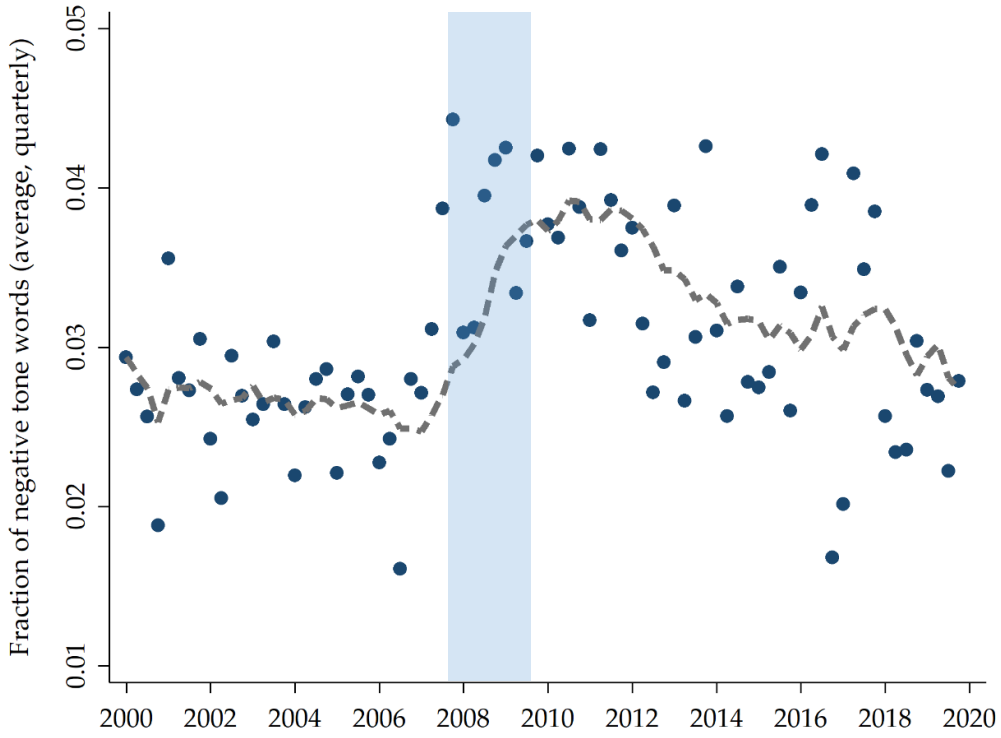

Figure 2. Security rating distribution for high yield funds and investment grade funds

The figure plots the distribution of credit ratings of debt instruments contained in the portfolios of fixed income funds. The sample spans the years 2010 – 2018 and uses the following data sources. We start with quarterly data on fixed income mutual funds' security holdings from CRSP. Using the securities' CUSIPs, we add bond credit ratings (highest rating from S&P, Moody's, and/or Fitch) from Mergent-FISD; ratings reflect credit risk information as of the reporting month of the portfolio holdings. For each fund portfolio and year, using the EDGAR – CRSP linking file, we add information on ratings references in the funds' investment mandates from the 497K filings. We report the distribution of the ratings of debt securities contained in the portfolios of high yield funds, as well as the ratings distribution for investment grade funds. Fund types are identified using mandate restrictions that apply to 80% or more of portfolio assets. A fund is classified as investment grade if its mandate refers to investment grade securities and does not contain any references to high yield instruments. A fund is classified as high yield if its mandate refers to high yield securities and does not contain any references to investment grade instruments. The terms speculative grade, junk, below investment grade, lower than investment grade and non-investment grade are considered equivalent to the term high yield.

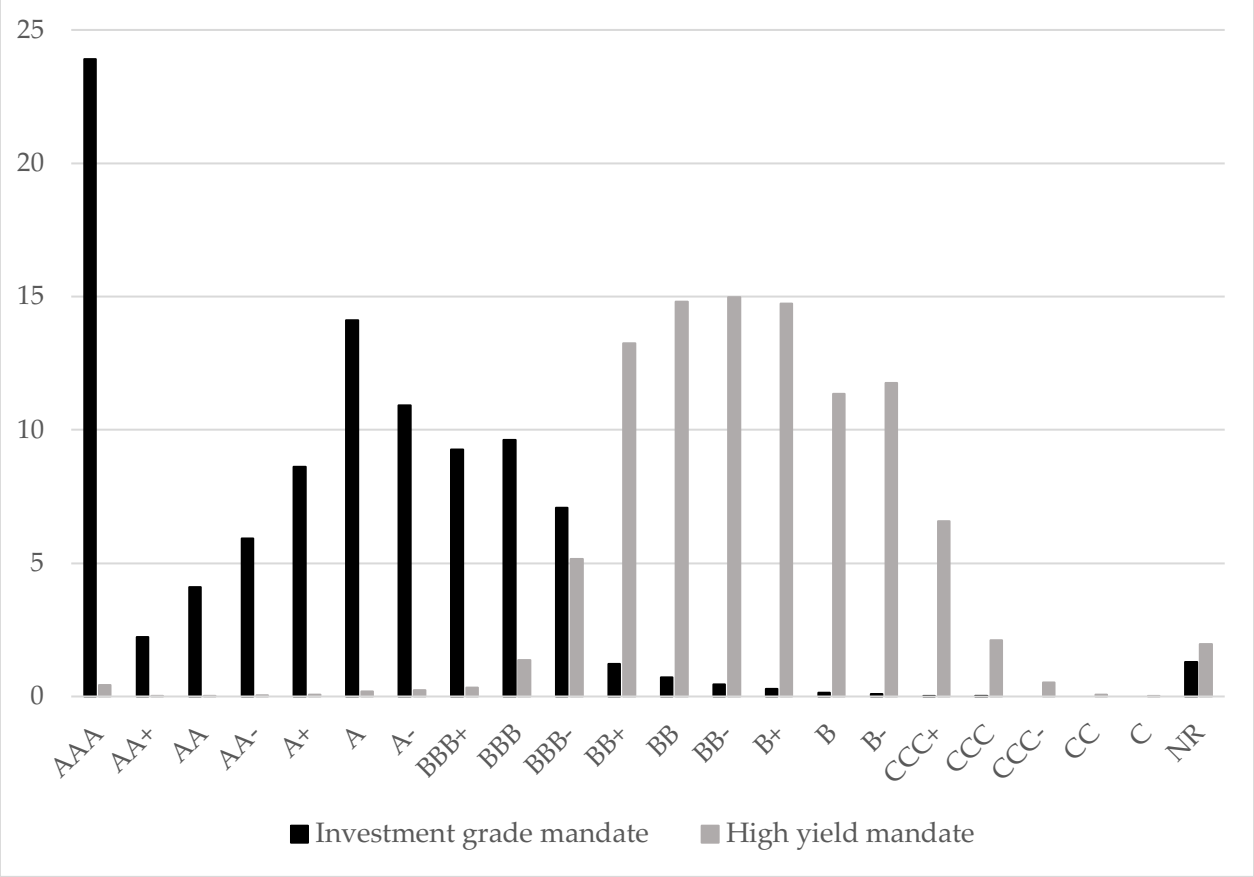

Table 1. Descriptions of the main text-based variables

This table reports the main text-based variables together with the corresponding dictionaries in the column "Search terms". The column "Excluded search terms" shows several expressions that are not considered to be matches because they do not capture the desired concepts. Minor variations in terms of spelling and capitalization are also included in the searches but are not separately designated in the table. Parentheses denote optional elements. All variables are indicator variables that take the value of one if the relevant investment mandate passage of the prospectus includes one of the search terms; for further details, see Section 1.

Variable name	Search terms	Excluded search terms
S&P	S&P, Standard & Poor, Standard and Poor	S&P 100, S&P 400, S&P 500, S&P 600, S&P Composite, S&P Index, S&P Target, S&P Small Cap, S&P Mid Cap, S&P Large Cap
Fitch	Fitch	-
Moody's	Moody	-
Big 3	*Search terms listed for the variables S&P, Fitch, and Moody's*	*Exclusion terms as listed for the variable S&P*
NRSRO	NRSRA, NRSRO, [nationally] recognized statistical rating agency, [nationally] recognized statistical rating organization	-
Letter rating	Aaa, Aa1, Aa2, Aa3, A1, A2, A3, Baa1, Baa2, Baa3, Ba1, Ba2, Ba3, B1, B2, B3, Caa1, Caa2, Caa3, Ca, C, P1, P2, P3, Not Prime, NP, AAA, AA+, AA, AA-, A+, A, A-, BBB+, BBB, BBB-, BB+, BB, BB-, B+, B, B-, CCC+, CCC, CCC-, CC, C, RD, SD, D, A1+, A1, A2, A3, B, C, D, F1+, F1, F2, F3, SG, SP1+, SP1, SP2, SP3, VMIG1, VMIG2, VMIG3, VMIG4, MIG1, MIG2, MIG3, MIG4	Part A, Part B, Part C, Part D, Class A, Class B, Class C, Class D, Investor A, Investor B, Investor C, Investor D, Fund(s) A, Fund(s) B, Funds(s) C, Fund(s) D, Appendix A, Appendix B, Appendix C, Appendix D, Schedule(s) A, Schedule(s) B, Schedule(s) C, Schedule(s) D, A fund, A portfolio, A fundamental, A non-fundamental, A broadly, A diversified, A sub-advisor, A shares, B shares, C shares, D shares, (A), (B), (C), (D)
Direct ratings reference	*Search terms listed for the variables S&P, Fitch, Moody's, NRSRO, and Letter rating. Additional search terms:*	*Exclusion terms as listed for the variables S&P and Letter rating.*

	rating agency, rating agencies, rating organization(s), Duff and Phelps, Duff & Phelps, D&P, Dominion, DBRS, Kroll, KBRA	
HY / IG	investment grade, high yield, speculative grade, junk, below investment grade, non-investment grade	-
All ratings references	*Search terms listed for the variables Direct ratings reference and HY / IG*	*Exclusion terms as listed for the variable Direct ratings reference*
ESG	ESG, CSR, socially, social and governance, social responsibility, social values, social impact, corporate responsibility, corporate governance, governance factors, governance criteria, governance guidelines, environmental(ly), responsible investment(s), responsible investing, responsibility factors	-
IG fund	*Fund types are identified using mandate restrictions that apply to 80% or more of portfolio assets. A fund is classified as investment grade if its mandate refers to investment grade securities and does not contain any references to high yield instruments.*	below investment grade, non-investment grade, lower than investment grade
HY fund	*Fund types are identified using mandate restrictions that apply to 80% or more of portfolio assets. A fund is classified as high yield if its mandate refers to high yield securities and does not contain any references to investment grade instruments. The terms* speculative grade, junk, below investment grade, lower than investment grade *and* non-investment grade *are considered equivalent to the term* high yield.	-

Table 2. Summary statistics

This table reports summary statistics for the main variables. Minima and maxima of dummy variables are not reported.
Panel A reports the number of summary prospectus filings (form 497K) over the period 2010 to 2018. Fund type classifications are based on Lipper objective codes (from the CRSP Mutual Fund database); see Table A4 for details.
Panel B reports variables constructed using text from the fund-specific summary prospectuses (filing type 497K); the sample period is 2010 – 2018. Table 1 discusses the content of these variables in detail. Panel B additionally reports the following variables, which are based on data from the CRSP Mutual Fund database. *Ln(Assets)* is the natural logarithm of the fund portfolio's total net assets in the quarter of the prospectus filing. *Ln(fund age)* is the natural logarithm of one plus the fund's age; a fund's age is the difference between the prospectus-filing year and the initial offering year of the fund. *Institutional* (*Retail*) is a dummy variable for funds that have at least one share class that is primarily marketed to institutional (retail) investors in a given year. *Index* and *ETF* are, respectively, indicator variables for index funds and ETFs. *Expense ratio* is the fund's expense ratio at fiscal year-end. *Fraction (All ratings references)* is the fraction of other funds of the same management company that refer to ratings in their mandates (that is, funds for which *All ratings references* takes the value of one). *Fraction (HY/IG), Fraction (NRSRO), Fraction (Big 3),* and *Fraction (Letter rating)* are defined analogously.
Panel C reports variables based on text from prospectuses filed at the level of fund groups (filing types 485A and 485B); the sample period is 1999 – 2018.

Panel A: Number of summary prospectus filings by fund type, 2010 – 2018

Year	Foreign	Corporate	Municipal	MBS	Other fixed income
2010	86	393	386	13	129
2011	119	467	432	15	205
2012	151	526	461	17	246
2013	178	612	504	16	323
2014	197	677	525	16	386
2015	203	732	554	16	428
2016	217	787	570	16	450
2017	224	824	575	16	454
2018	215	806	566	14	467
Sum	*1,590*	*5,824*	*4,573*	*139*	*3,088*

Panel B: Variables from the sample of 497K filings, 2010 – 2018

	Obs.	Mean	Std. Dev.	Min.	Max.
S&P	15,214	0.287	0.453		
Fitch	15,214	0.163	0.370		
Moody's	15,214	0.276	0.447		
Big 3	15,214	0.295	0.456		
Letter rating	15,214	0.419	0.493		
Direct rating reference	15,214	0.592	0.492		
NRSRO	15,214	0.223	0.417		
HY/IG	15,214	0.881	0.324		
All ratings references	15,214	0.930	0.255		
ESG	15,214	0.009	0.097		
Retail	14,760	0.713	0.452		
Institutional	14,760	0.746	0.435		
Index fund	14,760	0.112	0.315		
ETF	14,760	0.110	0.313		
Ln(Assets)	14,760	5.727	1.995	-2.303	12.533
Ln(Fund age)	14,760	2.386	0.992	0.000	4.554
Fraction (All ratings references)	13,256	0.894	0.221	0	1
Fraction (Big 3)	13,256	0.275	0.334	0	1
Fraction (Letter rating)	13,256	0.401	0.343	0	1
Fraction (HY/IG)	13,256	0.842	0.253	0	1
Fraction (NRSRO)	13,256	0.226	0.314	0	1
Expense ratio	13,000	0.008	0.004	0.000	0.044

Panel C: Variables from the sample of 485 filings, 1999 – 2018

	Obs.	Mean	Std. Dev.
S&P	9,499	0.703	0.457
Fitch	9,499	0.346	0.476
Moody's	9,499	0.695	0.461
Big 3	9,499	0.713	0.453
NRSRO	9,499	0.579	0.494
Letter rating	9,499	0.756	0.430
Direct rating reference	9,499	0.918	0.274
All ratings references	9,499	0.985	0.121
HY/IG	9,499	0.950	0.218
ESG	9,499	0.873	0.333

Table 3. Proof of concept: Rating references in money market mutual funds

This table reports the fraction of money market mutual funds whose mandates refer to ratings or rating agencies (dummy variable *All ratings references*), the fraction of funds referring to S&P, Moody's, and/or Fitch (dummy variable *Big 3*), as well as the fraction of funds whose mandates contain a variant of the term "NRSRO" (dummy variable *NRSRO*). The sample consists of funds that file 497K forms and which are classified as money market funds using Lipper objective codes (see Table A4).

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018
All ratings references	0.272	0.247	0.249	0.278	0.288	0.291	0.180	0.085	0.083
Big 3	0.009	0.011	0.011	0.010	0.010	0.013	0.003	0.003	0.003
NRSRO	0.161	0.158	0.165	0.165	0.180	0.182	0.105	0.019	0.013

Table 4. Annual averages of ratings variables, 2010 – 2018

This table reports annual averages of the variables referring to credit ratings. The variables are constructed using the fund-specific summary prospectuses (filing type 497K); the sample period is 2010 – 2018. All variables are indicator variables that take the value of one if the relevant investment mandate passage of the prospectus includes one of the search terms. *S&P*, *Moody's*, and *Fitch* take the value of one if the investment mandate refers to the respective credit rating agencies, zero otherwise. *NRSRO* is one if the mandate refers to the term "nationally recognized statistical ratings organization." *Letter rating* takes the value of one if the mandate refers to a specific alphanumeric credit rating, such as "A+." *Direct ratings reference* is one if the mandate refers to the generic term "rating agency," the name of a specific rating agency, an alphanumeric rating, or the term NRSRO. *HY/IG* is a dummy variable that is one if the mandate refers to terms that denote the investment grade threshold (such as "high yield", "speculative grade", or "investment grade"). Finally, *All ratings references* is the union of all other ratings-based indicator variables. Table 1 provides a more detailed definition of the text-based variables together with the corresponding dictionaries.

Year	S&P	Moody's	Fitch	NRSRO	Letter rating	Direct ratings reference	HY/IG	All ratings references
2010	0.255	0.249	0.125	0.223	0.379	0.563	0.837	0.902
2011	0.252	0.246	0.139	0.216	0.397	0.563	0.834	0.897
2012	0.268	0.257	0.147	0.215	0.411	0.578	0.854	0.916
2013	0.279	0.267	0.157	0.215	0.419	0.588	0.873	0.925
2014	0.283	0.271	0.159	0.214	0.419	0.589	0.883	0.930
2015	0.292	0.281	0.175	0.218	0.423	0.591	0.898	0.942
2016	0.302	0.291	0.175	0.230	0.425	0.601	0.899	0.943
2017	0.303	0.290	0.175	0.239	0.432	0.609	0.902	0.940
2018	0.313	0.300	0.182	0.230	0.431	0.611	0.897	0.942
2010-2018	*0.287*	*0.276*	*0.163*	*0.223*	*0.419*	*0.592*	*0.881*	*0.930*

Table 5. Trends in rating references, 2010 – 2018

Regression models estimating trends in rating references in fixed income fund investment mandates are reported. The sample consists of annual summary prospectuses (filing type 497K) of fixed income mutual funds over 2010 – 2018. *Linear trend* is 0 for the year 2010; it is 1 for 2011, 2 for 2012, etc. *All ratings references* is one if the fund mandate makes any type of ratings reference (including, but not limited to, any rating agency, a letter rating, or the term NRSRO). *Big 3* is one if the mandate refers to S&P, Moody's, or Fitch. *Fraction (All ratings references)* is the fraction of other funds in the fund family that refer to ratings in their mandates (i.e., funds for which *All ratings references* is one). *Fraction (Big 3)* is defined analogously. The following variables use data from the CRSP Mutual Fund database: *Ln(Assets)* is the natural logarithm of the fund's total net assets in the quarter of the prospectus filing. *Ln(fund age)* is the log of one plus the fund's age (defined as the difference between the prospectus-filing year and the fund's initial offering year). *Institutional* (*Retail*) is a dummy variable for funds that have institutional (retail) share classes. *Index* and *ETF* are, respectively, indicator variables for index funds and ETFs. *Expense ratio* is the fund's expense ratio at fiscal year-end. Heteroskedasticity-robust standard errors, clustered by year, are reported below coefficients. * denotes estimates that are significantly different from zero at the 10% level, ** at the 5% level, and *** at the 1% level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable:	*All ratings references* (col. 1 – 4)				*Big 3* (col. 5 – 8)			
Mean:	0.930	0.930	0.929	0.929	0.295	0.294	0.290	0.291
Linear trend	0.006***	0.006***	0.006***	0.003**	0.008***	0.006***	0.004***	0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Ln(Assets)		-0.001	-0.002	-0.002		0.012***	0.007***	-0.003*
		(0.001)	(0.002)	(0.003)		(0.001)	(0.001)	(0.002)
Retail		0.002	0.006	-0.010		-0.069***	-0.027***	0.008
		(0.005)	(0.006)	(0.006)		(0.014)	(0.003)	(0.015)
Institutional		0.015***	0.001	-0.015***		0.039***	-0.026***	-0.000
		(0.003)	(0.005)	(0.004)		(0.007)	(0.007)	(0.010)
Ln(Fund age)		-0.015***	-0.027***			-0.044***	-0.033***	
		(0.002)	(0.002)			(0.004)	(0.004)	
Index fund		-0.196***	-0.185***			-0.035*	-0.078***	
		(0.021)	(0.021)			(0.019)	(0.019)	
ETF		0.034**	0.048**			0.053***	0.021	
		(0.013)	(0.016)			(0.015)	(0.018)	
Expense ratio			1.160	1.266			1.684***	-2.175
			(1.166)	(2.360)			(0.481)	(1.578)
Fraction (All ratings references)			0.275***	0.226***				
			(0.019)	(0.039)				
Fraction (Big 3)							0.835***	0.375***
							(0.003)	(0.024)
Constant	0.904***	0.946***	0.733***	0.735***	0.260***	0.319***	0.124***	0.207***
	(0.005)	(0.006)	(0.012)	(0.046)	(0.003)	(0.012)	(0.011)	(0.026)
Fund F.E.				Yes				Yes
Observations	15,214	14,760	13,000	13,015	15,214	14,760	13,000	13,015
Adjusted R^2	0.003	0.044	0.105	0.860	0.002	0.022	0.388	0.916

Table 6. Trends in rating references by fund category

This table reports the coefficients of regression models estimating trends in rating references in fixed income mutual fund investment mandates. The sample consists of summary prospectuses (filing type 497K) of fixed income mutual funds over the years 2010 to 2018. The table reports trends in the use of ratings for funds of different types, defined using Lipper objective codes (see Table A4). *Linear trend* takes the value of 0 in the year 2010; it is 1 in 2011, 2 in 2012, 3 in 2013 etc. *All ratings references* is defined in Table 1. Heteroskedasticity-robust standard errors, clustered by year, are reported below coefficients. * denotes estimates that are significantly different from zero at the 10% level, ** at the 5% level, and *** at the 1% level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Sub-sample:	Foreign		Corporate		Municipal		MBS		Other fixed income	
Dependent variable:	All ratings references									
Mean:	0.919	0.919	0.975	0.975	0.929	0.929	0.194	0.194	0.885	0.885
Linear trend	0.010**	0.008**	0.005***	0.004***	0.004***	0.002***	0.014**	0.012*	0.007	0.006
	(0.003)	(0.003)	(0.001)	(0.001)	(0.001)	(0.000)	(0.005)	(0.005)	(0.004)	(0.004)
Constant	0.873***	0.882***	0.954***	0.955***	0.911***	0.918***	0.139***	0.146***	0.853***	0.859***
	(0.020)	(0.018)	(0.006)	(0.005)	(0.005)	(0.001)	(0.028)	(0.022)	(0.024)	(0.022)
Fund F.E.		Yes		Yes		Yes		Yes		Yes
Observations	1,590	1,590	5,824	5,824	4,573	4,573	139	139	3,088	3,088
Adjusted R^2	0.007	0.778	0.005	0.688	0.001	0.929	0.000	0.881	0.002	0.819

Table 7. Trends in rating references, 1999 – 2018

This table reports the coefficients for regression models estimating trends in rating references in mutual fund investment mandates contained in annual fund group prospectuses (filing type 485A/B). The sample period covers the years 1999 – 2018. The dependent variables are defined in Table 1. *Linear trend* takes the value of 0 in the year 1999; it is 1 in 2000, 2 in 2001, 3 in 2002 etc. *Linear trend (1999-2007)* takes the value of 0 in the year 1999, and in the years 2008 – 2018; it is 1 in 2000, 2 in 2001, 3 in 2002, …, and 8 in 2007. *Linear trend (2008-2018)* takes the value of 0 in the years 1999 – 2007; it is 9 in 2008, 10 in 2009, 11 in 2010, etc. We match the fund group's CIK from the 485 filing to the CRSP Mutual Fund database using the CRSP-CIK linking file. We retain in the sample group prospectuses that contain at least one fund that is classified as a fixed income mutual fund using Lipper objective codes. Heteroskedasticity-robust standard errors, clustered by year, are reported below coefficients.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable:	*All ratings references* (col. 1 – 4)				*Big 3* (col. 5 – 8)			
Mean:	0.985	0.985	0.985	0.985	0.713	0.713	0.713	0.713
Linear trend	0.001***	0.002***			0.004***	0.003***		
	(0.000)	(0.000)			(0.001)	(0.000)		
Linear trend (1999-2007)			0.002*	0.003**			0.002	0.004**
			(0.001)	(0.001)			(0.002)	(0.002)
Linear trend (2008-2018)			0.002***	0.002***			0.004***	0.003***
			(0.001)	(0.000)			(0.001)	(0.001)
Constant	0.970***	0.964***	0.966***	0.961***	0.669***	0.682***	0.675***	0.677***
	(0.006)	(0.006)	(0.008)	(0.007)	(0.007)	(0.006)	(0.010)	(0.008)
Fund group F.E.		Yes		Yes		Yes		Yes
Observations	9,499	9,499	9,499	9,499	9,499	9,499	9,499	9,499
Adjusted R^2	0.004	0.257	0.004	0.257	0.002	0.716	0.002	0.716

Table 8. Transition frequencies between rating references in investment mandates

This table reports a transition matrix for fixed income mutual funds that pertain to either of four categories in any given year (2010 – 2017): (1) funds that do not refer to any ratings-related term in their investment mandate; (2) funds that refer only to the investment grade threshold (i.e., the dummy variable *Direct ratings reference* is zero and *HY / IG* takes the value of one); (3) funds for which *Direct ratings reference* is one; or (4) funds that file a summary prospectus (497K) for the first time. Note that for a given fund category (1 – 4) corresponding to a given line of the table, the transition frequencies reported in the columns sum to 100% (the categories into which the funds can transition in the following year are mutually exclusive). The sample consists of 497K filings of fixed income mutual funds (defined using Lipper objective codes), spanning the years 2010—2018.

	No rating (t+1)	**HY / IG only (t+1)**	**Direct ratings reference (t+1)**	**Exit sample (t+1)**
No rating (t) (Obs. = 928)	88.3%	3.9%	4.8%	3.0%
HY / IG only (t) (Obs. = 4,443)	0.2%	94.8%	2.9%	2.1%
Direct ratings reference (t) (Obs. = 7,708)	0.2%	0.7%	97.0%	2.0%
New fund (t) (Obs. = 2,197)	7.1%	33.7%	57.2%	2.0%

Table 9: Determinants of changes in rating use in mandates

Columns 1 and 2 report coefficients from regression models studying funds that add a certain ratings reference to the investment mandate. The sample in specification 1 consists of funds that do not refer to ratings in their mandate at all in a given year *t*, that is, observations for which *All ratings references* is zero in *t*. The dependent variable in specification 1, *Add(All ratings references),* is a dummy variable that takes the value of one in year *t* if *All ratings references* is zero in year *t* but one in year *t+1*. We proceed analogously for the regression reported in column 2. Columns 3 and 4 report coefficients from regression models studying funds that remove a certain ratings reference from the investment mandate. The sample in specification 3 consists of funds that refer to ratings in their mandate in a given year *t*, that is, observations for which *All ratings references* is one in *t*. The dependent variable in specification 3, *Remove(All ratings references),* is a dummy variable that takes the value of one in year *t* if *All ratings references* is one in year *t* but zero in year *t+1*. We proceed analogously for the regression and sample reported in column 4. Heteroskedasticity-robust standard errors, clustered by fund, are reported below the coefficients. * denotes estimates that are significantly different from zero at the 10% level, ** at the 5% level, and *** at the 1% level. The sample period is 2010 – 2018.

Dependent variable:	(1) Add(All ratings references)	(2) Add(Big 3)	(3) Remove(All ratings references)	(4) Remove(Big 3)
Mean:	0.073	0.012	0.002	0.015
Ln(Assets)	0.021***	0.001	0.000	-0.001
	(0.006)	(0.001)	(0.000)	(0.001)
Ln(Fund age)	-0.074***	-0.001	-0.000	0.004*
	(0.018)	(0.002)	(0.000)	(0.002)
Retail	-0.082*	-0.014**	-0.002	-0.012*
	(0.043)	(0.006)	(0.001)	(0.007)
Institutional	-0.009	0.004*	-0.000	-0.001
	(0.020)	(0.002)	(0.001)	(0.006)
Index fund	-0.091***	-0.003	0.006***	0.025***
	(0.034)	(0.004)	(0.002)	(0.008)
ETF	-0.018	-0.009	0.003*	0.003
	(0.049)	(0.006)	(0.002)	(0.007)
Expense ratio	15.435***	0.998**	0.499***	2.130***
	(2.815)	(0.389)	(0.190)	(0.763)
Fraction (all ratings references)	0.014		-0.002	
	(0.038)		(0.002)	
Fraction (Big 3)		0.053***		-0.022***
		(0.010)		(0.007)
Constant	0.105*	0.004	0.000	0.011
	(0.062)	(0.007)	(0.003)	(0.010)
Observations	923	9,231	12,077	3,769
Adjusted R^2	0.072	0.014	0.003	0.009

Online Appendix to The Use of Credit Ratings in Financial Markets

Ramin P. Baghai, Bo Becker, and Stefan Pitschner *

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* Baghai (ramin.baghai@hhs.se) and Becker: Stockholm School Economics, ECGI, and CEPR. Pitschner: Uppsala University.

A. Additional information on the data, main samples, and variables

Table A1 reports excerpts from extracted sections on Principal Investment Strategies in 497K filings. Table A2 reports expressions used to select mandate passages in group prospectuses (filings of the type 485APOS and 485BPOS). Table A3 reports expressions used to identify statements about credit quality, "boilerplate" disclosure, and stock indices. Table A4 reports the main fixed income mutual fund categories considered in this paper, along with the constitutive Lipper objective codes (from CRSP).

B. Additional proofs of concept

B1. Time-series evidence

To provide additional evidence that the textual data we extract from investment mandates have real economic content, we identify references to environmental, social, and governance (ESG) criteria in investment mandates.[35] Given the rising interest in ESG issues in recent years, a positive trend would seem natural. Table B1 reports the fraction of summary prospectus filings that mention ESG-related terms over the period 2010 – 2018. As expected, only few fixed income funds discuss such matters. In addition to the modest overall level, we also observe the expected increase in ESG references over time (from 0.3% of fixed income funds in 2010 to 2.1% of funds in 2018). This provides additional evidence that the text-based analysis of mandates yields useful data on how fixed income funds operate.

B2. Investment mandates and funds' asset allocation decisions

In the main article, we show that funds classified as high yield according to their investment mandates hold almost exclusively high yield assets (the investment grade assets they hold are overwhelmingly rated BBB), and investment grade funds hold almost exclusively investment

[35] See Table 1 in the main article for a comprehensive list of the search terms used to identify ESG references.

grade assets. In this section, we provide further evidence on how investment mandates relate to funds' portfolio allocation decisions. First, we document additional cross-sectional properties of funds' investment portfolios. Do funds that specify an upper bound on the credit risk using references to alphanumeric ratings (such as A or B-) in the mandate hold a larger share of securities up to that rating level than other funds? Second, we ask which funds sell securities that are downgraded to high yield (e.g., BB+) from investment grade (e.g., BBB-). We expect funds that, according to their investment mandate, are supposed to hold primarily investment grade assets to be more likely to sell securities downgraded below investment grade than high yield funds. Third, we investigate purchases of newly issued high yield securities by funds with different mandates.

For the cross-sectional test, we proceed as follows. We analyze the use of specific credit rating symbols in mandates and the corresponding portfolio holdings of funds. Some funds refer to alphanumeric ratings in their mandate text to commit to certain risk levels. For example, the American Beacon Garcia Hamilton Quality Bond Fund contains the following sentence in the investment mandate (taken from the 2017 summary prospectus): *"Under normal circumstances, the Fund invests at least 80% of its net assets (plus the amount of any borrowings for investment purposes) in investment grade bonds. For purposes of the 80% policy, investment grade bonds include other investment grade debt securities. The Fund considers investment grade debt securities to be debt securities that are rated A- or better by Standard & Poor's Ratings Services, Inc. ("S&P"), Moody's Investors Service, Inc. ("Moody's") or Fitch Ratings Inc. ("Fitch") […]".*

The sample construction proceeds as follows: for the funds in the 497K sample, we obtain quarterly data on fixed income funds' security holdings from CRSP and bond credit ratings from Mergent-FISD. The sample contains 2,256 fund portfolios over the 2010 – 2018 period. We analyze the mandate text of every fund and isolate references to alphanumeric ratings. We then categorize funds into groups based on ratings references in the investment mandate: AAA (5 funds), AA (4),

A (49), BBB (327), BB (187), B (153), CCC (42), CC (5), C (26), or no reference to a letter rating.[36] For example, the above-mentioned American Beacon Garcia Hamilton Quality Bond Fund would be part of the "A" group because it refers to the rating A-. We then calculate the fraction of securities held up to a given rating for each fund and portfolio reporting quarter.

Figure B1 reports the average portfolio fractions (including 95% confidence intervals) of securities rated up to AA-, A-, BBB-, BB-, etc., for funds that refer to different rating categories in their investment mandate (AA, A, BBB, BB, etc.), as well as for all other funds. For example, the first category tabulated is AA. Here we report the average portfolio holding fraction of securities up to a rating of AA-, for funds that belong to the "AA" group (these are funds that refer to an AA rating in their mandate, light grey bar) and all other funds in the sample (dark grey bar). Funds in the AA group have a higher fraction of securities rated up to AA- in their portfolio (55%) than other funds that also hold at least one AA security (40%). More generally, it is evident from Figure B1 that funds that refer to a given alphanumeric rating in the mandate tend to hold a significantly higher fraction of securities rated up to that level than funds that do not refer to that rating in their mandate. This suggests that the rating in the mandate typically serves as an upper bound for the risk taking of the fund.

We note two additional points with regard to Figure B1. First, the figure raises the question why not all securities of funds that refer to a given letter rating are below the specified rating level. This may be the case because in some mandates, ratings restrictions apply only to securities at the time of purchase, or these restrictions may refer to the portfolio on average and not to all securities

[36] We analyze ratings by all big three agencies because funds may refer to more than one type of rating in the mandate. For example, a fund referring to Moody's Ba1 is treated equivalently as one referring to S&P's BB+: both funds would be part of group BB. Furthermore, group BB encompasses mandate references to BB+, BB, and BB-, as well as the corresponding Moody's categories; we classify the other groups similarly. Some funds may also refer to more than one alphanumeric rating in the same mandate (for example, BB and B); in that case, to categorize the fund, we consider the lowest rating (results are unaffected if we consider the highest rating). Finally, we note that the category that a fund belongs to may change if the mandate text changes from one year to the next.

held.[37] Another reason is that while ratings may primarily refer to an upper risk limit, a rating may also refer to the minimum risk a portfolio security should have.[38]

Second, Figure B1 shows that funds that refer to a BB rating or to a CC rating in the mandate are an exception to the pattern observed in the other categories: "BB funds" ("CC funds") have, on average, a *lower* portfolio share invested in securities rated up to BB- (CC) than other funds. To analyze this discrepancy more systematically, we extract references in the mandate text that explicitly indicate whether a given letter rating is an upper bound or a lower bound for the risk of a portfolio security.[39] Most ratings references define an upper bound for the credit risk of portfolio securities. The BB and CC rating categories, however, are exceptions. The majority (78%) of the modifying phrases used in conjunction with the BB rating explicitly state that the BB rating is a lower bound for the risk of portfolio securities, i.e., that the credit rating of these securities should be lower than BB. Similarly, funds that refer to a CC rating in their mandate typically refer to the rating as a lower bound for the credit risk (no fund refers to the CC rating as an upper bound).

Next, we consider security sales and purchases by funds with different investment mandates. The purpose of this analysis is to show that funds not only refer to credit ratings in their

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[37] For example, the AST Bond Portfolio 2022 fund contains the following sentence in the investment mandate (taken from the 2014 summary prospectus) which illustrates these points: *"The Portfolio's subadviser currently intends to maintain an overall weighted average credit quality rating of A- or better for the Portfolio. This target overall credit quality for the Portfolio will be based on ratings as of the date of purchase. In the event the overall credit quality drops below A- due to downgrades of individual portfolio securities, the Portfolio's subadviser will take appropriate action based upon the relevant facts and circumstances."*

[38] For example, in its 2013 summary prospectus, the AST High Yield Portfolio fund describes its principal investment strategy as follows: *"The Portfolio invests, under normal circumstances, at least 80% of the Portfolio's net assets plus any borrowings for investment purposes (measured at the time of purchase) in non-investment grade high-yield fixed income investments […]. Non-investment grade securities are commonly known as "junk bonds" and include securities rated Ba or lower by Moody's Investors Services, Inc. or equivalently rated by Standard & Poor's Corporation or Fitch […]."*

[39] Phrases denoting an upper bound are "at least", "higher than", "and above", "as low as", "or above", "or better", and "or higher". Phrases denoting a lower bound are "lower than", "and below", "and lower", "at or below", "or below", and "or lower".

investment mandates, but that the ratings-based investment restrictions of the mandates are actually reflected in their active portfolio choices. The sample is constructed as follows. We start with quarterly data on fixed income mutual funds' security holdings from CRSP. Using the securities' CUSIPs, we add bond credit ratings (for each security, we use the highest rating from S&P, Moody's, and/or Fitch) from Mergent-FISD; ratings reflect securities' credit risk at the end of the month in which the portfolio holdings are reported. We exclude unrated securities from the analysis. For each fund portfolio and year, we add (using the EDGAR – CRSP linking file) information on ratings references in the funds' investment mandates from the 497K filings. Using this sample, we estimate the following regression model:

$$Sell_{i,f,t} = \alpha \cdot Downgrade\ to\ HY_{i,t} \cdot HY\ fund_{f,t} + \beta \cdot Downgrade\ to\ HY_{i,t} \cdot IG\ fund_{f,t} + \gamma \cdot Downgrade\ to\ HY_{i,t} + X'\delta + \varepsilon_{i,f,t} \quad \text{(B1)}$$

where *i* denotes a fixed income security, *f* denotes a fund portfolio, and *t* denotes a quarter. *Sell* is an indicator variable that takes a value of one if a given security is included in a given portfolio in quarter *t* but is not in the portfolio in quarter *t+1*; it takes a value of zero otherwise. *Downgrade to HY* is a dummy variable that takes the value of one if a security is rated BBB- or higher in quarter *t* and it is rated BB+ or lower (or the security becomes "unrated") three months later. *HY fund* and *IG fund* are dummy variables reflecting whether the mandate of a fund indicates that it primarily invests in high yield or investment grade securities, respectively. $X'\delta$ is a matrix consisting of the following variables and their regression coefficients: fund fixed effects, security fixed effects, and year-quarter fixed effects. Summary statistics for this sample are reported in Panel A of Table B2.

In Panel B, we report the coefficients from regression model (B1). The estimates suggest that securities that are downgraded to high yield are less likely to be sold by high yield funds and they are more likely to be sold by investment grade funds. The benchmark group in this analysis consists of funds that are neither classified as high yield funds, nor as investment grade funds.

Our next test sheds light on security purchases by funds with different investment mandates. The sample consists of quarterly data on fixed income security issuances from Mergent /FISD. We include all security issuances that have a Moody's, S&P and/or Fitch credit rating in the quarter that they are issued. We match these securities to fund portfolios from CRSP and to our data on

fund-specific summary prospectuses. Using this sample, we estimate the following regression model:

$$Buy_{i,f,t} = \alpha \cdot HY\ security_{i,t} \cdot HY\ fund_{f,t} + \beta \cdot HY\ security_{i,t} \cdot IG\ fund_{f,t} + X'\delta + \varepsilon_{i,f,t} \quad \text{(B2)}$$

where *i* denotes a fixed income security, *f* denotes a fund portfolio, and *t* denotes a quarter. *Buy* is an indicator variable that takes the value of one if a security that is issued in quarter *t* is included in a given fund's portfolio in quarter *t+1*. *HY security* is a dummy variable that indicates that the highest rating the security receives at issuance is BB+ or lower; we consider ratings by Moody's, S&P, and Fitch. The other variables are the same as in regression model (B1) and Table B2.

Panel A of Table B3 reports summary statistics for this sample. In Panel B of Table B3, we report coefficients from the estimation of regression model (B2). We find that high yield funds are significantly more likely to buy newly issued high yield securities, while investment grade funds are significantly less likely to do so. As in Table B2, the benchmark group in this analysis consists of funds that are neither classified as high yield funds nor as investment grade funds.

In sum, this section provides additional evidence that funds not only refer to credit ratings in their investment mandates but that the ratings-based investment restrictions of the mandates are also reflected in funds' actual portfolio allocation decisions.

C. Additional evidence on the use of credit ratings in fixed income mutual fund investment mandates

Table 5 in the article examines trends in the use of credit ratings in fixed income investment mandates over the period 2010 – 2018. As the dependent variables in these regressions, we employ *All ratings references* and *Big 3* (see Table 1 in the article for detailed definitions). In Table C1, we reproduce the regressions from Table 5 in the article and also report coefficients from regressions with additional dependent variables: in Panel A, the dependent variables are *All ratings references* (columns 1 – 4) and *HY/IG* (5 – 8); we use *NRSRO* (columns 1 – 4) and *Big 3* (5 – 8) in Panel B; and, finally, *Letter rating* in Panel C.

Table C2 reports similar regressions as Table C1, but the sample excludes "passive" investment vehicles, i.e., ETFs and index funds. We exclude these funds for robustness purposes

because the portfolio choice decisions of these funds are mechanically tied to indices. Therefore, whether or not their mandates refer to ratings is largely irrelevant for their actual investment decisions. We find that the results in Table C2 are similar to those documented in Table C1.

Figure B1. Security holdings and mandate references to specific credit rating levels

The figure reports the association between ratings of portfolio securities and references to specific alphanumeric ratings in investment mandates of fixed income funds. The sample uses the following data sources. We start with quarterly data on fixed income mutual funds' security holdings from CRSP. Using the securities' CUSIPs, we add bond credit ratings (highest rating from S&P, Moody's, and/or Fitch) from Mergent-FISD. We then combine the quarterly portfolio holdings with information on ratings references in the funds' investment mandates from the 497K filings. We categorize funds into groups based on references to alphanumeric ratings in the mandate. The sample contains 2,256 fund portfolios over the 2010 – 2018 period. The figure reports the average portfolio fraction of securities up to a certain rating for funds that refer to specific rating categories in the mandate (dark grey bars), and all other funds (light grey bars). For example, the first category tabulated is AA (this group includes references to AA+, AA, AA-, as well as the corresponding Moody's categories). Here we report the average fraction of portfolio holdings up to a rating of AA-, for funds that belong to the AA group (light grey bar) and all other funds in the sample (dark grey bar). We report averages and the corresponding 95% confidence intervals for the average.

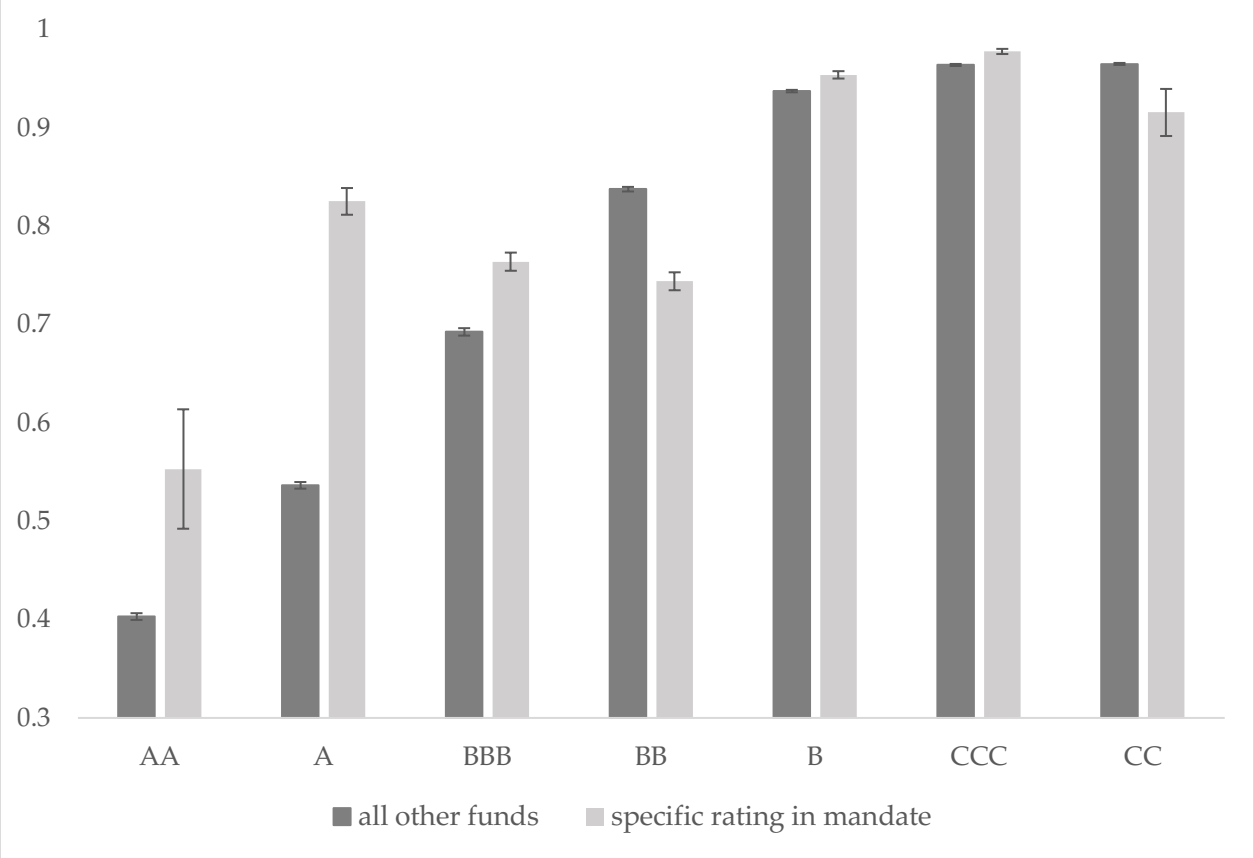

Table A1. Excerpts from extracted sections on Principal Investment Strategies

This table shows excerpts of "principal investment strategy" sections extracted from three 497K prospectuses in our sample. For details on how we use these sections to construct the text-based variables, see the description in Section 1.

Filing details	Excerpt from section on principal investment strategies
Northwestern Mutual Series Fund Select Bond Portfolio, 2016/05/01	*Normally, the Portfolio invests at least 80% of net assets (plus any borrowings for investment purposes) in a diversified portfolio of investment grade debt securities with maturities exceeding one year. The Portfolio may also invest up to 10% of net assets in non-investment grade, high yield/high risk bonds (so called "junk bonds"). Investment grade securities are generally securities rated investment grade by major credit rating agencies (BBB- or higher by S&P; Baa3 or higher by Moody's; BBB- or higher by Fitch) and non-investment grade securities are generally securities rated below investment grade by major credit rating agencies (BB+ or lower by S&P; Ba1 or lower by Moody's; BB+ or lower by Fitch), or, if unrated, determined by the Portfolio's adviser to be of comparable quality.*
Prudential Total Return Bond Fund, 2011/11/08	*The Fund's investment subadviser allocates assets among different debt securities, including (but not limited to) U.S. Government securities, mortgage-related and asset-backed securities, corporate debt securities and foreign securities. The Fund may invest up to 50% of its investable assets in high risk, below investment-grade securities having a rating of not lower than CCC—also known as high-yield debt securities or junk bonds. The Fund may invest up to 45% of its investable assets in foreign debt securities.*
Carillon Eagle Investment Grade Bond Fund, 2017/11/20	*During normal market conditions, the Investment Grade Bond Fund seeks to achieve its objective by investing at least 80% of its net assets (plus the amount of any borrowings for investment purposes) in a portfolio of U.S. and foreign investment grade fixed income instruments of varying maturities. Investment grade is defined as securities rated BBB- or better by Standard & Poor's Rating Services or an equivalent rating by at least one other nationally recognized statistical rating organization or, for unrated securities, those that are determined to be of equivalent quality by the fund's portfolio managers.*

Table A2. Expressions used to select mandate passages in group prospectuses

This table reports the search terms used to identify mandate passages within the 485APOS and 485BPOS group prospectuses. Minor variations in terms of spelling, capitalization, tense and singular/plural are also included in the searches, but are not separately designated in the table. Parentheses denote optional elements. Slashes denote that only one of the elements is required to occur. [*] denotes a wildcard. Qualifiers such as "normally", "typically" and "mainly" are allowed to occur in the mandate phrases".

Category	Search terms
Fund Terms	"we", "our", "fund", "portfolio", "trust", "(sub)adviser", "manager", "series", "strategy"
Action Terms	"invest", "buy", "hold", "maintain", "consider", "consist", "purchase", "allocate", "include", "define"
Mandate Phrases	"[%/percent/all/most] (or more) of (its/their/the fund's/the portfolio's/the series') (investable/total/net) [assets/income/value/portfolio]", "[at least/… …more than/less than/up to] [*] [%/percent]", "[fund/portfolio/trust/… …(sub)adviser/manager/series/strategy] [will/may/can/cannot/invests/… …consists/allocates/purchases/maintains/holds/buys/considers/defines/… …is (not) [permitted/allowed/restricted/limited]/does not]", "[fund/… …portfolio/trust/(sub)adviser/manager/series/strategy] [intends/seeks/… …attempts/tries/expects]", "[investment/portfolio/fund/operating/... …fundamental] [strategy/objective/goal/policy]"

Table A3. Expressions used to identify statements about credit quality, "boilerplate" disclosure, and stock indices

This table reports the search terms used to identify statements about credit quality, boilerplate disclosure, and stock indices. Minor variations in terms of spelling, capitalization, tense and singular/plural are also included in the searches, but are not separately designated in the table. Slashes denote that only one of the elements is required to occur.

Category	Search terms
Terms used to identify statements about credit quality	"credit quality", "credit risk", "rating", "rated", "upgraded", "downgraded", "nrsro", "nrsra", "investment grade", "high grade", "high yield", "junk", "speculative grade"
Terms used to identify boilerplate disclosure	"by consent of", "written request", "all of the information", "applicable laws", "laws and regulation", "under the terms of the", "pursuant to the requirements", "cannot assure", "no assurance", "the risk that", "regulated investment company", "pre-effective", "post-effective", "you should", "you may", "if you", "when you", "you are", "[could/may/can/to] lose money"
Terms used to identify statements about stock indexes	"stock market index", "stock price index", "stock index", "equity index"

Table A4. Fixed income fund categories and Lipper objective codes

This table reports the main fixed income mutual fund categories employed in this paper, along with the constitutive Lipper objective codes (from CRSP). Note that money market funds are not contained in our main sample; we use money funds only in the sample underlying Table 3.

Fixed income fund category	Lipper objective codes
Corporate	A, BBB, BBBL, CV, HY, IID, SID, SII
Foreign	EMD, EML, GLI, INI, SWM
Mortgage-backed securities	ARM, GNM
Municipal	AL, AZ, CAG, CAI, CAS, CAT, CO, CT, FL, FLI, FLT, GA, GM, HI, HM, IMD, KS, KY, LA, MA, MAT, MD, MDI, MI, MN, MO, NC, NJ, NY, NYI, NYT, OH, OHT, OR, OSS, OST, OTH, PA, PAT, SC, SIM, SMD, SSIM, TN, TX, VA, VAT, WA
Other	ACF, FLX, GB, IUT, LP, MSI, SFI, USO
Money market	CAM, CTM, IMM, ITE, ITM, IUS, MAM, MIM, MM, NJM, NYM, OHM, OTM, PAM, TEM, USS, UST

Table B1. Proof of concept: ESG references in fixed income funds

This table reports the fraction of fixed income mutual funds mentioning "ESG"-related terms in their investment mandate (instances when the dummy variable *ESG* takes the value of one). The sample construction is described in Section 1.B in the main article.

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018
ESG	0.003	0.002	0.004	0.004	0.007	0.009	0.01	0.015	0.021

Table B2. Security sales and investment mandates

This table reports summary statistics (Panel A) and coefficients for regression models for security sales by investment grade funds and high yield funds, compared to other fixed income funds (Panel B). Quarterly data on fixed income mutual funds' security holdings is from CRSP. Using the securities' CUSIPs, we add bond ratings (for each security, we use the highest rating from S&P, Moody's, and/or Fitch) from Mergent-FISD; ratings reflect securities' credit risk at the end of the month in which the portfolio holdings are reported. For each fund portfolio and year, we add (using the EDGAR – CRSP linking file) information on ratings references in the funds' investment mandates from the 497K filings. *Sell* is an indicator variable that takes a value of one if a given security is included in a given portfolio in quarter *t* but is not in the portfolio in quarter *t+1*; it takes a value of zero otherwise. *Downgrade to HY* is a dummy variable that takes the value of one if a security is rated BBB- or higher in quarter *t* and it is rated BB+ or lower (including cases where the security becomes unrated) three months later. *HY fund* and *IG fund* are dummy variables indicating whether a fund primarily invests in high yield or investment grade securities, respectively (see Table 1 for a detailed definition). In the regression reported in Panel B, heteroskedasticity-robust standard errors, clustered by fund, are reported below the coefficients. * denotes estimates that are significantly different from zero at the 10% level, ** at the 5% level, and *** at the 1% level. The sample period is 2010 – 2018.

Panel A: Variables for the analysis of security sales

	Obs.	Mean	Std. Dev.
Sell	7,729,355	0.133	0.340
Downgrade to HY	7,729,355	0.004	0.066
HY fund	7,729,355	0.111	0.314
IG fund	7,729,355	0.105	0.306

Panel B: Regression analysis of security sales

Dependent variable:	Sell
Mean:	0.133
Downgrade to HY × HY fund	-0.335***
	(0.020)
Downgrade to HY × IG fund	0.103***
	(0.026)
Downgrade to HY	0.489***
	(0.013)
Fund F.E.	Yes
Security F.E.	Yes
Year-quarter F.E.	Yes
Observations	7,729,355
Adjusted R^2	0.120

Table B3. Security purchases and investment mandates

This table reports summary statistics (Panel A) and coefficients for regression models that study purchases of newly issued debt securities by investment grade funds and high yield funds, compared to other fixed income funds (Panel B). The sample consists of quarterly data on fixed income security issuances from Mergent /FISD. We include all security issuances that have a Moody's, S&P and/or Fitch credit rating in the quarter that they are issued. We match these securities to fund portfolios from CRSP and to our data on fund-specific summary prospectuses. *Buy* is an indicator variable that takes the value of one if a security that is issued in quarter *t* is included in a given fund's portfolio in quarter *t+1*. *HY security* is a dummy variable that indicates that the highest rating the security receives at issuance is BB+ or lower; we consider ratings by Moody's, S&P, and Fitch (or any subset of these raters). *HY fund* and *IG fund* are dummy variables indicating whether a fund primarily invests in high yield or investment grade securities, respectively (see Table 1 for a detailed definition). In the regression reported in Panel B, heteroskedasticity-robust standard errors, clustered by fund, are reported below the coefficients. * denotes estimates that are significantly different from zero at the 10% level, ** at the 5% level, and *** at the 1% level. The sample period is 2010 – 2018.

Panel A: Variables for the analysis of security purchases

	Obs.	Mean	Std. Dev.
Buy	119,266,119	0.004	0.062
HY security	119,266,119	0.058	0.233
HY fund	119,266,119	0.070	0.255
IG security	119,266,119	0.942	0.233
IG fund	119,266,119	0.124	0.329

Panel B: Regression analysis of security purchases

Dependent variable:	Buy
Mean:	0.004
HY security × HY fund	0.098***
	(0.007)
HY security × IG fund	-0.013***
	(0.001)
Fund F.E.	Yes
Security F.E.	Yes
Year-quarter F.E.	Yes
Observations	119,266,119
Adjusted R^2	0.049

Table C1. Trends in rating references, 2010 – 2018

This table reports the coefficients for regression models estimating trends in rating references in fixed income fund investment mandates. The sample consists of summary prospectuses (filing type 497K) of fixed income mutual funds (defined using Lipper objective codes, see Table A5) over the years 2010 – 2018. *Linear trend* takes the value of 0 in the year 2010; it is 1 in 2011, 2 in 2012, 3 in 2013 etc. The remaining variables are defined in Table 1. Heteroskedasticity-robust standard errors, clustered by year, are reported below coefficients. * denotes estimates that are significantly different from zero at the 10% level, ** at the 5% level, and *** at the 1% level.

Panel A: Trends—all ratings references, references to the investment grade threshold

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable:	All ratings references				HY/IG			
Mean:	0.930	0.930	0.929	0.929	0.881	0.880	0.877	0.876
Linear trend	0.006***	0.006***	0.006***	0.003**	0.009***	0.010***	0.009***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Ln(Assets)		-0.001	-0.002	-0.002		-0.002	0.001	-0.003
		(0.001)	(0.002)	(0.003)		(0.001)	(0.002)	(0.003)
Retail		0.002	0.006	-0.010		0.012	0.007	-0.012
		(0.005)	(0.006)	(0.006)		(0.007)	(0.006)	(0.007)
Institutional		0.015***	0.001	-0.015***		0.013**	-0.004	-0.018***
		(0.003)	(0.005)	(0.004)		(0.004)	(0.004)	(0.004)
Ln(Fund age)		-0.015***	-0.027***			-0.031***	-0.049***	
		(0.002)	(0.002)			(0.002)	(0.002)	
Index fund		-0.196***	-0.185***			-0.166***	-0.133***	
		(0.021)	(0.021)			(0.019)	(0.019)	
ETF		0.034**	0.048**			0.011	0.050***	
		(0.013)	(0.016)			(0.010)	(0.013)	
Expense ratio			1.160	1.266			9.300***	0.221
			(1.166)	(2.360)			(1.174)	(2.424)
Fraction (All ratings references)			0.275***	0.226***				
			(0.019)	(0.039)				
Fraction (HY/IG)							0.442***	0.247***
							(0.022)	(0.022)
Constant	0.904***	0.946***	0.733***	0.735***	0.841***	0.920***	0.506***	0.691***
	(0.005)	(0.006)	(0.012)	(0.046)	(0.006)	(0.010)	(0.011)	(0.035)
Fund F.E.				Yes				Yes
Observations	15,214	14,760	13,000	13,015	15,214	14,760	13,000	13,015
Adjusted R^2	0.003	0.044	0.105	0.860	0.004	0.031	0.160	0.893

Panel B: Trends—NRSRO references, references to the big three rating agencies

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. var.:	NRSRO				Big 3			
Mean:	0.223	0.226	0.234	0.234	0.295	0.294	0.290	0.291
Linear trend	0.003**	0.005***	0.002***	0.001**	0.008***	0.006***	0.004***	0.002***
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Ln(Assets)		0.004**	0.005***	-0.003*		0.012***	0.007***	-0.003*
		(0.001)	(0.001)	(0.002)		(0.001)	(0.001)	(0.002)
Retail		0.098***	0.011	0.020		-0.069***	-0.027***	0.008
		(0.012)	(0.008)	(0.013)		(0.014)	(0.003)	(0.015)
Institutional		-0.044***	-0.056***	-0.014		0.039***	-0.026***	-0.000
		(0.008)	(0.006)	(0.009)		(0.007)	(0.007)	(0.010)
Ln(Fund age)		-0.012**	-0.018***			-0.044***	-0.033***	
		(0.004)	(0.002)			(0.004)	(0.004)	
Index fund		-0.161***	-0.085***			-0.035*	-0.078***	
		(0.019)	(0.006)			(0.019)	(0.019)	
ETF		0.072**	0.017			0.053***	0.021	
		(0.027)	(0.015)			(0.015)	(0.018)	
Expense ratio			-1.484	3.951*			1.684***	-2.175
			(1.239)	(1.793)			(0.481)	(1.578)
Fraction (NRSRO)			0.876***	0.534***				
			(0.007)	(0.027)				
Fraction (Big 3)							0.835***	0.375***
							(0.003)	(0.024)
Constant	0.212***	0.184***	0.097***	0.086***	0.260***	0.319***	0.124***	0.207***
	(0.004)	(0.008)	(0.019)	(0.015)	(0.003)	(0.012)	(0.011)	(0.026)
Fund F.E.				Yes				Yes
Observations	15,214	14,760	13,000	13,015	15,214	14,760	13,000	13,015
Adjusted R^2	0.000	0.022	0.438	0.927	0.002	0.022	0.388	0.916

Panel C: Trends—references to specific alphanumeric ratings

	(1)	(2)	(3)	(4)
Dependent variable:		Letter rating		
Mean:	0.419	0.420	0.418	0.418
Linear trend	0.005***	0.005***	0.003***	0.002
	(0.001)	(0.001)	(0.000)	(0.002)
Ln(Assets)		0.012***	0.007***	0.001
		(0.002)	(0.001)	(0.001)
Retail		-0.019	-0.026**	-0.001
		(0.012)	(0.009)	(0.019)
Institutional		0.023**	-0.028***	-0.016
		(0.007)	(0.006)	(0.012)
Ln(Fund age)		-0.030***	-0.024***	
		(0.004)	(0.004)	
Index fund		-0.167***	-0.152***	
		(0.020)	(0.022)	
ETF		0.012	0.033*	
		(0.019)	(0.017)	
Expense ratio			-0.150	0.421
			(1.185)	(3.698)
Fraction (Letter rating)			0.805***	0.409***
			(0.006)	(0.054)
Constant	0.395***	0.416***	0.158***	0.247***
	(0.006)	(0.009)	(0.006)	(0.041)
Fund F.E.				Yes
Observations	15,214	14,760	13,000	13,015
Adjusted R^2	0.001	0.010	0.323	0.909

Table C2. Trends in rating references, excluding passive funds

This table reports the coefficients for regression models estimating trends in rating references in fixed income fund investment mandates. The sample consists of summary prospectuses (filing type 497K) of fixed income funds (defined using Lipper objective codes, see Section 1) over the years 2010 – 2018. The sample excludes "passive" mutual funds (ETFs and index funds). *Linear trend* takes the value of 0 in the year 2010; it is 1 in 2011, 2 in 2012, 3 in 2013 etc. The remaining variables are defined in Table 1. Heteroskedasticity-robust standard errors, clustered by year, are reported below coefficients. * denotes estimates that are significantly different from zero at the 10% level, ** at the 5% level, and *** at the 1% level.

Panel A: Trends—all ratings references, references to the investment grade threshold

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable:	All ratings references				HY/IG			
Mean:	0.946	0.946	0.946	0.946	0.894	0.894	0.891	0.891
Linear trend	0.006***	0.006***	0.007***	0.004***	0.009***	0.009***	0.010***	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Ln(Assets)		-0.007***	-0.005**	-0.003*		-0.009***	-0.002	-0.005**
		(0.002)	(0.002)	(0.001)		(0.002)	(0.002)	(0.002)
Retail		0.007	-0.019***	-0.009*		0.017*	-0.032***	-0.012*
		(0.006)	(0.004)	(0.004)		(0.007)	(0.006)	(0.006)
Institutional		0.014***	-0.003	-0.016***		0.013**	-0.014***	-0.020***
		(0.003)	(0.004)	(0.003)		(0.005)	(0.003)	(0.003)
Ln(Fund age)		-0.008***	-0.021***			-0.024***	-0.045***	
		(0.002)	(0.002)			(0.002)	(0.002)	
Expense ratio			6.247***	0.732			15.787***	-0.102
			(0.318)	(2.381)			(0.557)	(2.477)
Fraction (All ratings references)			0.200***	0.103***				
			(0.019)	(0.028)				
Fraction (HY/IG)							0.416***	0.153***
							(0.020)	(0.023)
Constant	0.919***	0.963***	0.780***	0.868***	0.853***	0.944***	0.520***	0.792***
	(0.006)	(0.009)	(0.015)	(0.043)	(0.007)	(0.013)	(0.009)	(0.041)
Fund F.E.				Yes				Yes
Observations	13,023	12,833	11,212	11,227	13,023	12,833	11,212	11,227
Adjusted R^2	0.004	0.011	0.057	0.851	0.005	0.018	0.165	0.891

Panel B: Trends—NRSRO references, references to the big three rating agencies

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable:	NRSRO				Big 3			
Mean:	0.242	0.243	0.255	0.254	0.285	0.282	0.276	0.277
Linear trend	0.002**	0.004***	0.002***	0.001*	0.007***	0.006***	0.003***	0.003***
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)
Ln(Assets)		0.005**	0.006***	-0.001		0.013***	0.009***	-0.000
		(0.002)	(0.001)	(0.002)		(0.001)	(0.001)	(0.001)
Retail		0.100***	0.026**	0.020		-0.062***	-0.025***	0.007
		(0.012)	(0.008)	(0.013)		(0.013)	(0.004)	(0.014)
Institutional		-0.044***	-0.056***	-0.016		0.030***	-0.035***	-0.003
		(0.007)	(0.005)	(0.009)		(0.008)	(0.007)	(0.009)
Ln(Fund age)		-0.011**	-0.020***			-0.041***	-0.028***	
		(0.005)	(0.002)			(0.004)	(0.003)	
Expense ratio			-3.790**	3.769*			2.253***	-2.094
			(1.324)	(1.803)			(0.661)	(1.954)
Fraction (NRSRO)			0.900***	0.530***				
			(0.005)	(0.022)				
Fraction (Big 3)							0.846***	0.374***
							(0.003)	(0.025)
Constant	0.233***	0.174***	0.100***	0.088***	0.254***	0.311***	0.093***	0.184***
	(0.004)	(0.009)	(0.020)	(0.020)	(0.004)	(0.014)	(0.015)	(0.027)
Fund F.E.				Yes				Yes
Observations	13,023	12,833	11,212	11,227	13,023	12,833	11,212	11,227
Adjusted R^2	0.000	0.009	0.449	0.923	0.001	0.013	0.415	0.918

Panel C: Trends—references to specific alphanumeric ratings

	(1)	(2)	(3)	(4)
Dependent variable:	Letter rating			
Mean:	0.436	0.435	0.433	0.434
Linear trend	0.005***	0.005***	0.003***	0.003*
	(0.001)	(0.001)	(0.000)	(0.001)
Ln(Assets)		0.012***	0.010***	0.004***
		(0.002)	(0.001)	(0.001)
Retail		-0.011	-0.017	-0.002
		(0.012)	(0.011)	(0.018)
Institutional		0.016*	-0.035***	-0.019
		(0.007)	(0.006)	(0.012)
Ln(Fund age)		-0.029***	-0.021***	
		(0.005)	(0.004)	
Expense ratio			-0.179	0.490
			(1.626)	(3.706)
Fraction (Letter rating)			0.812***	0.413***
			(0.008)	(0.060)
Constant	0.412***	0.407***	0.126***	0.243***
	(0.007)	(0.013)	(0.008)	(0.046)
Fund F.E.				Yes
Observations	13,023	12,833	11,212	11,227
Adjusted R^2	0.001	0.004	0.342	0.908

Table C3: Determinants of changes in rating use in mandates

Panel A reports coefficients from regression models studying funds that add a certain ratings reference to the investment mandate. The sample in specification 1 consists of funds that do not refer to ratings in their mandate at all in a given year *t*, that is, observations for which *All ratings references* is zero in *t*. The dependent variable in specification 1, *Add(All ratings references),* is a dummy variable that takes the value of one in year *t* if *All ratings references* is zero in year *t* but one in year *t+1*. We proceed analogously for the regressions and samples reported in the other columns. Panel B reports coefficients from regression models studying funds that remove a certain ratings reference from the investment mandate. The sample in specification 1 consists of funds that refer to ratings in their mandate in a given year *t*, that is, observations for which *All ratings references* is one in *t*. The dependent variable in specification 1, *Remove(All ratings references),* is a dummy variable that takes the value of one in year *t* if *All ratings references* is one in year *t* but zero in year *t+1*. We proceed analogously for the regressions and samples reported in the other columns. Heteroskedasticity-robust standard errors, clustered by fund, are reported below the coefficients. * denotes estimates that are significantly different from zero at the 10% level, ** at the 5% level, and *** at the 1% level. The sample period is 2010 – 2018.

Panel A: Adding ratings references in mandates

Dependent variable:	(1) Add(All ratings references)	(2) Add(HY / IG)	(3) Add(NRSRO)	(4) Add(Big 3)	(5) Add(Letter rating)
Mean:	0.073	0.051	0.008	0.012	0.019
Ln(Assets)	0.021***	0.011***	-0.001	0.001	0.000
	(0.006)	(0.004)	(0.000)	(0.001)	(0.001)
Ln(Fund age)	-0.074***	-0.045***	-0.001	-0.001	0.003
	(0.018)	(0.011)	(0.001)	(0.002)	(0.002)
Retail	-0.082*	-0.025	-0.003	-0.014**	-0.015**
	(0.043)	(0.022)	(0.003)	(0.006)	(0.007)
Institutional	-0.009	0.000	0.000	0.004*	-0.004
	(0.020)	(0.013)	(0.003)	(0.002)	(0.004)
Index fund	-0.091***	-0.054*	0.007	-0.003	-0.009**
	(0.034)	(0.030)	(0.006)	(0.004)	(0.004)
ETF	-0.018	0.013	-0.017***	-0.009	-0.005
	(0.049)	(0.034)	(0.006)	(0.006)	(0.007)
Expense ratio	15.435***	13.157***	0.271	0.998**	1.031**
	(2.815)	(2.307)	(0.355)	(0.389)	(0.469)
Fraction (all ratings references)	0.014				
	(0.038)				
Fraction (HY/IG)		0.035			
		(0.024)			
Fraction (NRSRO)			0.023***		
			(0.007)		
Fraction (Big 3)				0.053***	
				(0.010)	
Fraction (Letter rating)					0.053***
					(0.008)
Constant	0.105*	0.016	0.012**	0.004	0.006
	(0.062)	(0.036)	(0.006)	(0.007)	(0.009)
Observations	923	1,603	9,954	9,231	7,572
Adjusted R^2	0.072	0.050	0.003	0.014	0.010

Panel B: Removing ratings references in mandates

Dependent variable:	(1) Remove(All ratings references)	(2) Remove(HY / IG)	(3) Remove(NRSRO)	(4) Remove(Big 3)	(5) Remove(Letter rating)
Mean:	0.002	0.002	0.012	0.015	0.016
Ln(Assets)	0.000	0.000	-0.001	-0.001	0.001
	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Ln(Fund age)	-0.000	-0.000	-0.003	0.004*	0.005**
	(0.000)	(0.001)	(0.003)	(0.002)	(0.002)
Retail	-0.002	-0.001	0.016**	-0.012*	-0.014*
	(0.001)	(0.001)	(0.007)	(0.007)	(0.007)
Institutional	-0.000	-0.000	0.010**	-0.001	-0.010*
	(0.001)	(0.001)	(0.004)	(0.006)	(0.005)
Index fund	0.006***	0.005**	-0.008*	0.025***	0.017
	(0.002)	(0.002)	(0.004)	(0.008)	(0.011)
ETF	0.003*	0.002	-0.005	0.003	0.005
	(0.002)	(0.002)	(0.006)	(0.007)	(0.011)
Expense ratio	0.499***	0.429**	0.234	2.130***	0.949
	(0.190)	(0.202)	(0.582)	(0.763)	(0.674)
Fraction (all ratings references)	-0.002				
	(0.002)				
Fraction (HY/IG)		-0.003			
		(0.002)			
Fraction (NRSRO)			-0.031***		
			(0.007)		
Fraction (Big 3)				-0.022***	
				(0.007)	
Fraction (Letter rating)					-0.003
					(0.006)
Constant	0.000	0.001	0.023**	0.011	0.010
	(0.003)	(0.003)	(0.011)	(0.010)	(0.009)
Observations	12,077	11,397	3,046	3,769	5,428
Adjusted R^2	0.003	0.002	0.010	0.009	0.004

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