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Abstract

Credit ratings have been shown to be imperfect and sometimes biased measures of risk. Has this affected their use in unregulated settings? Using textual analysis, we measure the use of credit ratings in investment mandates of fixed income mutual funds, where ratings serve to limit investment in risky assets. We find that this use has steadily increased from high initial levels over the past two decades. Fixed income markets' extensive and continued reliance on credit ratings either points to a lack of practically useful alternatives, a positive view of ratings by market participants, or inefficient contracting.

JEL Classification: G24, G23, G01

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

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The Private Use of Credit Ratings: Evidence from Mutual Fund Investment Mandates

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

First draft: May 2018
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Abstract. Credit ratings have been shown to be imperfect and sometimes biased measures of risk. Has this affected their use in unregulated settings? Using textual analysis, we measure the use of credit ratings in investment mandates of fixed income mutual funds, where ratings serve to limit investment in risky assets. We find that this use has steadily increased from high initial levels over the past two decades. Fixed income markets' extensive and continued reliance on credit ratings either points to a lack of practically useful alternatives, a positive view of ratings by market participants, or inefficient contracting.

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Individuals and households hold large amounts of assets through financial institutions like mutual funds.[1] The management of these assets is delegated by their ultimate owners to investment managers. Investment managers' discretion in making portfolio allocation decisions, including the choice of asset classes and securities, are specified in investment mandates.

Credit ratings are used widely in investment mandates of fixed income funds. Ratings provide near-ubiquitous, low-cost signals of asset quality, with well-established meaning and a long track record. In theory, such public signals of asset quality can help mitigate agency problems in the delegation of portfolio management (e.g., He and Xiong 2013, Parlour and Rajan 2016). In this paper, we ask two questions regarding the use of credit ratings in investment mandates. First, does the actual use of ratings correspond to their central role in theories of delegation? Second, has the evolution in views about the reliability of credit ratings that followed the 2008 financial crisis led to a reduced use of ratings, and, if so, what has replaced them?[2]

To answer the two questions, we use textual analysis of a comprehensive sample of US fixed income mutual funds to classify direct (e.g., "assets rated A- or better") and indirect ("investment grade securities") reliance on credit ratings in investment mandates. In our most comprehensive sample, covering 2010 – 2018, the use of credit ratings is very broad: only one in fourteen fund mandates does not reference ratings in any way. This broad use is consistent with models in which

[1] For example, in 2018, US open-end bond and money market mutual funds managed $7.2 trillion of assets (Investment Company Institute 2019).

[2] A view shared by the US legislature and the Financial Stability Board (FSB, an international body that monitors and makes recommendations about the global financial system) is that (i) credit rating agencies produced flawed ratings in some asset classes prior to the financial crisis (perhaps due to problematic incentive structures), (ii) that this contributed to destabilizing the financial system, and (iii) that the reliance of the financial system on credit ratings must be reduced. See, for example, the work of the FSB on reducing reliance on ratings (https://www.fsb.org/work-of-the-fsb/policy-development/additional-policy-areas/reducing-reliance-on-credit-ratings/) and the legislative efforts of the US government in the *Dodd-Frank Wall Street Reform and Consumer Protection Act* (commonly referred to as the *Dodd-Frank Act*). This general view also reoccurs in the financial media; see, e.g., the article entitled "Inflated Bond Ratings Helped Spur the Financial Crisis. They're Back" published in the Wall Street Journal in August 2019.

the function of public signals is to communicate with investors. This also corresponds to how asset managers describe their use of ratings. For example, the investment manager BlackRock points out that *"references to ratings in investment guidelines play an important role in ensuring that end investors' expectations with respect to how their assets should be managed are clearly communicated"* (Novick, Chavers, and Rosenblum 2013). Our data provide clear, quantitative support for the idea that credit ratings serve a central purpose in contracting of delegated asset management.

If ratings are used by financial institutions to communicate with investors, the ultimate goal is likely to attract assets (Donaldson and Piacentino 2018). We examine this issue in the context of a small number of funds in our sample which have either added or removed references to ratings. Funds that remove references to credit ratings from their investment mandates subsequently experience lower inflows, while those that add such references do not see accelerated inflows. This offers some corroboration for the idea that ratings use is motivated by the market for funds to manage.

Our second question—how the use of ratings in investment mandates has changed over time—receives a more surprising answer. We find that ratings use has been increasing, particularly since the financial crisis. At the beginning of our main sample, in 2010, one in ten funds does not rely on ratings in any way in the mandate. By the end of our sample, in 2018, only one in seventeen funds does not use ratings at all. This trend toward increased use of ratings appears to conflict with a broadly held view, both in academia and among financial regulators, that ratings are inherently flawed. This view gathered momentum after the large losses sustained on structured assets in the financial crisis and has been influential in motivating efforts to reduce the reliance on credit ratings in regulations (see, e.g., Sangiorgi and Spatt 2017; Becker, Opp, and Saidi 2019).[3]

[3] For example, in 2008, the Swiss bank UBS reported write-downs of $43 billion on mortgage-backed securities (MBS), many of them highly rated. See Benmelech and Dlugosz (2009a), Griffin and Tang (2011)

To examine patterns in the use of credit ratings, we compile a database of investment mandates from US fixed income mutual funds. We use annual filings of fund prospectuses, containing funds' investment mandates, which funds are required to file annually by the US Securities and Exchange Commission (SEC). Our data cover the universe of US fixed income open-end mutual funds from 1999 to 2018 (with more detailed and standardized information available starting in 2010). Mandates use ratings in a few different ways: some specify that the funds will be invested primarily in investment grade securities; other mandates refer to specific minimum ratings; some mandates require ratings from particular agencies, while others allow the ratings of any regulated agency. We use textual analysis to extract indicators for the various uses of credit ratings in each investment mandate. Overall, 59% of mandates refer to a particular credit rating agency or to a specific alphanumeric rating, 88% refer to "high yield", "investment grade", "speculative grade", or other terms which reference ratings indirectly, and 93% refer to ratings in at least one way.[4]

The application of textual analysis to investment mandates is new. In order to verify that our methods accurately capture mandates and to test whether mandates are descriptive of mutual funds' investment decisions, we compare mandates to fund portfolios. The variables we construct from mandates turn out to closely match funds' security holdings. Funds classified as high yield—based on the text in their investment mandates—hold almost exclusively high yield assets (and the investment grade assets they hold are overwhelmingly rated BBB). In contrast, funds that we classify as investment grade hold almost exclusively investment grade assets (the few high yield assets they hold are almost exclusively rated BB). The use of ratings in investment mandates also

and Gordy and Willeman (2012) for evidence that ratings of securitized assets were broadly inflated before the crisis.

[4] Our results confirm the survey-based evidence of Cantor, Gwilym, and Thomas (2007) that ratings are important in mandates. Cantor et al. survey fifty fund managers and fifty trustees/pension plan sponsors in the US and in Europe regarding the use of credit rating rules and guidelines in the conduct of their investment activities. A large fraction has ratings-based guidelines in their investment mandates.

explains funds' purchases and sales of fixed income securities. For example, newly issued high yield securities are significantly less likely to be bought by investment grade funds, while they are significantly more likely to be bought by high yield funds (compared to funds that have no such investment restrictions in their mandates). Similarly, investment grade funds are likely to sell securities that are downgraded from investment grade (e.g., BBB-) to high yield (e.g., BB+), while high yield funds are less likely to do so.

The panel data on investment mandates permits us to shed light on how the use of ratings has shifted over time, in particular since the financial crisis. From 2010 to 2018, the proportion of fixed income mandates directly referencing credit ratings increased from 56% to 61%; the proportion referencing them indirectly (e.g., using the term "high yield") increased from 84% to 90%. This pattern of increased ratings use appears to be very broad: it holds (i) for both individual fund mandates and mandates contained in prospectuses of fund groups; (ii) for funds specializing in corporate, municipal, foreign, or general fixed income assets[5]; (iii) for all three of the large credit rating agencies (S&P, Moody's, and Fitch—the use of other raters in investment mandates is practically non-existent); (iv) for both direct references to ratings (e.g., letters denoting credit ratings, such as "Baa1") and indirect references to ratings (e.g., "investment grade" or "high yield"); (v) in the universe of funds as well as only for continuing funds (i.e., focusing on within-fund changes over time and excluding the effect of entry and exit).

It is conceivable that the private 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; such filings cover the period 1999 to 2018 but are less standardized than the fund-specific filings that form the basis of our main analysis. We find that the use of ratings in investment mandates has remained constant or even moderately increased over the whole 1999 – 2018 period.

[5] Very few funds are exclusively focused on MBS: for these we cannot reject a flat trend.

We conclude that fixed income funds—which need to measure and report the credit risk of their portfolios to investors—have been, and remain, heavily reliant on credit ratings. The use of ratings is universal across fixed income assets, and it appears to be related to fund flows. The financial crisis did not discourage the use of ratings in investment mandates.

There are at least three possible causes for this persistence in the non-regulatory use of ratings. First, the recent financial crisis may not have tainted investors' perceptions of ratings quality, at least for asset classes where it did not reveal flaws, i.e., corporate and municipal bonds (there are few funds exclusively dedicated to structured assets).[6] Second, there may be no viable alternatives, making credit ratings the best available option, even if investors do find them flawed. Credit ratings have well-understood scales (especially the investment grade and high yield categories), they have long track records of default prediction, and they are available for many securities effectively free of charge for investors. Under this theory, ratings use is efficient in a second-best sense. Finally, contracting in fund markets may be "sticky," so that inefficient contracting practices remain the market convention even if better alternatives do exist. That way, ratings may remain in use in investment mandates even if they are no longer considered good at the job. This raises the possibility of poor welfare properties of the current market equilibrium.

Our findings of the extensive and increasing private use of ratings have implications for financial regulation. Credit ratings fulfill the same function in regulation as in private contracting: measuring credit risk. Having a well-understood measure of risk 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

[6] Some prior evidence suggests that corporate bonds, in contrast to structured securities, were well calibrated to the underlying economic risks of the issuers at the onset of the financial crisis (Benmelech and Dlugosz 2009b), and that credit rating standards in corporate bonds may have increased in recent decades (Baghai, Servaes, and Tamayo 2014).

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 US, the Dodd-Frank Act instructed federal agencies to remove references to ratings wherever possible.[7] Our findings suggest that contracting on credit risk without ratings may be infeasible and replacing them difficult.

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 US mutual funds. This information is extracted from archived prospectuses of US 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 2010 and 2018 pursuant to rule 497(k) of the Securities Act of 1933.[8] 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).[9] Such groups of funds are typically a

[7] 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. In Europe, the European Parliament passed extensive regulation on credit rating agencies in 2009, culminating in the 2011 establishment of the European Securities and Markets Authority (ESMA) as the single direct supervisor of rating agencies within the EU. Regulation 462/2013 (also referred to as CRA III) further amended existing regulation on credit ratings in Europe, on issues including the reliance of firms on external credit ratings, sovereign debt ratings, competition in the rating industry, the civil liability of raters, and the independence of rating agencies.

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

[9] 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

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 less clear-cut, they allow for an analysis of trends over a longer sample that covers both the pre- and post-financial crisis periods. Filing types 485APOS and 485BPOS 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. We consider group prospectuses filed between 1999 and 2018. 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.[10] 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.

From our basic sample, we remove all filings that contain an XBRL attachment and fewer than 100 sentences. These filings contain no text that is useful for our analysis; typically, they are filed for the sole purpose of submitting additional exhibits for a previously filed prospectus. We also remove supplements and incomplete filings.[11] 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

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.

[10] For details, see https://www.sec.gov/rules/final/33-7512r.htm .

[11] 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).

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".

In the case of 497K filings, we identify the relevant passages by focusing on the mandatory section "Principal Investment Strategies".[12] Following SEC regulation, this section contains the rules according to which the reporting funds invest. Fund group filings of the types 485APOS and 485BPOS tend to have a somewhat 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:

- a relevant fund word (e.g., "we", "fund", "portfolio")
- a relevant action word (e.g., "invest", "hold", "purchase")
- a mandate phrase (e.g., "we may", "up to XX% of the portfolio").[13]

Finally, for both filing types, we exclude examples and consider only statements about credit quality.[14] This ensures that we do not capture references that are unrelated to credit ratings (for

[12] We successfully identify these sections in approximately 99.5% percent of all complete 497K filings. Table A1 in the appendix shows several excerpts to illustrate the type of information these sections contain.

[13] 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.

[14] 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.

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.[15] We report these variables together with the corresponding dictionaries and exclusion lists in Table 1.

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. 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 US 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 15,218 filings by 2,348 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

[15] 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.

corporate debt funds (5,825 filings) and municipal debt funds (4,573), followed by "other" fixed income mutual funds (3,092). Fixed income funds primarily investing in foreign debt securities and those primarily investing in MBS contribute 1,589 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 US 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 2,070 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 summary statistics for *Direct ratings reference*, which is the main variable of interest in our analysis of Section 2. This dummy variable takes the value one when an investment mandate mentions at least one specific rating agency, a variant of the term "NRSRO", letters denoting a credit rating (such as "A-" or "BB"), or the general concept "rating agency"; for a detailed overview of the corresponding search terms, see Table 1. Finally, we 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.[16]

The resulting sample contains 9,522 prospectuses filed by 719 different fund groups over the period 1999 – 2018. Panel C of Table 2 reports summary statistics for this sample. It shows the variables derived from the extracted investment mandate passages.

2. Empirical analysis

In this section, we examine the private use of credit ratings by institutional investors. We first verify that the variables extracted from the regulatory filings are informative, that is, related to meaningful features of funds. Next, we present the main set of results on the trends in the use of credit ratings in fixed income fund investment mandates based on a comprehensive sample of fund-level summary prospectuses covering the 2010 to 2018 period. We extend our analysis to the period 1999 to 2018 by using fund group prospectuses. We then verify that references to credit ratings in funds' investment mandates are reflected in funds' actual portfolio allocation decisions. Finally, we discuss the incidence and some implications of changing an investment mandate with respect to the use of credit ratings.

A. Proof of concept

In this subsection, we verify that the textual data we extract from investment mandates have real economic content. We propose two settings in which we examine the time-series properties of the measures derived from the textual analysis of mutual fund prospectuses.[17]

[16] 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.

[17] Subsection 2.D below studies how investment mandates relate to funds' portfolio allocation decisions and thus provides further evidence of the quality of information extracted from the mandates.

First, we identify references to environmental, social, and governance (ESG) criteria in investment mandates.[18] Given the rising interest is ESG issues in recent years, a positive trend would seem natural. Figure 1 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.

Our second "proof of concept" exploits a regulatory reform that affected money market mutual funds. As discussed in Section 1.B, we exclude money market mutual funds from our main sample, because the investment opportunity set of such funds was circumscribed by ratings-based regulation until very recently. Specifically, to ensure that money market funds invest only in high quality short-term securities, 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 (with effective date October 14, 2016), this rule was changed to comply with section 939A of the Dodd-Frank Act, which requires federal agencies (including the SEC) to remove references to credit ratings from regulations when possible. Under the amended rule, an "eligible security" is a security that the money market fund's board determines to have "minimal credit risk." This requirement does not mean that money market funds cannot *also* rely on credit ratings. However, we expect money market funds to be less likely to refer to credit ratings in their prospectuses after the reform.

In Figure 2, we plot the annual averages of the dummy variables *NRSRO* and *Direct ratings reference* for money market mutual funds (funds are classified into money market funds using Lipper objective codes, see Table A4 in the appendix). The bars in the figure indicate, respectively, the fraction of funds that refer to the term "NRSRO" or to any other ratings-related term. The fraction of money market funds that refer to credit ratings falls considerably following the 2014

[18] See Table 1 for a comprehensive list of the search terms used to identify ESG references.

reform: for example, the number of money market funds referring to the term "NRSRO" drops from 57 in 2015 (18% of money market funds) to 4 in 2018 (1% of funds).

In sum, our time-series evidence in Figures 1 and 2 confirms that the text-based analysis of mandates yields useful data on how fixed income funds operate.

B. Trends in the use of credit ratings in investment mandates

In this section, we describe our main findings on the private use of credit ratings by fixed income mutual funds. What is the extent to which credit ratings are used in fixed income mutual funds' investment mandates? Have funds reduced references to credit ratings after the financial crisis, mirroring regulatory efforts to pull back on the regulatory reliance on ratings?

Table 3 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 (this includes cases where the mandate refers to "investment grade" or to "high yield," or to both); this fraction has increased from around 84% in 2010 to approximately 90% in 2018. We interpret a mention of the investment grade threshold as an indirect reference to credit ratings. About 22% of funds refer to the term "NRSRO" in the whole sample. 56% of funds refer to specific rating terms or agencies ("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 3 suggests that both direct and indirect references to ratings in fixed income mandates have remained stable over the 2010 – 2018 period or have even modestly increased in recent years.

Investment mandates of fixed income funds regularly refer to credit rating agencies. Do trends differ across these different raters? Are there reversals in trends, perhaps due to reputational damage suffered by rating agencies during the financial crisis? For example, in 2015, S&P paid about $1.5 billion to resolve a collection of lawsuits filed by the US government related to S&P's ratings on MBS prior to the financial crisis. Similarly, in 2017, Moody's settled charges related to structured finance ratings with the Department of Justice for $0.9 billion. It is conceivable that S&P or Moody's (or other raters) 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 3 sheds some more 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 while the term "NRSRO" has become somewhat more prevalent from 2010 to 2018, no specific rater has significantly changed its standing in mandates over this period. 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, we find that 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. In sum, our analysis suggests that there has been no substantial revision of the view of individual agencies since the financial crisis.

The aggregate time trends documented so far do not suggest any reduction in the use of credit ratings in investment mandates. However, other variables may be changing over time, and this may make a clear interpretation of the increasing trends documented in Table 3 difficult. To avoid drawing conclusions from time trends that may be affected by omitted variables bias, we therefore 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 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. The following regression model isolates point (iii), i.e., within-fund variation over time:

$$Direct\ ratings\ reference_{f,t} = \alpha + X'\beta + \gamma_f + \varepsilon_{f,t} \quad (1)$$

where f denotes the fund and t the year. γ_f is a vector of fund fixed effects. X is a vector of year fixed effects for the years 2011 – 2018 (2010 is omitted and serves as the benchmark). The

coefficients β therefore capture trends in rating references by fixed income funds after accounting for fund fixed effects. The fund fixed effects eliminate the impact of fund turnover on the time trend, isolating the effect of changes in mandates of continuing funds. Figure 3 reports the coefficients β from regression model (1), including 95% confidence intervals based on heteroskedasticity-robust standard errors. The figure documents a positive trend in ratings use within fund mandates over the years 2010 to 2018.

The same analysis, with variations in the specifications, is shown in Table 4. The reported coefficients are from regressions of the following type:

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

where f denotes the fund and t the year. γ_f is a vector of fund fixed effects. Y is the dependent variable: *Direct ratings reference* in Panel A, and *NRSRO* and *HY/IG* in Panel B. *Linear trend* takes the value of 0 in the year 2010; it is 1 in 2011, 2 in 2012, 3 in 2013 etc. In Panel A, columns 1 and 3 report the coefficients on *Linear trend* from regressions without fixed effects, while columns 2 and 4 report coefficients from regressions that include fund fixed effects. Finally, the specifications reported in columns 3 and 4 include additional fund level control variables: the log of total net assets, fund age, an indicator variable for whether the fund has institutional share classes, a dummy variable for index funds, and a dummy variable for ETFs.

Consistent with Figure 3, the regressions reported in Table 4 suggest that there has been a moderate increase in rating references in fixed income investment mandates over the period from 2010 to 2018. In Panel A, the coefficients on *Linear trend* range from 0.006 in column 1 to 0.008 in column 4 and are marginally larger in specifications with fund fixed effects. This implies that the incidence of rating references has increased by 0.6 to 0.8 percentage points per year over the period 2010 – 2018. The trend is similar for both *NRSRO* (reported in columns 1 – 4 of Panel B) and *HY/IG* (columns 5 – 8 in Panel B).

Table 5 reports similar regressions as Table 4, 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. In Panel A, the dependent variable is *Direct ratings reference*. Similar to Table 4, the estimated coefficient on *Linear trend* ranges from 0.006 (column 1) to 0.009 (column 4). Directionally, the effects are similar for the dependent variables *NRSRO* and *HY/IG*, presented in Panel B, although some of the trend coefficients are less precisely estimated (in specifications with the dependent variable *NRSRO*). Overall, the trends in rating use are similar when we exclude index funds and ETFs.

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 we document in Tables 4 and 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 in mortgage-backed securities (columns 7 and 8), and "other" fixed income funds (columns 9 and 10). The statistical significance is reduced in some specifications, potentially because of the reduced sample size. However, modest increases in rating use over the 2010 – 2018 period can be observed in all fund categories.

C. Additional insights on the use of ratings in investment mandates based on a sample of fund group prospectuses

Our main sample, employed in the analysis of Section 2.B, is based on summary prospectuses (filings of the type 497K). The advantage of using this sample is that each summary prospectus is fund-specific, and that all filings contain standardized sections that discuss the funds' investment mandates (see Section 1). 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. Therefore, our analysis of

ratings use in fixed income investment mandates in Section 2.B has effectively focused on the post-financial crisis period. However, it is conceivable that the private 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 detail in Section 1.C.

In our sample based on fund group prospectuses, the average of the variable *Direct ratings reference* is 0.92 (for more summary statistics for the group prospectus sample see Table 2, Panel C). 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. Figure 4 provides evidence on trends in the private use of ratings in investment mandates over the period from 1999 to 2018. For the figure, we estimate the following regression model:

$$Direct\ ratings\ reference_{g,t} = \alpha + X'\beta + \gamma_g + \varepsilon_{g,t} \quad (3)$$

where g denotes the fund group and t the year. To identify changes in ratings use in existing fund groups, as opposed to variation in use that is driven by compositional changes in the fund universe, we control for fund group fixed effects, which we denote by γ_g. X is a vector of year dummies with corresponding coefficients β; we include indicator variables for the years 2000 – 2018, omitting the variable for the year 1999, which serves as the benchmark. The coefficients β capture the trend in rating references by fixed income funds as reflected in the 485 filings. We plot these coefficients β, as well as 95% confidence intervals based on heteroskedasticity robust standard errors.

It is evident from Figure 4 that the trend in ratings use is slightly positive, both before and after 2010. Thus, it does not appear that our 497K sample (starting in 2010) misses any important breaks or a sudden decline immediately after the outbreak of the 2008 financial crisis. Instead, the

ratings use in investment mandates has remained constant or even moderately increased over the 1999 – 2018 period, which is consistent with the trend over the 2010 to 2018 period observed in the 497K sample. The figure looks very similar if no fund group fixed effects are included in regression equation (3).

Table 7 presents regression results. We report coefficients from regressions of the following type:

$$Direct\ ratings\ reference_{g,t} = \alpha + \beta \cdot Linear\ trend_t + \gamma_g + \varepsilon_{g,t} \quad (4)$$

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, 3 in 2002 etc. Columns 1 and 2 report coefficients from regressions for the whole sample of 485 filings of fund groups that have at least one fixed income fund; while the specification from 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.

This trend estimate is somewhat lower than the one based on summary prospectuses reported in Table 4, for two reasons. First, the level of ratings use in the group prospectuses, given that they can encompass many funds,[19] is higher than in the sample of fund-specific prospectuses: for the period 2010 – 2018, the average of the variable *Direct ratings reference* is 0.59 in the 497K sample, while the average is 0.92 in the sample of 485 filings. Given the higher level in the group prospectus sample, there is plausibly less scope for a positive trend. Second, the 485 filings, in contrast to the 497K filings, are not fund-specific and, because of their more idiosyncratic structure, they do not consistently permit to pinpoint precisely the investment mandate sections

[19] The median filing underlying the sample used in regression specifications 1 and 2 of Table 7 contains five funds.

of funds. Despite this measurement challenge (which may result in point estimates closer to zero due to attenuation bias), the regressions still support the conclusion that rating use has moderately increased over the 1999 – 2018 sample period, but from a high initial level.

In the sample for the regressions reported in columns 1 and 2, we have retained all filings that contain at least one fund that can be classified as a fixed income fund using Lipper objective codes (see Section 1.B). To further reduce measurement error, we next focus on those 485 filings that refer to only one fund. Further, this fund must be classified as a debt fund using Lipper objective codes. Fund-specific information (names of specific funds, as well as fund-specific identifiers) are contained in the 485 filings from 2006 onwards. The resulting sample is small (1,782 observations and 319 funds) and covers the years from 2006 to 2018. Specification 3 does not contain fixed effects, while specification 4 includes fund fixed effects. As before, the regression results suggest that the private use of ratings in investment mandates has moderately increased over time. The coefficient estimate of the *Linear trend* variable is larger than in columns 1 and 2. This may suggest that attenuation bias is lower in these regressions due to a more precise circumscription of the fixed income sample (we focus on fund group filings consisting of only one fund, which has to be a debt fund), or that the trend is stronger in the period post 2006.

Finally, we investigate if trends in ratings use differed before and after the financial crisis of 2008. To do this, we estimate the same regression specifications as those reported in columns 1 and 2 of Table 7. As before, the dependent variable is *Direct ratings reference*. However, we estimate separate trends for the 1999 – 2007 and the 2008 – 2018 periods, respectively. Results are reported in Table 8. The trend in ratings use has been positive in the post-crisis period, while there has been no change in the propensity to use ratings in the decade preceding the financial crisis. Overall, our results support the conclusion that over the period from 1999 to 2018, the usage of credit ratings in investment mandates has not decreased. If anything, the trend has been slightly positive.

D. Investment mandates and funds' asset allocation decisions

So far, we have documented that a high and increasing share of fixed income mutual funds refer to credit ratings—directly or indirectly—in their investment mandates, conceivably to circumscribe fund managers' investment opportunity sets, and to limit risk taking. An open question is whether funds actually follow these prescriptions. That is, do funds' actual portfolio allocation decisions reflect the mandate texts we study? We shed light on this in three ways. First, we document the cross-sectional properties of funds' investment portfolios. Are funds whose mandates specify that they invest mainly in investment grade (high yield) assets indeed more (less) likely to hold highly rated securities? Second, we ask which funds sell securities that are downgraded to high yield (e.g., BB+) from investment grade (e.g., BBB-). Third, we investigate purchases of newly issued high yield securities by funds with different mandates.

To construct the sample underlying the first test, we proceed as follows. We obtain quarterly data on fixed income funds' security holdings from CRSP. Using the security identifiers (CUSIPs) and information on the portfolio reporting month, we add bond credit ratings from Mergent-FISD. We assign numerical values to the letter ratings (with 1 equal to AAA for S&P and Fitch, and equal to Aaa for Moody's); if a security is rated by more than one agency, we assign the highest current rating to the security. We match this dataset with 497K filings for a given fund and quarter using the EDGAR – CRSP linking file. A fixed income fund's portfolio information is included in the sample (i) if the fund invests in US bonds for which there are credit ratings in Mergent-FISD (this database primarily covers corporate bonds, in addition to some agency and government securities), and (ii) for the year in which the fund files a summary prospectus. We then classify funds into high yield funds and investment grade funds using the text-based analysis of the investment mandates. 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 (funds where the variable *IG fund* is one; see Table 1 for detailed variable definitions). 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 (cases where the variable *HY fund* is one). The resulting sample contains 29,286 rated securities pertaining to 357 fund portfolios over the period from 2010 to 2018.[20]

Figure 5 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 fixed income fund. Consistent with their investment mandates, funds classified as high yield tend to hold mostly lower-rated debt securities (below BBB-), while investment grade funds tend to hold mostly high-rated securities.

It is also interesting to note that some high yield funds hold a non-negligible fraction of their assets in AAA securities: on a value-weighted basis, high yield funds hold on average 0.4% in AAA assets, more than they hold in assets rated between AA+ and A combined. The AAA-assets in our sample are primarily US agency issues and government debt. A fixed income fund may use credit derivatives to take on credit risk, as an alternative, or complement, to bonds. For example, a fund may hold treasury bonds and complement these with credit exposure from the credit default swap (CDS) market. In principle, this can generate a payoff structure comparable to that of a portfolio of high-yield bonds.[21] If a fund uses derivatives, the rating distribution of its portfolio will deviate from the true risk of the portfolio's payoffs. Specifically, we expect such funds to have holdings of (AAA-rated) treasuries. Indeed, we find evidence that corroborates this. For example, the investment mandate (from the 2012 summary prospectus) of the Access Flex High Yield Fund reads: *"The Fund invests primarily in derivatives and money market instruments that ProFund Advisors believes, in combination, should provide investment results that correspond to the high yield market. […] The Fund invests in derivatives as a substitute for investing directly in debt securities in order to gain*

[20] Note that many funds are not strictly "high yield" or "investment grade" funds.

[21] Benefits of using the CDS market in this way may include liquidity, standardization, or accounting advantages.

exposure to the high yield market. [...] CDSs may be used by the Fund to obtain credit risk exposure similar to that of a direct investment in high yield bonds."

We next consider security sales by funds with different investment mandates. 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:

$$Sell_{i,f,t} = \alpha \cdot Downgrade\ to\ HY_{i,t} \cdot HY\ fund_{f,t} + \beta \cdot Downgrade\ to\ HY_{i,t} \cdot IG\ fund_{f,t} + \gamma \cdot Downgrade\ to\ HY_{i,t} + X'\delta + \varepsilon_{i,f,t} \quad (4)$$

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 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 the dummy variables *HY fund* and *IG fund*. Summary statistics for this sample are reported in Panel A of Table 9.

In Panel B, we report the coefficients from regression model (4). The estimates reported in column 1 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 (albeit the latter effect is not statistically significant at conventional levels). The benchmark group in this analysis consists of funds that are neither classified as high yield funds, nor as investment grade funds. In column 2, we report coefficients from the same regression model, but the underlying sample only

comprises funds that have a direct ratings reference in their investment mandates, that is, funds for which *Direct ratings reference* takes the value one. We find that securities that are downgraded to high yield are significantly less likely to be sold by high yield funds and they are significantly more likely to be sold by investment grade funds. The benchmark group are funds that are neither investment grade nor high yield funds, but that do reference ratings or rating agencies in their investment mandate.

Our final 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:

$$Buy_{i,f,t} = \alpha \cdot HY\ security_{i,t} \cdot HY\ fund_{f,t} + \beta \cdot HY\ security_{i,t} \cdot IG\ fund_{f,t} + X'\delta + \varepsilon_{i,f,t} \qquad (5)$$

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 (4) and Table 9. Panel A of Table 10 reports summary statistics for this sample.

In Panel B of Table 10, column 1, we report coefficients from the estimation of regression model (5). 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 9, the benchmark group in this analysis consists of funds that are neither classified as high yield funds nor as investment grade funds. In column 2, we report coefficients from the same regression model, but the underlying sample only consists of funds that have a direct ratings reference in their investment mandate, that is, funds for which *Direct ratings reference* takes a value of one. The results are very similar to those reported in column 1.

In sum, this section provides 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.

E. Changing contract terms: adding or removing credit 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. 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 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."*[22]

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 11, 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

[22] 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 variable *Direct ratings reference* takes the value of one in 2016 only (it is zero in 2017).

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; however, *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 0.2 percent of the funds that use ratings in their investment mandates in one 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.

For fixed income funds, credit ratings have traditionally been important for demarcating safe and risky assets, and for mitigating agency problems (e.g., He and Xiong 2013, Parlour and Rajan 2016). Donaldson and Piacentino (2018) provide an additional explanation for the use of ratings in investment mandates arguing that asset managers may design their investment mandates to attract flows of investor capital. A deep exploration of the question of how investor flows relate to contracting terms is beyond the scope of this paper. However, we take a first step in addressing this issue.

In Figure 6, we graphically examine how fund flows change as funds add (Panel A) or remove (Panel B) references to credit ratings in their investment mandates. To be specific, in Panel A, we compare average flows in the six months before and after funds file a summary prospectus in which they have modified the investment mandate to include a reference to credit ratings. That is, while for the previous year's filing we record no rating references (*Direct ratings reference* takes a value of zero), the investment mandate in the current year does refer to rating agencies or credit ratings (*Direct ratings reference* takes a value of one).[23] Funds that add a rating reference see an

[23] We follow Goldstein, Jiang, and Ng (2017) and define net flows at the fund share class level as follows: $Flow_{k,t} = \frac{TNA_{k,t} - TNA_{k,t-1}(1+R_{k,t})}{TNA_{k,t-1}}$, where $R_{k,t}$ is the return of share class *k* during month *t* and *TNA* is the total net asset value, obtained from CRSP. Fund flows are winsorized at the 1% and 99% levels. The sample

acceleration in flows in the six months after the filing (compared to the six months preceding the filing). The increase in flows is small and statistically insignificant, increasing from an average inflow of around 0.73% per month in the six months before to an average inflow of about 0.79% per month in the six months after the filing.

In Panel B of Figure 6, we compare average flows before and after funds file a summary prospectus in which they have modified the investment mandate to no longer reference credit ratings. Average flows decline quite dramatically from 2.4% per month to 0.6% per month. A t-test rejects that these pre- and post-means of fund flows are equal (p-value 0.02).

3. Conclusions

We quantify to which extent credit ratings are used in the delegated management of fixed income portfolios. The answer in our sample of US mutual funds is that the use of ratings in mandates is very common. Ratings are used in a multitude of ways (directly, indirectly; specific agencies or anyone), but in some form in almost all mandates. Our data make precise the extent to which credit ratings serve a central and pervasive role in delegated asset management.

Over our sample period, the use of ratings went from very common (nine in ten funds) to almost universal (sixteen in seventeen funds). The financial sector does not appear to have lost faith in credit ratings following the financial crisis, despite the widespread and overwhelmingly negative attention ratings have received. Analyzing different types of regulatory filings from the 1999-2018 period, and employing different measures of ratings use, we can clearly reject a decline in the use of ratings.

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period is 2010 – 2018; we exclude from the sample passive funds (index funds and ETFs) and we only include funds that add or remove a ratings reference once during our sample period (results are very similar if we include the few funds that change mandate more than once). In Panel A of Figure 6, the sample consists of 135 funds (466 share classes) that add a ratings reference, while in Panel B the sample consists of 33 funds (105 share classes) that remove ratings references.

Even if credit ratings are flawed, as the academic literature and regulatory efforts convincingly suggest, they remain of central importance in financial markets.[24] This continued and widespread private use of credit ratings may be a sign that, in many areas, financial market participants either find them reliable enough or face a lack of appropriate substitutes. Any regulatory effort to replace ratings or curb their usage therefore needs to recognize as a first-order challenge the need for high quality alternatives.

One difference between private use and regulatory use of ratings concerns scale: because assessing credit risk is information production, the process is characterized by high fixed costs and low or zero marginal costs of sharing. This suggests that regulators may in some instances find it economical to produce their own measures instead of relying on already available metrics like ratings. For example, the US insurance regulator has replaced ratings for structured assets (Becker, Opp, and Saidi 2018). Similarly, the French central bank produces its own credit risk measure for most French borrowing firms (Banque de France 2016). Whether or not this is feasible and practical, the issue of what can replace credit ratings should be front and center in any discussion about limiting their role, in any setting, private or public.

[24] Problems with ratings are well documented. Cornaggia, Cornaggia, and Hund (2017) document the difference in performance of ratings across asset classes. Benmelech and Dlugosz (2009a,b), Griffin and Tang (2011), and Gordy and Willeman (2012) document problems specific to structured ratings, while Baghai, Servaes, and Tamayo (2014) discuss biases in corporate ratings. Factors making structured ratings problematic include large issuers (He, Qian, and Strahan 2014), fierce competition between agencies (Flynn and Ghent 2017, Baghai and Becker 2018), a significant boom in issuance (Bolton, Freixas, and Shapiro 2011), and many regulated investors (Opp, Opp, and Harris 2013). See Sangiorgi and Spatt (2017) for a recent summary.

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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	-
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:* rating agency, rating agencies, rating organization(s), Duff and Phelps, Duff & Phelps, D&P, Dominion, DBRS, Kroll, KBRA	*Exclusion terms as listed for the variables S&P and Letter rating.*
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	*Investment grade funds 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	*High yield funds 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 used in the analysis of Section 2. 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).

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. *Fund age* is the difference between the prospectus-filing year and initial offering year of the fund. *Institutional* is a dummy variable for funds that have at least one share class that is primarily marketed to institutional investors. *Index* and *ETF* are, respectively, indicator variables for index funds and ETFs.

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	177	612	504	16	325
2014	197	677	525	16	386
2015	203	731	554	16	429
2016	217	788	570	16	449
2017	224	824	575	16	455
2018	215	807	566	14	468
Sum	*1,589*	*5,825*	*4,573*	*139*	*3,092*

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

	Obs.	Mean	Std. dev.	Min.	Max.
S&P	15,218	0.287	0.453		
Fitch	15,218	0.163	0.370		
Moody's	15,218	0.276	0.447		
Letter rating	15,218	0.419	0.493		
Direct ratings reference	15,218	0.592	0.492		
Rating agency	15,218	0.357	0.479		
NRSRO	15,218	0.223	0.417		
ESG	15,218	0.009	0.097		
HY/IG	15,218	0.881	0.324		
All ratings references	15,218	0.930	0.255		
Institutional	14,767	0.746	0.435		
Index fund	14,767	0.112	0.315		
ETF	14,767	0.110	0.313		
Ln(Assets)	14,767	5.727	1.995	-2.303	12.533
Fund age	14,767	14.803	11.480	0	94

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

	Obs.	Mean	Std. dev.
S&P	9,522	0.703	0.457
Moody's	9,522	0.694	0.461
Fitch	9,522	0.346	0.476
Rating agency	9,522	0.712	0.453
NRSRO	9,522	0.578	0.494
Letter rating	9,522	0.755	0.430
Direct ratings reference	9,522	0.917	0.276
ESG	9,522	0.872	0.334
HY/IG	9,522	0.949	0.220
All ratings references	9,522	0.984	0.127

Table 3. 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. Table 1 discusses the content of these variables in detail.

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	0.251	0.245	0.138	0.216	0.397	0.562	0.834	0.897
2012	0.268	0.257	0.147	0.215	0.411	0.578	0.854	0.916
2013	0.280	0.267	0.157	0.215	0.420	0.589	0.873	0.925
2014	0.283	0.271	0.159	0.214	0.419	0.590	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	0.608	0.901	0.939
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 4. Trends in rating references, 2010 – 2018

This table reports the coefficients for regression models estimating trends in rating references in fund investment mandates. The sample consists of summary prospectuses (filing type 497K) of fixed income mutual funds (defined using Lipper objective codes, see Section 1) 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 Tables 1 and 2. Heteroskedasticity-robust standard errors 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 in direct ratings references

	(1)	(2)	(3)	(4)
Dependent variable:	Direct ratings reference			
Mean:	0.592	0.592	0.593	0.593
Linear trend	0.006***	0.007***	0.007***	0.008***
	(0.002)	(0.001)	(0.002)	(0.001)
Ln(Assets)			0.003	-0.003
			(0.002)	(0.002)
Fund age			-0.002***	0.000
			(0.000)	(0.001)
Institutional			-0.002	0.001
			(0.010)	(0.007)
Index fund			-0.228***	-0.041
			(0.021)	(0.033)
ETF			0.054**	0.023
			(0.022)	(0.034)
Constant	0.564***	0.558***	0.588***	0.573***
	(0.008)	(0.003)	(0.016)	(0.013)
Fund F.E.		Yes		Yes
Observations	15,218	15,218	14,767	14,767
Adjusted R^2	0.001	0.905	0.014	0.904

Panel B: Other rating references

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. Var.:	NRSRO				HY/IG			
Mean:	0.223	0.223	0.226	0.226	0.881	0.881	0.880	0.880
Linear trend	0.003*	0.005***	0.003**	0.006***	0.009***	0.006***	0.010***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Ln(Assets)			0.004**	-0.004***			-0.004***	-0.004**
			(0.002)	(0.002)			(0.001)	(0.002)
Fund age			-0.001*	-0.000			-0.002***	0.001***
			(0.000)	(0.001)			(0.000)	(0.000)
Institutional			-0.024***	-0.011			0.017***	-0.012**
			(0.008)	(0.007)			(0.006)	(0.005)
Index fund			-0.160***	-0.038			-0.172***	0.059
			(0.016)	(0.033)			(0.016)	(0.040)
ETF			-0.002	0.036			0.010	-0.064
			(0.018)	(0.034)			(0.015)	(0.040)
Constant	0.212***	0.201***	0.232***	0.235***	0.840***	0.853***	0.898***	0.875***
	(0.007)	(0.003)	(0.013)	(0.011)	(0.006)	(0.003)	(0.010)	(0.009)
Fund F.E.		Yes		Yes		Yes		Yes
Observations	15,218	15,218	14,767	14,767	15,218	15,218	14,767	14,767
Adjusted R^2	0.000	0.909	0.015	0.910	0.004	0.876	0.031	0.876

Table 5. Trends in rating references, excluding passive funds

This table reports the coefficients for regression models estimating trends in rating references in 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 Tables 1 and 2. Heteroskedasticity-robust standard errors 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 in direct ratings references

	(1)	(2)	(3)	(4)
Dependent variable:	Direct ratings reference			
Mean:	0.613	0.613	0.613	0.613
Linear trend	0.006***	0.009***	0.007***	0.009***
	(0.002)	(0.001)	(0.002)	(0.001)
Ln(Assets)			0.006**	0.001
			(0.002)	(0.002)
Fund age			-0.002***	0.000
			(0.000)	(0.001)
Institutional			-0.011	-0.003
			(0.010)	(0.007)
Constant	0.585***	0.575***	0.581***	0.569***
	(0.009)	(0.004)	(0.017)	(0.016)
Fund F.E.		Yes		Yes
Observations	13,030	13,030	12,840	12,840
Adjusted R^2	0.001	0.908	0.002	0.907

Panel B: Other rating references

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. var.:	NRSRO				HY/IG			
Mean:	0.242	0.242	0.243	0.243	0.894	0.894	0.894	0.894
Linear trend	0.002	0.005***	0.003*	0.006***	0.009***	0.006***	0.009***	0.006***
	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Ln(Assets)			0.006***	-0.003			-0.010***	-0.006***
			(0.002)	(0.002)			(0.001)	(0.002)
Fund age			-0.001*	-0.000			-0.002***	0.001***
			(0.000)	(0.001)			(0.000)	(0.000)
Institutional			-0.024***	-0.014**			0.017***	-0.014***
			(0.009)	(0.007)			(0.006)	(0.005)
Constant	0.232***	0.218***	0.225***	0.247***	0.853***	0.868***	0.930***	0.897***
	(0.008)	(0.003)	(0.015)	(0.015)	(0.006)	(0.003)	(0.010)	(0.010)
Fund F.E.		Yes		Yes		Yes		Yes
Observations	13,030	13,030	12,840	12,840	13,030	13,030	12,840	12,840
Adjusted R^2	0.000	0.906	0.001	0.907	0.005	0.875	0.019	0.874

Table 6. Trends in rating references by fund category

This table reports the coefficients of regression models estimating trends in rating references in 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 Section 1 and Table A4 in the appendix). *Linear trend* takes the value of 0 in the year 2010; it is 1 in 2011, 2 in 2012, 3 in 2013 etc. *Direct ratings reference* is defined in Table 1. Heteroskedasticity-robust standard errors 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)
Fund sub-sample:	Foreign		Corporate		Municipal		MBS		Other fixed income	
Dependent variable:	Direct ratings reference									
Mean:	0.573	0.573	0.613	0.613	0.633	0.633	0.194	0.194	0.518	0.518
Linear trend	0.004	0.009***	0.005*	0.004***	0.008***	0.011***	0.014	0.012*	0.012***	0.007***
	(0.005)	(0.003)	(0.003)	(0.001)	(0.003)	(0.001)	(0.013)	(0.006)	(0.004)	(0.002)
Constant	0.556***	0.532***	0.590***	0.597***	0.599***	0.585***	0.139**	0.146***	0.461***	0.486***
	(0.027)	(0.014)	(0.014)	(0.005)	(0.014)	(0.005)	(0.058)	(0.028)	(0.021)	(0.011)
Fund F.E.		Yes		Yes		Yes		Yes		Yes
Observations	1,589	1,589	5,825	5,825	4,573	4,573	139	139	3,092	3,092
Adjusted R^2	-0.000	0.880	0.000	0.920	0.001	0.911	0.000	0.881	0.003	0.884

Table 7. Trends in rating references, sample of fund group prospectus filings

This table reports the coefficients for regression models estimating trends in rating references in mutual fund investment mandates contained in fund group prospectuses (filing type 485A/B). The sample period covers the years 1999 – 2018 in columns 1 and 2, while the sample period is 2006 – 2018 in columns 3 and 4. *Linear trend* takes the value of 0 in the year 1999; it is 1 in 2000, 2 in 2001, 3 in 2002 etc. *Direct ratings reference* is defined in Table 1. For the sample in columns 1 and 2, 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 fund using Lipper objective codes. The sample in columns 3 and 4 focusses on group prospectuses that refer to only one fund; further, this one fund is classified as a debt fund using Lipper objective codes. Heteroskedasticity-robust standard errors 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)
Dependent variable:	Direct ratings reference			
Mean:	0.917	0.917	0.939	0.939
Linear trend	0.001**	0.002***	0.005***	0.004***
	(0.001)	(0.000)	(0.002)	(0.001)
Constant	0.904***	0.899***	0.876***	0.884***
	(0.007)	(0.006)	(0.024)	(0.019)
Fund group F.E.		Yes		
Fund F.E.				Yes
Observations	9,522	9,522	1,782	1,782
Adjusted R^2	0.001	0.569	0.005	0.645

Table 8. Trends in rating references in fund group prospectuses: Pre / post financial crisis

This table reports the coefficients for regression models estimating trends in rating references in mutual fund investment mandates contained in fund group prospectuses (filing type 485A/B). The sample period is 1999 – 2018. *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. *Direct ratings reference* is defined in Table 1. 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 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)
Dependent variable:	Direct ratings reference	
Mean:	0.917	0.917
Linear trend (1999-2007)	0.000	0.000
	(0.002)	(0.001)
Linear trend (2008-2018)	0.001*	0.001**
	(0.001)	(0.001)
Constant	0.907***	0.903***
	(0.009)	(0.008)
Fund group F.E.		Yes
Observations	9,522	9,522
Adjusted R^2	0.000	0.569

Table 9. 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). 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. *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 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 Panel B, column 1 includes all fixed income funds, while column 2 only includes funds that have a direct credit ratings reference in their investment mandate (i.e., funds where *Direct ratings reference* is one). *Fund type fixed effects* refer to the inclusion of the dummy variables *HY fund* and *IG fund* in the regressions. Heteroskedasticity-robust standard errors, clustered by fund, 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. The sample period is 2010 – 2018.

Panel A: Variables for the analysis of security sales

	Obs.	Mean	Std. dev.
Sell	7,729,294	0.134	0.340
Downgrade to HY	7,729,294	0.002	0.045
HY fund	7,729,294	0.111	0.314
IG fund	7,729,294	0.105	0.306
Direct ratings reference	7,729,294	0.495	0.500

Panel B: Regression analysis of security sales

	(1)	(2)
Dependent variable:	Sell	
Mean:	0.134	0.150
Downgrade to HY × HY fund	-0.139***	-0.082***
	(0.018)	(0.018)
Downgrade to HY × IG fund	0.020	0.109***
	(0.033)	(0.039)
Downgrade to HY	0.171***	0.112***
	(0.016)	(0.014)
Fund F.E.	Yes	Yes
Security F.E.	Yes	Yes
Fund type F.E.	Yes	Yes
Observations	7,729,294	3,824,372
Adjusted R^2	0.104	0.098

Table 10. 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 Panel B, column 1 includes all fixed income funds, while column 2 only includes funds that have a direct credit ratings reference in their investment mandate (i.e., funds for which the variable *Direct ratings reference* takes a value of one). *Fund type fixed effects* refer to the inclusion of the dummy variables *HY fund* and *IG fund* in the regressions. Heteroskedasticity-robust standard errors, clustered by fund, 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. The sample period is 2010 – 2018.

Panel A: Variables for the analysis of security purchases

	Obs.	Mean	Std. dev.
Buy	119,313,901	0.004	0.062
HY security	119,313,901	0.058	0.233
HY fund	119,313,901	0.070	0.254
IG fund	119,313,901	0.124	0.329
Any rating	119,313,901	0.595	0.491

Panel B: Regression analysis of security purchases

	(1)	(2)
Dependent variable:	Buy	
Mean:	0.004	0.003
HY security × HY fund	0.098***	0.103***
	(0.007)	(0.009)
HY security × IG fund	-0.013***	-0.012***
	(0.001)	(0.001)
Fund F.E.	Yes	Yes
Security F.E.	Yes	Yes
Fund type F.E.	Yes	Yes
Observations	119,313,901	71,028,394
Adjusted R^2	0.049	0.049

Table 11. 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. = 930)	88.3%	3.9%	4.8%	3.0%
HY / IG only (t) (Obs. = 4,441)	0.2%	94.8%	2.9%	2.1%
Direct ratings reference (t) (Obs. = 7,709)	0.2%	0.7%	97.0%	2.0%
New fund (t) (Obs. = 2,197)	7.1%	33.7%	57.2%	2.0%

Figure 1. ESG references in fixed income funds

This figure 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 period is 2010 – 2018.

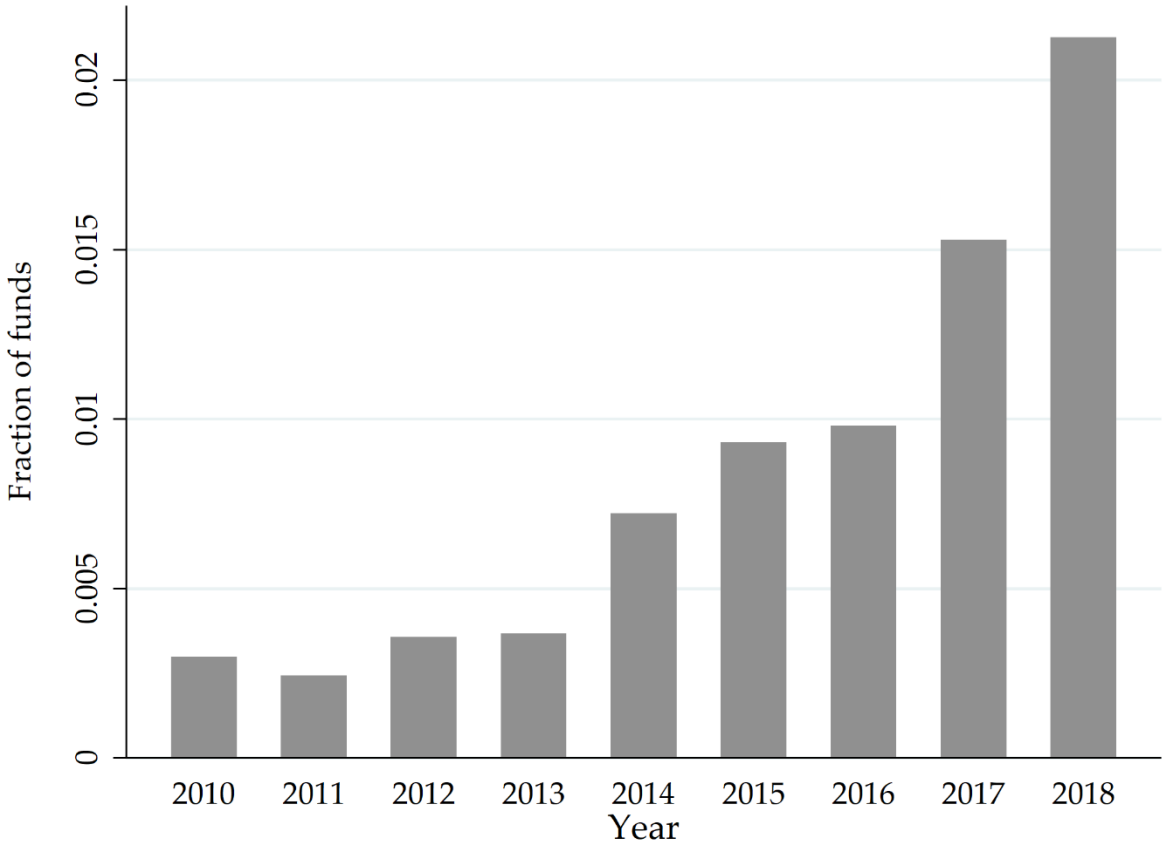


Figure 2. Rating references in money market mutual funds

This figure reports the fraction of money market mutual funds whose mandates refer to ratings or rating agencies (dummy variable *Direct ratings reference* is one), as well as the fraction of funds whose mandates contain a variant of the term "NRSRO" (dummy variable *NRSRO* is one). The sample consists of funds that file 497K forms and which can be classified as money market funds using Lipper objective codes (see Table A4). The sample period is 2010 – 2018.

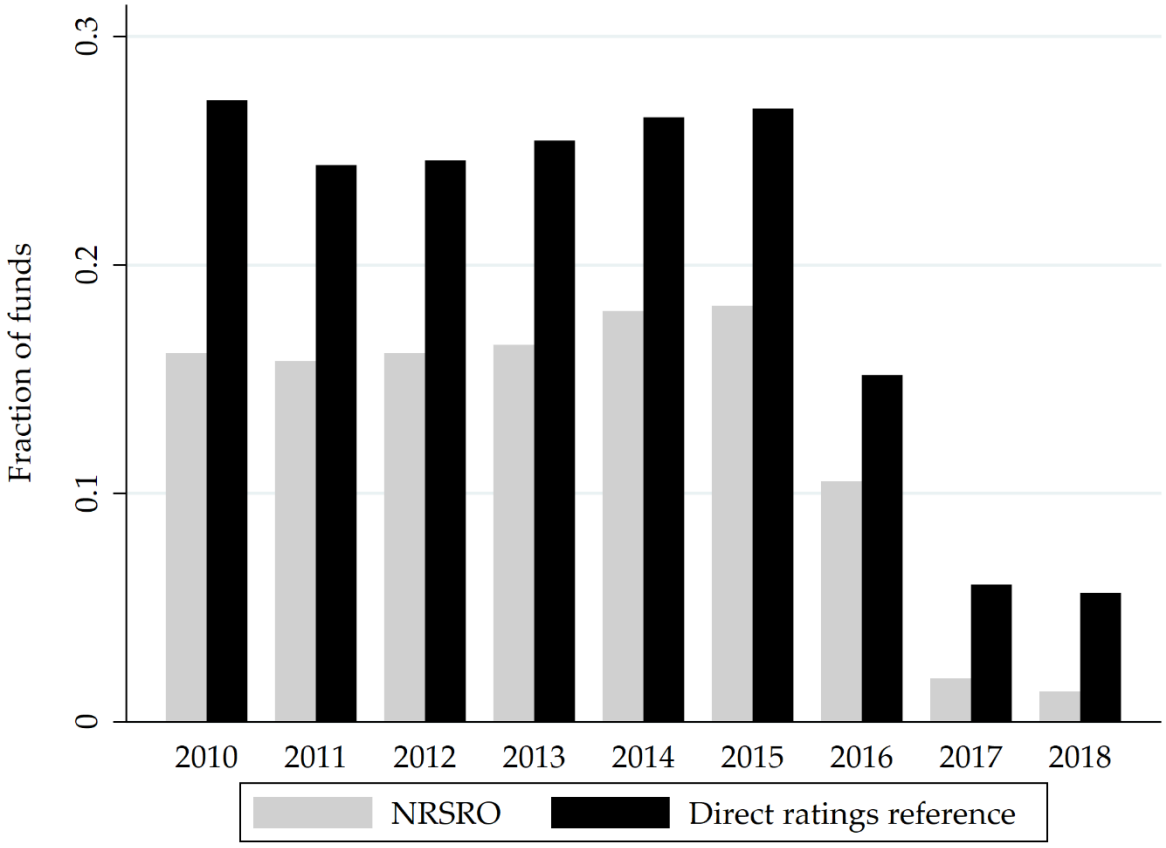


Figure 3. Trends in rating references, 2010 – 2018

This figure shows trends in rating use over the period 2010 – 2018. First, we estimate the following regression model:

$$Direct\ ratings\ reference_{f,t} = \alpha + X'\beta + \gamma_f + \varepsilon_{f,t}$$

where f denotes the fund and t the year. γ_f is a vector of fund fixed effects. X is a vector of year fixed effects with corresponding regression coefficients β; we include dummy variables for the years 2011 – 2018, omitting the variable for the year 2010, which serves as the benchmark. We plot the coefficients β, including 95% confidence intervals based on heteroscedasticity robust standard errors. *Direct ratings reference* is defined in Table 1. The sample uses summary prospectus filings (form type 497K).

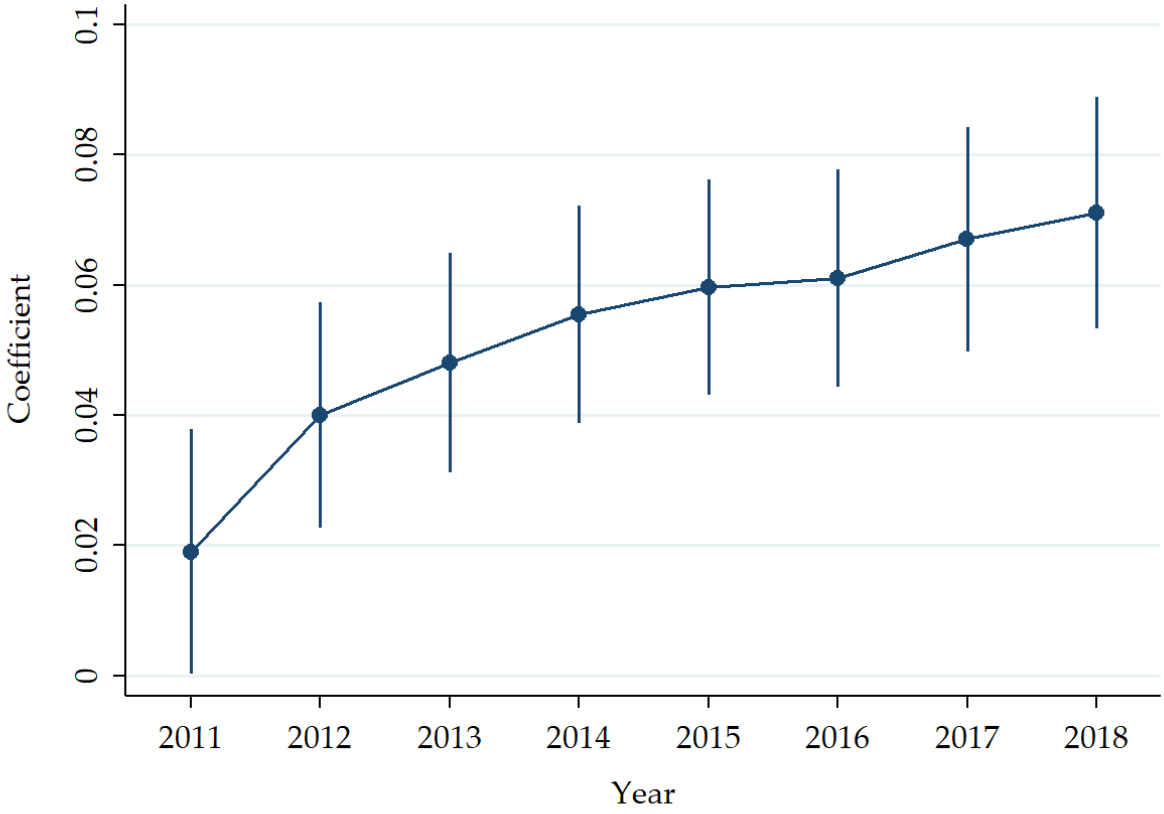


Figure 4. Trends in rating references, 1999 – 2018

This figure shows trends in rating use over the period 1999 – 2018. First, we estimate the following regression model:

$$Direct\ ratings\ reference_{g,t} = \alpha + X'\beta + \gamma_g + \varepsilon_{g,t}$$

where g denotes the fund group and t the year. γ_g are fund group fixed effects. X is a vector of year fixed effects with corresponding coefficients β; we include dummy variables for the years 2000 – 2018, omitting the variable for the year 1999, which serves as the benchmark. We plot these coefficients β, including 95% confidence intervals based on heteroskedasticity robust standard errors. *Direct ratings reference* is defined in Table 1. The sample uses fund group prospectus filings (form type 485).

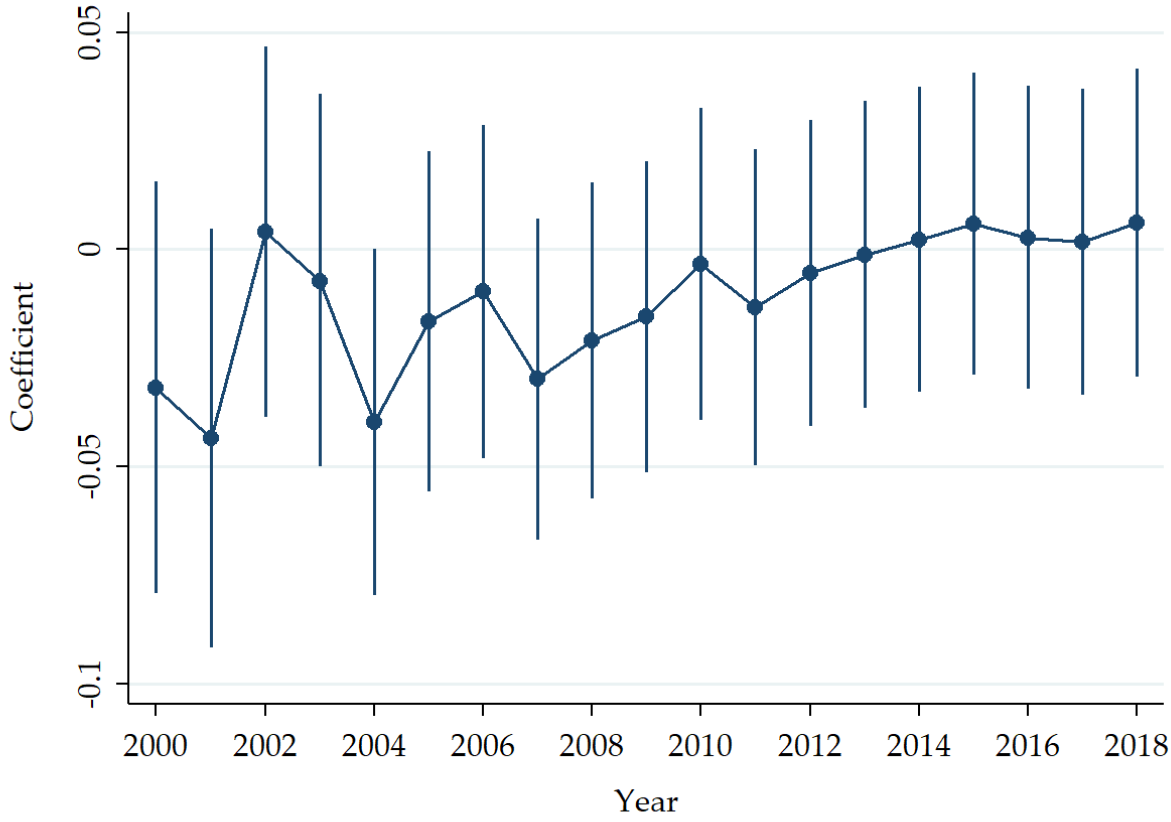


Figure 5. Security rating distribution for high yield funds and investment grade funds

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 (the dummy variable *HY fund* takes the value of one, see Table 1), as well as the ratings distribution for investment grade funds (the dummy variable *IG fund* takes the value of one, see Table 1). The observations are weighted by the market value of the investment in a given security by a given fund. The horizontal axis reports security ratings, while the vertical axis reports percentages.

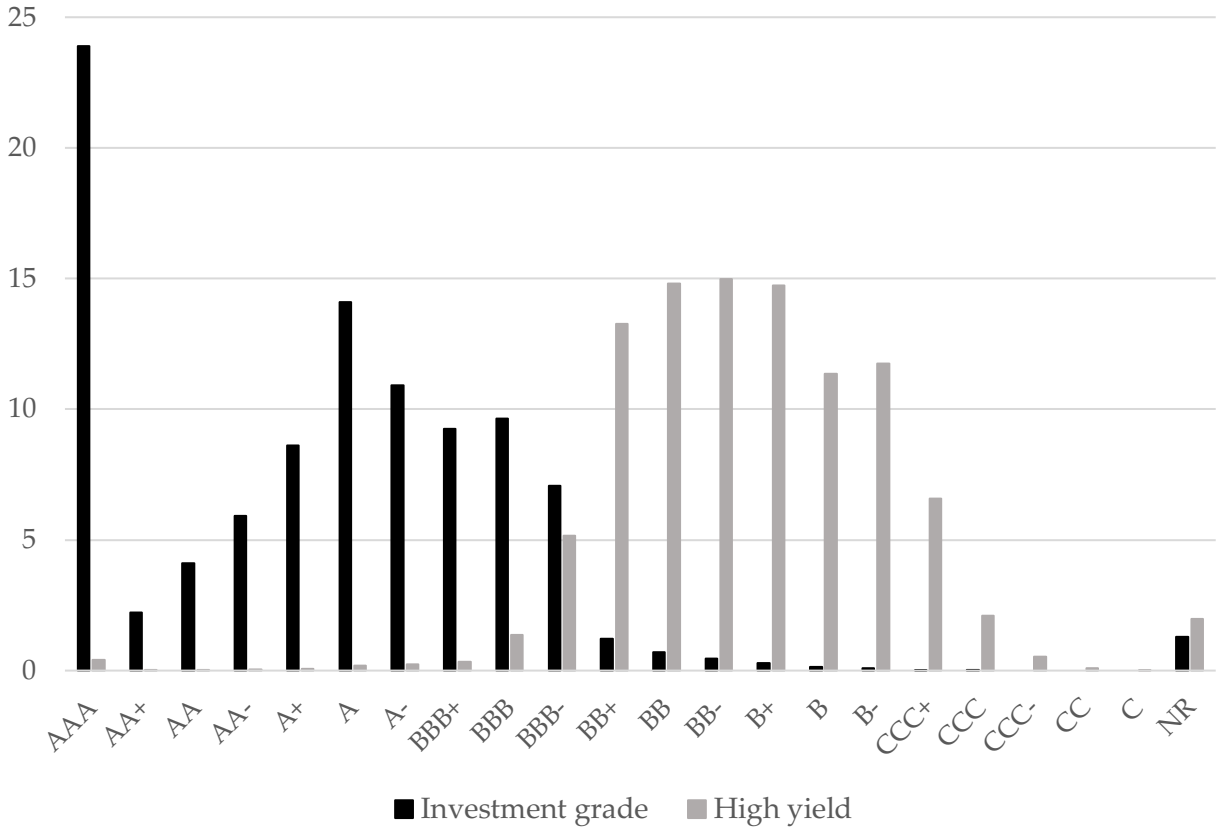
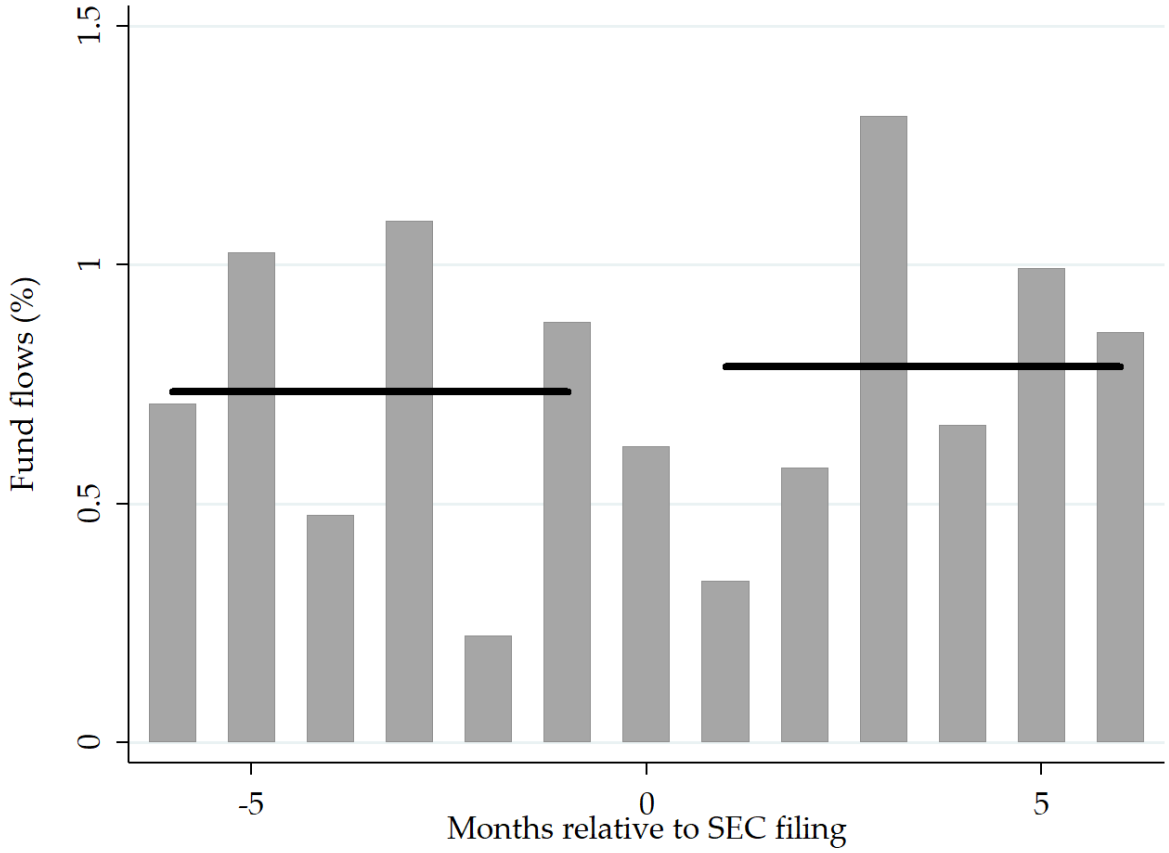


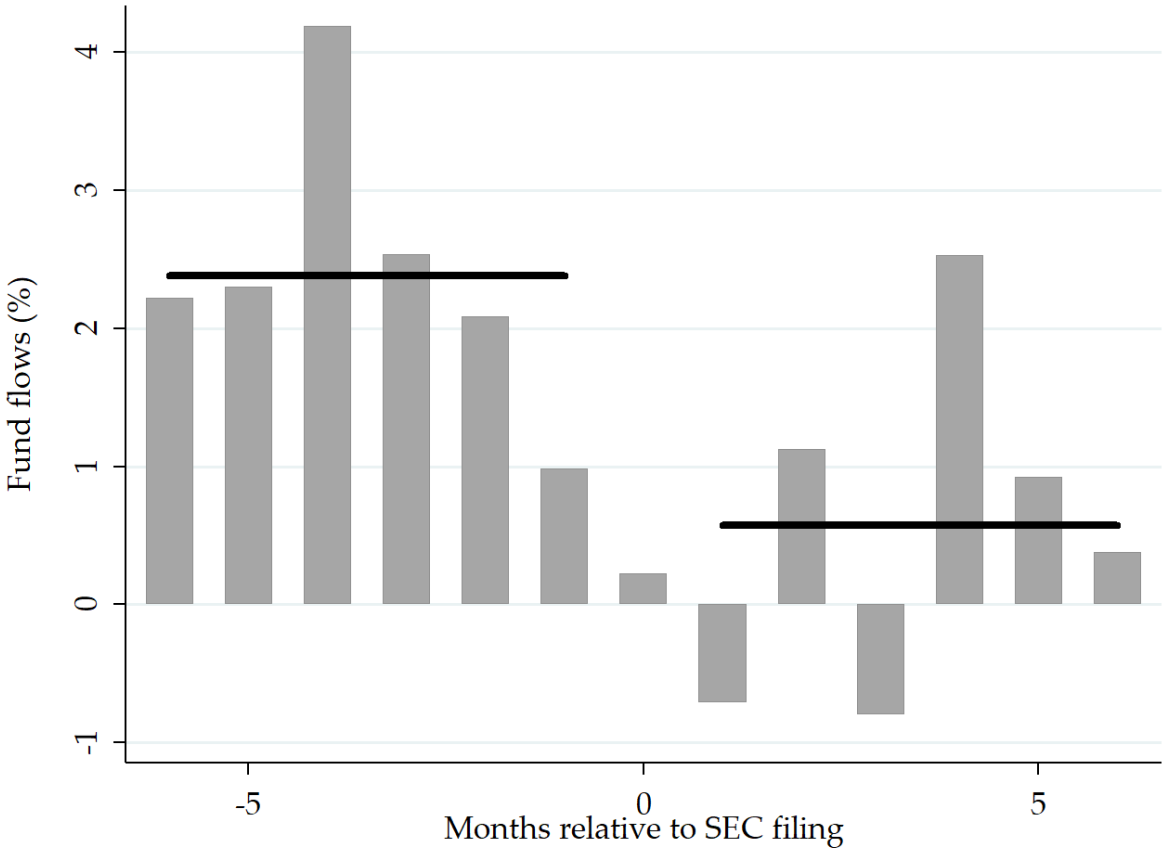
Figure 6. Flows into funds that add or remove rating references in the investment mandate

This figure shows average monthly investment flows for funds that add or remove rating references in their investment mandates. In Panel A, we focus on funds that, relative to the previous year's 497K filing, add references to credit rating agencies in their investment mandate (that is, for the current year's filing, *Direct ratings reference* is one whereas it is zero in the previous year). We combine this with information on monthly fund flows constructed using CRSP data (the unit of observation is the share class—month). We retain information for the filing month in which a rating reference is added ("event month"), as well as the six months preceding and following the filing month. In the figure, the grey bars correspond to averages of flows for the event month ("0" on the horizontal axis), as well as the six months before and after the event month. The two black horizontal lines indicate the average flows in the six months preceding or, respectively, following the rating reference addition. In Panel B, we proceed similarly but focus on funds that remove rating references. The sample consists of fixed income mutual funds with at least two consecutive annual 497K filings between 2010 and 2018; it excludes passive funds, i.e., index funds and ETFs. We also exclude funds that add or remove credit ratings references more than once between 2010 and 2018.

Panel A: Funds that add rating references



Panel B: Funds that remove rating references



APPENDIX

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 and "boilerplate" disclosure

This table reports the search terms used to identify statements about credit quality and boilerplate disclosure, respectively. 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 (see discussion in Section 1.B); we use money funds only in the sample underlying Figure 2.

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