

# Do Mutual Funds Walk the Talk?

## A Textual Analysis of Risk Disclosure by Mutual Funds

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### Abstract

Using textual analysis, we examine whether risk disclosures in funds' summary prospectus reflect funds' investment risks. We document the risks disclosed by funds and how they relate to academic risk factors. We then evaluate the relevance, conciseness and order of the risk disclosures. We find that disclosed risks explain about 50% of variations in fund returns; funds tend to overdisclose by reporting insignificant risks; the order of disclosure does not imply importance. We also find that funds improve their disclosure relevance after receiving SEC comment letters. We further explore the implications of risk disclosure for flow, risk taking and performance.

**Keywords:** Mutual funds, risk, disclosure, textual analysis, information, prospectus, flow

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# 1. Introduction

Approximately 50% of U.S. households invest in mutual funds as a way to save for retirement, education, and other purposes.<sup>1</sup> As a result, investors' fund investment decisions have large implications for individual and public welfare. In order to invest wisely, investors need access to accurate and adequate fund information to inform their decisions. Risk and return are the two most important factors in making investment decisions. So far, required disclosures, fund ratings, and academic research have focused more on fund returns (and risk-adjusted returns) than on risk. However, asset allocation, which explains about 90% of the variability in fund returns across time, builds on appropriate risk assessment.<sup>2</sup> Investors need to know not only the amount of total risk but also what types of risk they are assuming when investing in a mutual fund because many investors hold multiple funds and need to know risk interactions among funds to evaluate the total risk of the entire portfolio. Investors rely primarily on a fund's prospectus to obtain information about the fund's risks.<sup>3</sup> Do funds' risk disclosure statements accurately reflect their actual investment risks? This paper aims to answer the question by analyzing the text of the summary prospectus. The answer to this question has significant investment, legal and regulatory implications.

Nevertheless, the basic question of whether fund disclosure is informative remains understudied. Prior studies largely focus on quantitative measures of risks and returns. Advances in technology allow us to analyze qualitative descriptions of risks using textual

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<sup>1</sup> In 2019, 46.4% of the households in the United States owned mutual funds. Jennifer Rudden, "Share of households owning mutual funds in the U.S. 1980-2019," May 7, 2020, <https://www.statista.com/statistics/246224/mutual-funds-owned-by-american-households/>

<sup>2</sup> For example, see Ibbotson and Kaplan (2000). The substantial noise in asset returns and limited empirical evidence on the investment skills of fund managers further strengthen the importance of asset allocation decisions.

<sup>3</sup> Even for investors who use information provider such as Morningstar, much important information about fund risk on Morningstar is from fund prospectus.

analysis. A fund prospectus is a legally binding contract between the fund and the fundholder. Every investor is required to acknowledge reading the prospectus before they can invest in the fund. Thus, the accuracy and informativeness of a fund prospectus is of great investment, legal and regulatory interests. To provide investors with key information in a concise format, in 2009 the U.S. Securities and Exchange Commission (SEC) required funds to provide a summary prospectus.<sup>4</sup> Yet, little is known about how informative risk disclosure in the summary prospectus is. This paper bridges the gap in the literature. We examine the quality of risk disclosure in the summary prospectus by analyzing whether the disclosed risks explain fund returns. We also investigate the implications of risk disclosure for understanding key aspects of mutual funds, including fund flow, risk taking, and fund performance.

What risk factors do funds disclose? While a large academic literature has identified numerous risk factors (a phenomenon dubbed “factor zoo” by Cochrane (2011)), there is no systematic study of what risk factors are deemed important from the perspective of the finance industry. We start our study with a textual analysis of the risks disclosed by mutual funds in their summary prospectuses. First, we document what types of risks are disclosed. While many risks disclosed by mutual funds overlap with well-known risk factors in academic literature (e.g. market risk), some other disclosed risks are beyond academic risk factors (e.g., custody risk). In addition, mutual funds disclose more risks over time. We also show that some disclosed risks can be empirically linked to academic risk factors, such as size, value, and growth, while this link is less clear for some other risks.

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<sup>4</sup> As one of the main resources for investors to obtain information of mutual funds, the statutory prospectuses have been criticized for its longevity and complex.

We then examine the quality of a fund's risk disclosure in terms of its informativeness. Specifically, we explore three aspects of informativeness: relevance, conciseness and order.<sup>5</sup> These features are also highlighted in SEC's discussion documents. Relevance captures how well the disclosed risks explain future fund returns. Conciseness examines whether funds disclose risks that are significant in explaining fund returns. The order tests whether the risks disclosed first are more important.

To investigate disclosure relevance, we construct the measure "Risk Coverage Ratio" (*RCR*), which examines what proportion of variations in fund future returns can be explained by disclosed risks, benchmarked against the proportion that can be explained by all risks disclosed by all funds. The rationale is that if a fund discloses risks properly, then the variation in fund future performance should be well explained by the disclosed risks. Since all equity funds are exposed to the market risk and the disclosure of "market risk" does not add marginal information for investors, we exclude the "market risk" when calculating the main *RCR* measure. The average *RCR* is 53%. When including the "market risk", the average of *RCR w/mkt* increases to 91%. This evidence suggests that even though all the disclosed risks could explain more than 90% of return variations, a large part of this explanatory power comes from the "market risk". When the "market risk" is not considered, about half of the return variation is explained by the rest disclosed risks.

To examine the conciseness of the disclosure, we develop a measure of *Overdisclosure* that calculates the number of disclosed risks that are not significantly related to fund returns as a percentage of all disclosed risks. This is our second measure of disclosure quality. The smaller the percentage, the more concise the overall disclosure is. Our estimate shows an average *Overdisclosure* of 63%, suggesting more than half of disclosed risks do not

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<sup>5</sup> SEC ADI 2019-08 - Improving Principal Risks Disclosure: <https://www.sec.gov/investment/accounting-and-disclosure-information/principal-risks/adi-2019-08-improving-principal-risks-disclosure>

significantly relate to fund returns. This finding indicates room for improvement in streamlining the list of risks in the summary prospectus.

The quality of disclosure is not only measured by whether funds disclose related risks, but also by whether funds disclose the risk in a proper order. To investigate the ordering of disclosed risks, we examine the explanatory power of fund's first three disclosed risks and that of the last three disclosed risks. We find that without considering "market risk", the top risks are not significantly more important than the bottom risks, suggesting that funds do not disclose important risks first.

What affects disclosure quality? We first study the effect of SEC comment letters. The SEC may issue a comment letter to ask funds to revise their prospectuses if it identifies potential material deficiencies in disclosures. Thus, we examine whether funds improve their risk disclosure after receiving a SEC's comment letter regarding their prospectuses. We find that funds respond to SEC's comment letter by disclosing more risks. While the revised disclosures become less concise, the relevance of risk disclosure is significantly improved.

We further examine how fund characteristics relate to disclosure quality. We find that funds in larger families, riskier funds, and funds with higher expense ratios tend to have more relevant disclosure (higher *RCR*). In addition, funds tend to overdisclose risks after they experience a decrease in new money flow. When funds have inferior performance, they tend to disclose more risks in the future.

Moreover, we study the implications of risk disclosure for understanding key aspects of mutual funds, such as fund flow, risk-taking, and performance. To test whether investors respond to risk disclosure quality, we examine whether funds with a high *RCR* attract more fund flow. We find that even though an average investor does not respond to the quality of risk disclosure, sophisticated investors care about it. A more relevant risk disclosure attracts

flows from sophisticated investors. Such response provides evidence that some investors pay attention to fund risk disclosure quality in the summary prospectus.

Finally, we study the relation between the risk disclosure and future fund risk-taking and performance. We find that funds with more relevant disclosure exhibit higher idiosyncratic risk. Funds that overdisclose tend to have lower risks in the future. This finding is consistent with the intuition that a fund manager who overdiscloses risks is more conservative and assumes less investment risk.

This paper adds to the broad mutual fund literature by evaluating an important but understudied topic, the quality of mutual fund disclosure. Most of the existing literature on mutual funds focuses on quantitative measures such as fund performance, flow, and portfolio risk. A large literature is devoted to uncovering factors that can forecast fund performance.<sup>6</sup> Many of the predictors are based on signals extracted from fund holdings information.<sup>7</sup> Prior researchers have also studied how funds shift risk as a way to attract cashflow and win performance tournaments.<sup>8</sup> Our finding provides new evidence on how disclosure quality relates to fund flow, risk-taking, and performance. Moreover, the main variables in this paper based on fund prospectus reflect the information set from the perspective of ordinary investors rather than that of researchers. Inferring risk and risk-factor loadings using return data may be feasible for researchers but could be quite impossible for unsophisticated

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<sup>6</sup> See, for example, Brown and Goetzmann (1995), Gruber (1996), Ferson and Schadt (1996), Chevalier and Ellison (1999), Zheng (1999), Ferson (2010), Wermers (2011), Fama and French (2010), Sheng, Simutin, and Zhang (2021).

<sup>7</sup> See, for example, Cohen, Coval, and Pastor (2005), Kacperczyk, Sialm, and Zheng (2005) (2008), Kacperczyk and Seru (2007), Cremers and Petajisto (2009), Barras, Scaillet, and Wermers (2010), and Jiang and Zheng (2018).

<sup>8</sup> See, for example, Brown, Harlow, and Starks (1996), Brown and Goetzmann (1997), Chevalier and Ellison (1997), Koski and Pontiff (1999), Goetzmann, Ingersoll, Spiegel, and Welch (2007), Kempf and Ruenzi (2008), Huang, Sialm, and Zhang (2011), and Schwarz (2012).

investors, who rely on information disclosed by funds. This study yields novel evidence and unique insights on how well mutual fund disclosure serves the needs of investors.

This study contributes to the literature on the benefits and costs of disclosure. Prior studies examine the potential benefits and costs of mutual fund portfolio disclosure find that disclosure imposes costs on informed investors (e.g., Ge and Zheng (2006); Wermers (2001); Frank, Poterba, Shackelford, and Shoven (2004); Agarwal, Mullally, Tang, and Yang (2015); Dyakov, Harford, and Qiu (2021)). Schwarz and Potter (2016) study the motivation of mutual funds' voluntary disclosure. Brown, Goetzmann, Liang, and Schwarz (2008) examine the value of hedge fund disclosure through the SEC Form ADV requirement. Goldstein and Yang (2019) study the effects of disclosure on real efficiency. Our paper provides new evidence that low-skill funds tend to disclose more risks.

Our paper is the first to analyze the economic content of disclosed risks in mutual fund summary prospectus. While textual analysis of corporate disclosures is a large literature, its application in mutual fund disclosure is still limited. deHaan, Song, Xie, and Zhu (2021) study the readability score of index fund prospectuses. Kostovetsky and Warner (2020) examine product differentiation of mutual funds based on the strategy descriptions. Recent research studies the similarity/uniqueness of the text in fund prospectus (Abis and Line (2021); Krakow and Schäfer (2021)). Different from these studies, our paper examines the economic meaning and implications of the disclosed risks. We provide the first look of the types of risks disclosed in the fund prospectus and link them to academic risk factors. We use a novel approach to examining the links between disclosed risks and fund returns to study whether funds' risk disclosure accurately reflects their actual investment risks.

Finally, this paper relates to the fast-growing literature on textual analysis in finance. Prior literature has focused on studying corporate disclosures such as annual reports (e.g.,

Li (2008); Lopez-Lira (2020)), and news articles (e.g., Tetlock (2007); Manela and Moreira (2017); Liu and Matthies (2021); Fisher, Martineau, and Sheng (2022)). These studies mainly focus on sentiment and readability of the text. Unlike these studies, we focus on the content and economic meaning of textual disclosure from mutual funds. Our approach allows a better understanding of the economic implications of textual disclosure beyond general readability and sentiment.

## 2. Data and Background

### 2.1 Mutual Fund Data

Our data sample covers the period from the last quarter in 2009 to the end of 2019 because the SEC starts to require fund summary prospectus in 2009. Mutual fund data is from the Center for Research in Security Prices (CRSP) Survivorship Bias Free Mutual Fund Database. Following the literature, we focus on diversified open-end domestic equity funds and therefore exclude balanced, bond, money market, international and sector funds. We use the Lipper objective and classification codes, Wiesenberger objective codes, Strategic insight objective codes, Policy codes, and Thomson Reuters style code to identify U.S. domestic equity funds. Index funds are also eliminated according to fund name and our manual check. To make sure that the funds invest primarily in equity, we restrict the funds to hold more than 80% and less than 105% of their assets in equity. We remove funds with a time-series average size smaller than \$10 million over the sample period. The information of mutual funds includes fund after-fee raw returns, total net assets (*TNA*), expense ratios, turnover ratios and other characteristics. For funds with multiple share classes, we compute fund level data by aggregating across different classes. Returns, expense ratios and turnover ratios are calculated as class size-weighted averages. Fund size is the sum of share class *TNA*. For qualitative variables, we retain the observation of the oldest share class.



We also use other performance measures, including the one factor alpha of Jensen (1968), the Fama-French three-factor alpha (Fama and French (1993)) and the Fama-French-Carhart four-factor alpha (Carhart (1997)). Alpha measures are estimated from rolling window regressions using monthly data from previous 36 months. Fund-level flow is calculated as a percentage of beginning total net assets as in Equation (1):

$$Flow_q = \frac{TNA_q - TNA_{q-1} \times (1 + Return_q)}{TNA_{q-1}} \quad (1)$$

where  $TNA_q$  is the total net assets at the end of quarter  $q$ .  $Return_q$  is fund raw return from the end of quarter  $q-1$  to the end of quarter  $q$ . We use funds' management company name to identify funds in the same family and calculate fund family size as the sum of total assets of its affiliated funds. Finally, volatility is estimated as standard deviation of daily raw returns within a quarter. Some holding-based measures are also used in the paper such as active share (Cremers and Petajisto (2009)) and Industry Concentration Index (ICI) (Kacperczyk, Sialm and Zheng (2008)). We merge the Thomson Reuters Mutual Fund Holdings Database using the MFLINKS table (Wermers (2000)).

Panel A of Table 1 reports the time series average of cross-sectional summary statistics for our final sample used for later regressions (after merging with the summary prospectus data). The final sample consists of 1,476 actively managed domestic equity funds. The quarterly after-fee raw return is 2.99% on average. The mean size of the funds is 1,909.81 million dollars. Fund charges 1.05% fees on average. Investors' new money is flowing out from the funds, as 0.57% of the fund beginning size per quarter. The average turnover ratio is 69.23% and the volatility of daily raw return within a quarter is 0.93% on average.

## 2.2 Background on Fund Summary Prospectus

Under the Investment Company Act of 1940, the SEC requires mutual funds to provide investors the statutory prospectus which contains the details of the funds. However, there have been concerns about the statutory prospectus from investor advocates, fund industry representatives and others. Because it is too long and not easy to read. It usually combines multiple funds in one single file and the language is complicated and legalistic. While important, the key information in the statutory prospectus is hardly absorbed by investors. Given such concerns and the importance of efficient provision of fund information to investors, starting from March 31, 2009, the SEC requires a summary prospectus.

The summary prospectus is a summary section required at the front of every statutory prospectus, consisting of key information about the fund, including fees and expenses, principal investment strategy, principal risks and performance. It is required to be in three or four pages and presented in plain English in a standardized order. In addition, the summary section is required to be presented separately for each fund even if the fund is covered by a multiple fund prospectus. The requirement is to help the investors process the information and make better decisions, as quoted from the SEC file of this final rule, the purpose of this regulation is *“to improve mutual fund disclosure by providing investors with key information in plain English in a clear and concise format, while enhancing the means of delivering more detailed information to investors.”*<sup>9</sup> In this study, we focus on the risk disclosure in the summary prospectus.

The summary prospectus lists principal risks that are important for investors to value and compare funds. Two examples of risk disclosure in summary prospectus are presented in Internet Appendix A. Some funds disclose many risks with detailed

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<sup>9</sup> The full text of this rule can be found here: <https://www.sec.gov/rules/final/2009/33-8998.pdf>.

explanations (Example 2), while other funds list only a few risks and offer a brief explanation for each one (Example 1). Another difference between these two examples is the type of risks the funds disclose. For instance, the second fund (Federated Kaufmann Small Cap Fund) disclosed several risks (e.g., currency risk, credit risk) that are not mentioned in the first fund's (American Growth Fund Series One) risk section. In short, risk disclosure shows substantial variations.

In 2019, the SEC published Accounting and Disclosure Information recommendations, aiming to improve mutual fund risk disclosures for investors. The recommendation proposes several methods to improve risk disclosure. Funds are encouraged to tailor risk disclosures to more closely describe the principal risks associated with that particular fund. Also, the disclosure should be clear and concise to help investors better understand the information. Besides, the SEC encourages funds to order risks by importance, with the most significant risks appearing first. Consistent with this recommendation, our measures of disclosure quality include relevance, conciseness, and order.

### **2.3 Extracting Disclosed Risks from the Summary Prospectus**

To get information about a fund's risk disclosure, we first download all the summary prospectuses available from the SEC EDGAR website. Without any sample filter, we are able to download 191,356 textual files for 15,212 unique funds from 2009 to 2019. We merge the textual data with our actively managed domestic equity fund sample according the fund level Central Index Key (CIK) of the SEC. We are able to match 23,493 files from 1,672 unique funds. To capture funds' risk disclosures, we extract the phrases that contain the key word "risk" or "risks". The details are documented in Internet Appendix B.

After extracting the risk phrases, we clean the phrases by removing those that are not a name of risk, such as “many risks”, “a fund takes risk”, etc. Since funds may choose different wording to express the same meaning, we manually check the extracted phrases and combine those that we believe have the same meaning and split those that we believe have different meanings. For example, we combine “merger arbitrage risk”, “arbitrage strategies risk” and “arbitrage trading risk” to “arbitrage risk” and split “mid- and large-cap companies risk” to “mid cap risk” and “large cap risk”. For each fund-date observation, any risk that appears multiple times is only counted once. Internet Appendix B documents how we combine and split risks according to the meaning. For funds that make adjustments to their summary prospectus, we combine such disclosures with the main one. We also delete risks with trivial frequency.<sup>10</sup> The cleaning of textual data leaves a total of 42 risks. Table 2 lists all the 42 risks and the corresponding average number of disclosing funds.

The textual analysis method we employ here is dictionary-based, which is well-accepted in the finance literature (e.g., Manela and Moreira (2017); Liu and Matthies (2021); Fisher, Martineau, and Sheng (2022)). This method is suitable when researchers have good prior knowledge about what they are looking for and the list of words is straightforward. In this paper, the dictionary-based method is proper because our focus is risk-related keywords.<sup>11</sup>

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<sup>10</sup> The most common risk “market risk” has 961.9 funds disclosing it on average over time, and we eliminate the risk with fewer than 35 funds disclosing it.

<sup>11</sup> Other method such as unsupervised machine learning method Latent Dirichlet Allocation (LDA) is useful when prior about what is looking for from texts is less clear.

### 3. What Risks Do Mutual Funds Disclose?

In this section, we document several stylized facts about risk disclosure by mutual funds. Specifically, we report what risks are disclosed, their relative frequencies, and the time trend. As shown in Table 2, the most frequently disclosed fund risk is “market risk,” disclosed by 961.9 funds on average. It is not surprising given that all the equity mutual funds are subject to the market risk. The second frequently disclosed risk is “active investment risk,” disclosed by 646.4 funds on average, which is also reasonable since our sample consists of actively managed funds. In contrast, “index/passive investing risk” is one of the least frequent risks in our sample. We also see disclosure of some less common risks, such as “event risk”, “custody/operation risk”, etc. To better visualize the risk disclosure, we plot the top 20 risks in Table 2 as a word cloud, where higher-ranked risks are plotted in bigger fonts. It is shown in Figure 1.

To better understand how the risk disclosure changes over time, we create a heat map in Figure 2. The figure allows us to visualize the relative frequencies of the top 20 risks over years. For each risk, we calculate the number of funds disclosing the risk per quarter as a percentage of the total number of funds in that quarter, and then average this percentage over quarters within a year. A darker color implies a higher percentage. We observe that across risks, the “market risk” is the most frequent one, and the second is “active investment risk”. The relative frequencies of the disclosed risks remain quite stable over time. A few risks, such as foreign investment and liquidity, are disclosed in higher relative frequencies in recent years.

One important fact we find is that many risks disclosed by mutual funds are related to well-known risk factors in academic literature, but others span a broad range of categories

that are beyond academic risk factors.<sup>12</sup> First of all, there are systematic risks, such as “market risk”, “interest rate risk”, and “liquidity risk”. We also observe portfolio-specific risk, for example, “active investment risk”, “portfolio turnover risk”, “non-diversification risk” and so on. The largest category is asset class risk, including “foreign investment risk”, “small cap risk”, “value investing risk”, and “derivatives risk”. Last but not least, some risks are less well-known, such as “custody/operation risk”, “cyber security risk”, etc.

This fact is interesting because the risks disclosed by mutual funds include more types and varieties than well-known risk factors in academic literature. For example, the finance industry has viewed cyber security risk as important for a long time (since 2015), but the academic literature has not paid attention to it until 2020 (e.g., Jiang, Khanna and Yang (2020); Florackis et al (2020)). Thus, the panorama view of risks from the industry perspective documented in this paper is insightful not only for studies in mutual funds, but also for asset pricing literature.

To further understand the disclosed risks from mutual funds in an academic setting, we link them to risk measures in the academic literature in a systematic way. In other words, we examine whether the fund industry and the academia speak the same language. Specifically, for each disclosed risk, we first find a corresponding academic risk measure that makes the most economic sense to the best of our knowledge. The proposed risk measures are listed in Internet Appendix Table IA1. They are based on common knowledge in the finance literature. For example, we find CAPM market premium for the “market risk”. Among all the 42 risks, we are able to find academic risk measures for 31 of them. We then identify the most relevant academic risk measure using a regression framework. In particular, we examine which measure can most significantly explain the variation in returns associated

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<sup>12</sup> We define risk factors broadly and take them from the existing literature. We do not take a stand on whether a documented factor is a risk factor or not.

with that risk. For each disclosed risk, the associated return is calculated as the difference between the return of a portfolio of funds that disclose this specific risk and the return of a portfolio of funds that do not disclose this risk. The portfolios are equally weighted.

We report the most significant risk measure for each disclosed risk, according to the absolute value of  $t$ -statistics in Table IA2 of the Internet Appendix. The results are reasonably consistent with our economic intuition because most well-known risk factors are linked to the corresponding disclosed risks. For example, “growth investing risk” is linked to the Fama-French value factor; “large cap risk” is linked to the Fama-French size factor; “portfolio turnover risk” is linked to fund turnover. There are also some risks whose correspondences are less intuitive.

Overall, most disclosed risks can be linked to academic empirical measures that make economic sense. Our evidence suggests that generally speaking, the risk disclosure in the summary prospectus is reliable in the sense that there is a good correspondence between the industry and academic perspectives on risks. This exercise also serves as a validity test for forming portfolios of funds based on disclosed risks in Section 4.

## 4. How Informative Are Funds’ Risk Disclosure?

In this section, we examine the quality of risk disclosure by mutual funds by assessing the relevance, conciseness and order by importance. Accordingly, we construct three measures: Risk Coverage Ratio ( $RCR$ ), *Overdisclosure*, and Risk Coverage Ratio of the top three risks, and of the bottom three risks ( $RCR_{Top}$  and  $RCR_{Bottom}$ ).

### 4.1 Risk Coverage Ratio

To assess the quality of risk disclosure in a fund’s summary prospectus, a natural question to ask is whether the fund’s future actual investment risks are reflected by its

current disclosure. In other words, do mutual funds walk the talk? Although all funds are required to disclose risks properly, they may have various reasons to hide their risk exposure. For example, some funds may not want to disclose positions that give them a performance edge. Prior studies also support this argument (e.g., Wermers (2001); Frank, Poterba, Shackelford, and Shoven (2004); Ge and Zheng (2006)).

To examine the relevance of risk disclosure, we construct a measure, risk coverage ratio ( $RCR$ ), which captures how well the disclosed risks explain future fund returns. Specifically, we examine what proportion of variations in actual future fund returns can be explained by disclosed risks. The rationale for this approach is as follows: if a fund discloses its risks properly, its future returns should be largely explained by the disclosed risks. The higher the explained proportion, the greater the coverage of the risk disclosure. Our general method is to regress future fund returns on returns of disclosed risks and construct  $RCR$  with  $R^2$  from the regression.

We develop a new method to construct the returns of disclosed risks. The general idea is to use the return difference between a portfolio of funds disclosing the specific risk and a portfolio of funds not disclosing the risk to proxy for the return of a disclosed risk. More specifically, for each fund in each quarter, the return of each disclosed risk is calculated as the return of all *other* funds that disclose this risk minus the return of the portfolio of funds that do not disclose this risk. This way, we do not include the fund in the dependent variable when we calculate the return of the disclosed risk. The portfolios are equal weighted.

Among all the 42 risks we study, the “market risk” is special. All equity funds are exposed to the market risk, therefore the disclosure of “market risk” does not add marginal information for investors. So, we exclude the “market risk” from the risk universe that we study and focus on the remaining 41 risks. As a result,  $RCR$  captures how well the disclosed risks other than the “market risk” explain the part of fund future returns that is not related



to the market, i.e. the CAPM alpha. Specifically, for each fund with  $k$  risks disclosed in quarter  $q$ , we run the following regression:

$$\alpha_t = \beta_0 + \beta_1 \times \text{Disclosed\_Risk\_Return}_{1t} + \dots + \beta_k \times \text{Disclosed\_Risk\_Return}_{kt} + e_t \quad (2)$$

Since  $RCR$  is forward-looking, for the disclosure in each quarter, we run Equation (2) using daily data in the next quarter. Time  $t$  in Equation (2) represents day  $t$  in quarter  $q+1$ .

$\alpha_t$  is daily CAPM alpha, and it is estimated from rolling window regression using the daily data from the previous year.<sup>13</sup>  $\text{Disclosed\_Risk\_Return}_{1t}$  to  $\text{Disclosed\_Risk\_Return}_{kt}$  are daily return proxies in quarter  $q+1$  of  $k$  risks disclosed in quarter  $q$  except the “market risk”.  $k$  varies with fund  $i$  and quarter  $q$ . For each fund on day  $t$ , the return proxy of disclosed risk is constructed as the CAPM alpha of the portfolio of all funds that disclose this risk in quarter  $q$  minus the CAPM alpha of the portfolio of all funds that do not disclose this risk in quarter  $q$ .<sup>14</sup> The portfolio CAPM alpha is the equally weighted average CAPM alpha of individual funds in the portfolio. We exclude the observations if the disclosing portfolio contains fewer than five funds.

The  $R^2$  from Equation (2) measures the fraction of future abnormal returns that can be explained by returns of disclosed risks, excluding “market risk”. We call this  $R^2\_Disclose_i(\alpha_{q+1}, d_q)$ . This is the  $R^2$  from Equation (2) based on the disclosure at the end of quarter  $q$  and estimated using daily CAPM alpha within quarter  $q+1$  for fund  $i$ . We

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<sup>13</sup> Specifically, for each fund on each day  $t$ ,  $\alpha_t$  is estimated from the follows regression:  $(R_\tau - r_{f\tau}) = \alpha_t + \beta_t \times (R_{m\tau} - r_{f\tau}) + e_\tau$ , and  $\hat{\alpha}_t = (R_t - r_{ft}) - \hat{\beta}_t \times (R_{mt} - r_{ft})$  where  $R_\tau$  is the fund raw return in day  $\tau$ ,  $r_{f\tau}$  is the risk-free rate, and  $R_{m\tau}$  is the return on the market portfolio.  $\tau = t - 1, t - 365$ .

<sup>14</sup> We use CAPM alpha instead of raw return in this specification because the  $RCR$  does not count the market factor.

also run a regression for each fund in each quarter on returns of all the 41 risks in our risk universe:

$$\alpha_t = \beta_0 + \beta_1 \times Disclosed\_Risk\_Return_{1t} + \dots + \beta_n \times Disclosed\_Risk\_Return_{nt} + e_t \quad (3)$$

where  $Disclosed\_Risk\_Return_{1t}$  to  $Disclosed\_Risk\_Return_{nt}$  are daily return proxies in quarter  $q+1$  of  $n$  risks disclosed all funds during the whole sample period, in other words,  $n = 41$  and  $n$  is fund-quarter invariant. The  $R^2$  from this regression captures the fraction of variations in non-market returns that can be explained by all risk disclosure in the mutual fund domain. We call this  $R^2_i(\alpha_{q+1}, d)$ , which is the  $R^2$  from Equation (3) based on all risks and estimated using daily CAPM alpha within quarter  $q+1$  for fund  $i$ . It establishes a base case for the risk coverage since we include all disclosed risks by all funds.

We estimate Risk Coverage Ratio ( $RCR$ ) that excludes the “market risk” as follows:

$$RCR_{iq} = \frac{R^2\_Disclose_i(\alpha_{q+1}, d_q)}{R^2_i(\alpha_{q+1}, d)} \quad (4)$$

$RCR_{iq}$  captures the relevance of risk disclosure because it measures the explanatory power of disclosed risks in a fund relative to the explanatory power of all risks disclosed by all funds. Benchmarking against  $R^2_i(\alpha_{q+1}, d)$  allows a comparison across funds with different levels of risk. In general, low-risk funds have low  $R^2\_Disclose_i(\alpha_{q+1}, d_q)$ , therefore low  $R^2\_Disclose_i(\alpha_{q+1}, d_q)$  does not necessarily imply underdisclosure. Benchmarking  $R^2\_Disclose_i(\alpha_{q+1}, d_q)$  against  $R^2_i(\alpha_{q+1}, d)$  mitigates this problem.<sup>15</sup>

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<sup>15</sup> We also estimate  $RCR$  using adjusted  $R^2$ . The summary statistics of the disclosure measures estimated by adjusted  $R^2$  are reported in Table IA3 in the Internet Appendix.

Even though the disclosure of “market risk” incorporates little marginal information for investors, it is still interesting to know how  $RCR$  is different when the “market risk” is included. To achieve this goal, we repeat the previous procedure of estimating  $RCR$  by including the disclosure of “market risk” and replace all daily CAPM alpha with daily raw returns. We call this measure  $RCR\ w/mkt$ , which captures how well the disclosed risks of all the 42 risks including the “market risk” explain the variations in fund future raw returns.

Another interesting question is how well the disclosed risks explain returns compared to the common risk factors. Does risk disclosure in mutual fund industry increase the explanatory power on top of academic common factors? To answer this question, we re-estimate  $RCR$  with  $R^2$  from the regression on Fama-French-Carhart six factors (Fama and French (2015); Carhart (1997)) as the benchmark and call this measure  $RCR\ FFC6$ .  $RCR\ FFC6$  is defined similar as in Equation (4) except that the denominator is changed to  $R^2_i(\alpha_{q+1}, FFC6)$ , which is the  $R^2$  from the following regression:

$$\alpha_t = \beta_0 + \beta_1 \times SMB_t + \beta_2 \times HML_t + \beta_3 \times RMW_t + \beta_4 \times CMA_t + \beta_5 \times UMD_t + e_t \quad (5)$$

where  $SMB_t$ ,  $HML_t$ ,  $RMW_t$ ,  $CMA_t$  and  $UMD_t$  are size, value, profitability, investment and momentum factor returns on day  $t$  in quarter  $q+1$ .

Table 3 shows the summary statistics for the  $RCR$  and other disclosure measures. The average  $RCR$  is about 53%. We also observe large cross-sectional variations: the cross-sectional standard deviation of  $RCR$  is 26%; the minimum is only 1%, and the maximum is 94%. When including the “market risk”, the average of  $RCR\ w/mkt$  increases to 91%. These numbers suggest that even though all the disclosed risks could explain more than 90% of future return variation, a large proportion of this explanatory power comes from the

“market risk”. When the “market risk” is not considered, about half of the return variation is explained by the remaining disclosed risks. *RCR FFC6* has a mean of 1.33. This larger-than-one number implies that risk disclosure explains 33% more than the Fama-French-Carhart six factors. Risk disclosure in the summary prospectus provides marginal information on top of the common risk factors to investors.

## 4.2 Overdisclosure

While it is important to disclose all risks that funds are exposed to, one question is whether funds disclose risks that they are not important. Funds may overdisclose risks for at least two reasons. First, low-skill funds may want to disclose many risks, including some risks that they are less important, to mitigate concerns about potential litigation. Hanley and Hoberg (2012) show that firms use strategic disclosure in IPO prospectuses to hedge against litigation risk. Second, funds may want to disclose many risks to hide their true exposure.

Thus, we also examine whether funds overdisclose risks in their summary prospectus. Specifically, we run regression Equation (2) with all disclosed risks except the “market risk”. We count the number of risks that are statistically insignificant (with  $p$ -value  $\geq 0.05$ ). The *Overdisclosure* measure is the number of risks that are *not* significant divided by the total number of risks disclosed in the fund’s summary prospectus. In other words, this measure captures the fraction of disclosed risks that do not significantly affect the fund’s future returns. Table 3 shows that, on average, 63% of risks are not statistically significant. This finding suggests that there is an overdisclosure problem in funds’ risk disclosure. This result has important policy implications. For example, the SEC may require funds to disclose relevant information only and improve conciseness. In Section 5, we further examine the funds motivation for overdisclosure and find it is related to litigation concerns.

### 4.3 The Order of Risks

The quality of disclosure is not only measured by whether funds disclose related risks, but also by whether funds disclose the risk in a proper order. Not all risks in the prospectus are equally important. The SEC suggests that funds order the risks by importance. In other words, the risks listed first should be more important than the risks further down the list. To test whether funds disclose important risks first, we re-estimate  $RCR$  in Equation (4) by focusing on the first three risks and the last three risks based on the order. We call these  $RCR\ Top$  and  $RCR\ Bottom$ . Table 4 shows that  $RCR\ Top$  is only 38% on average, compared to 53% for all risks. These results suggest that the top risks do not account for a predominant proportion of the return variations relative to all risks. Also, the average of  $RCR\ Bottom$  is about 38% as well, sharing the similar magnitude with  $RCR\ Top$ .

To further investigate whether mutual funds disclose risks in the order of importance, we test whether  $RCR\ Top$  is significantly larger than  $RCR\ Bottom$ . For each fund we calculate  $RCR\ Top$  minus  $RCR\ Bottom$ . To make sure that  $RCR\ Top$  and  $RCR\ Bottom$  are estimated from non-overlap risks, we restrict funds to at least disclose six risks. We then test this difference. The difference is first averaged across funds in each quarter, then we conduct a  $t$ -test for the time series of mean difference and adjust for Newey-West standard errors for two lags. The procedure is repeated for  $RCR\ w/mkt$ . As shown in Table 4, without considering the “market risk”, the difference between  $RCR\ Top$  and  $RCR\ Bottom$  is about zero, and statistically insignificant. When the “market risk” is included, the magnitude of the difference is about 20%, and statistically significantly different from zero. The results indicate that without “market risk”, the order of disclosed risks does not imply importance.

In addition to these measures, we document the number of disclosed risks and how this number changes over time. Table 3 Panel A shows that an average fund discloses about 7 risks. There is large cross-fund dispersion in the number of disclosed risks: the minimum

is only 1, and the maximum is 23. However, most funds do not change the number of disclosed risks over time very much. On average, the number of risks disclosed per fund increases by about 0.06 per quarter.

We also examine the dynamics of the risk disclosure and related measures over time, as shown in Table 5. This table reports the mean for *Number of Risks* disclosed, *RCR*, *Overdisclosure*, *RCR Top*, *RCR Bottom* and *RCR Top - RCR Bottom* over years. The first row covers the last quarter in 2009 to the end of 2010. The *Number of Risks* and *RCR* increase over years, but there is no clear increasing pattern for *Overdisclosure*. In other words, mutual funds disclose more risks and the disclosure becomes more relevant over years. But the increased risks do not lead to overdisclosure. Both *RCR Top* and *RCR Bottom* increase, however their difference does not, suggesting ordering by importance does not improve over time.

Overall, we find that the risks a fund discloses in its summary prospectus excluding the “market risk” can explain about half of variations in the fund’s future returns. Top risks are not more important than the bottom risks. We also find that funds overdisclose risks since more than half of the disclosed risks are not significant in explaining the variations in fund returns. But, in general, the quality of risk disclosure improves over time.

## 5. SEC Comment Letters and Risk Disclosure

In this section, we examine whether funds improve their risk disclosure when they receive regulatory communications from SEC. The SEC’s Division of Investment Management oversees the mutual fund industry. The division stresses the importance of making full and fair disclosure of all material facts and avoid misleading investors. It issues a comment letter to specific fund outlining its questions and concerns if it identifies

potentially material deficiencies in disclosures or accounting applications or believes that additional clarification is required. The comment letter can be very specific about what the SEC's concerns are. In Internet Appendix C, we provide an example of two comments directly related to risk disclosure from a SEC comment letter to Columbia Acorn Trust Fund.

One conjecture is that a fund may disclose more after receiving a SEC's comment letter regarding its disclosures. To test this hypothesis, we collect all comment letters about fund prospectuses from the SEC EDGAR website. Since the ID (CIK) in this data is at the fund family level, our analysis for this test is based on fund family. We define *SEC Letter* as an indicator variable, which equals to one if a fund receives a comment letter from SEC in quarter  $q$ . On average, 19% of fund families receive a comment letter regarding their prospectuses during the sample period. We then examine whether the fund family changes its risk disclosure in quarter  $q+1$ . Table 6 presents the results of this test. In Column (1), the coefficient on *SEC Letter* is positive, suggesting that a fund family increases the number of risks disclosed after getting the SEC letter. Importantly, *RCR* also improves, suggesting that the risk disclosure becomes more relevant (Column (2)). The economic magnitude is large. On average, a fund's *RCR* increases 3.4% after SEC comment letter, which is 6.4% of the mean of *RCR*. However, *Overdisclosure* increases as well (Column (3)).

Overall, these results suggest that funds respond to SEC's requirements and disclose more risks. While they may disclose more risks that are not significant, they do disclose more principal risks as reflected in the improved relevance of the disclosure. Thus, the SEC comment letter improves fund disclosure in important dimensions.

## 6. Risk Disclosure, Fund Characteristics, Flow and Performance

Once we construct measures to capture the relevance and conciseness of funds' risk disclosures, we now investigate how these measures relate to fund characteristics. In particular, we examine the determinants of risk disclosure and study the implications of risk disclosure measures for understanding key aspects of mutual funds, including fund flow, risk taking, and fund performance.

### 6.1 Determinants of Risk Disclosure

Given that we observe substantial cross-fund variation in the quality of risk disclosure, we examine how disclosure quality relates to fund past characteristics. We use Fama-MacBeth regression where the dependent variables are *RCR*, *Overdisclosure*, and *Log Number of Risks* disclosed.<sup>16</sup> Specifically, we run the following regression:

$$\begin{aligned} Disclosure_{iq} = & \beta_0 + \beta_1 \times Log\_fam\_size_{iq} + \beta_2 \times Log\_size_{iq} + \beta_3 \times Exp\_ratio_{iq} \\ & + \beta_4 \times Volatility_{iq} + \beta_5 \times Flow_{iq} + \beta_6 \times Turn\_ratio_{iq} + \beta_7 \times \alpha_{iq-3,q} \\ & + e_{iq} \end{aligned} \tag{6}$$

where  $Disclosure_{iq}$  is *RCR*, *Overdisclosure* or *Log Number of Risks* disclosed in quarter  $q$  for fund  $i$ .<sup>17</sup> The right-hand side variables include log family size, log size, expense ratio,

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<sup>16</sup> For all regressions, we also do panel regression with time fixed effects and the standard errors are double clustered at fund and time level. The results are consistent with those from Fama-MacBeth regression. The results of panel regressions are shown in the Internet Appendix.

<sup>17</sup> For all the regression involving *RCR*, we also run the same regression regarding to *RCR* estimated by adjusted  $R^2$ . The results are show in Internet Appendix. The results are qualitatively the same as those from the original regression.



and turnover ratio at the end of quarter  $q$ . Volatility is estimated as the standard deviation of fund daily raw returns in quarter  $q$ . Flow is the new money calculated as in Equation (1) in quarter  $q$ .  $\alpha_{iq-3,q}$  is quarterly Fama-French-Carhart four-factor alpha averaged from quarter  $q-3$  to quarter  $q$ . Note that disclosure measure is forward looking and this equation is to regress the future disclosure measures on the current fund characteristics.

Table 7 Column (1) shows that funds in larger families, riskier funds, and funds with higher expense ratios tend to have more relevant disclosures (higher  $RCR$ ). Column (2) suggests that smaller funds, funds with higher expense ratios, less risky funds tend to overdisclose more risks. In addition, when funds experience a decrease in new money flow, they tend to overdisclose risks in the next period. Column (3) implies that funds in larger families, funds that charge higher fees, less risky funds tend to disclose more risks. The estimated coefficient of alpha implies that when funds have inferior performance, they tend to disclose more. This finding is consistent with poorly performing funds disclosing more risks in order to minimize legal risks.

## 6.2. Risk Disclosures and Fund Flow

Since the SEC's primary goal in requiring funds to provide a summary prospectus is to give investors better access to fund information. A natural question to ask is whether investors respond to these measures. To test whether this goal is achieved, we examine whether funds with a high  $RCR$  attract more funding from investors, measured by fund flow. Specifically, we regress fund future flow on current  $RCR$ , controlling for fund characteristics. Column (1) in Table 8 shows the results. We find that in general fund flows are not related to a fund's past  $RCR$ . This is not surprising because the  $RCR$  measure is not easily observed by average investors.

In addition, we test whether sophisticated investors and naïve investors respond to these disclosure measures differently. Prior studies show that investor sophistication plays

a role in making investment decisions (Barber, Huang, and Odean (2016); Guercio and Reuter (2014)). To proxy investor sophistication, we calculate the percentage of assets that belongs to institutional shares within a fund and identify institutional funds as those with more than 75% institutional assets. In Column (2), we restrict the sample to the institutional funds and then run a similar regression as in Table 8 Column (1). The results, reported in column (2), show that the investor flow positively responds to  $RCR$ , suggesting that sophisticated investors care about the relevance of risk disclosure and respond to it. Furthermore, we run a regression with an interaction term between  $RCR$  and investor sophistication, as shown in Equation (7), to show how investors respond to  $RCR$  differently.

$$\begin{aligned} Flow_{iq+4} = & \beta_0 + \beta_1 \times RCR_{iq-1} + \beta_2 \times Inst\ pct_{.iq} + \beta_3 \times (RCR_{iq-1} \times Inst\ pct_{.iq}) \\ & + \sum \beta_i \times Control_{iq} + e_{iq} \end{aligned} \quad (7)$$

where  $Inst\ pct_{.iq}$  is the percentage of institutional assets in quarter  $q$ . Note that  $RCR$  is forward looking, so all variables on the right-hand side are in quarter  $q$ , and flow in one year later.<sup>18</sup> Table 8 Column (3) reports the results of this test. The estimated coefficients of the interaction term are positive and significant, suggesting that sophisticated investors care more about the relevance of risk disclosure than naïve investors.<sup>19</sup> Overall, the results on fund flow indicate that sophisticated investors pay close attention to fund's risk disclosure quality.

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<sup>18</sup> In unreported tables, we also run Regression (7) for flow in the quarter  $q+1$  and quarter  $q+8$ . Both results are qualitatively the same as that of Regression (7).

<sup>19</sup> We also test flow response to *Overdisclosure*, and the result is not significant. The result is shown in Table IA6 in the Internet Appendix.

### 6.3. Risk Disclosure and Future Risk Taking and Performance

We now examine whether the quality of funds' risk disclosure is related to two important dimensions of mutual funds: risk-taking behavior and performance. For fund's risk-taking, we examine three types of risks: total risk, systematic risk, and idiosyncratic risk. The total risk is estimated as the standard deviation of a fund's return. Systematic risk is proxied by market beta, which is estimated within each quarter in a CAPM model using daily returns. Following Ang et al. (2006), idiosyncratic risk is measured by the standard deviation of the residual in Fama-French three-factor model, which is also estimated by fund and quarter using daily data.

We then regress the risk measures in the next period on the several risk disclosure measures we discussed above, controlling for size, fund family size, expense ratios, flow, performance, turnover, and the corresponding risk measure in the current quarter. Table 9 presents the results. Funds with more *Overdisclosure* exhibit lower risk in the future, for all types of risk measures (Columns (2), (4), and (6)). This is consistent with the hypothesis that a fund manager who overdiscloses risks is more conservative and assumes less investment risk. *RCR* is only related to idiosyncratic risk. Funds with higher *RCR* (Column (5)) exhibit higher idiosyncratic risk in the future. This is consistent with the fact that *RCR* does not include market risk.

How does risk disclosure relate to future fund performance? We examine this question by looking at the association between funds' current disclosures and their performance in the next one year. We use various performance measure, including raw returns, CAPM alpha, Fama-French three-factor alpha, and Fama-French-Carhart four-

factor alpha (Fama and French (1993); Carhart (1997)). We regress fund future performance on current *RCR*.<sup>20</sup>

The results are presented in Table 10. Columns (1)-(2) show that *RCR* negatively predicts raw returns and CAPM alpha in the next year. However, Columns (3)-(4) suggest that *RCR* cannot predict future Fama-French three-factor alpha and Fama-French-Carhart four-factor alpha. The predictability power of *RCR* is due to a fund's risk taking and becomes no longer significant once we control for the additional risks/styles in calculating fund performance (i.e., FFC3 alpha, FFC4 alpha). These results are consistent with the fact that *RCR* captures funds' investment risk.

## 7. Conclusion

While the SEC requires mutual funds to disclose risks properly in their summary prospectus, empirical evidence on the quality of the disclosures is limited. One challenge in assessing the disclosure quality is that the disclosure is text based and therefore difficult to analyze. To address this challenge, we use textual analysis to identify the disclosure of risks for a large sample of actively managed domestic equity mutual funds. We examine the economic content of risk disclosures in details, documenting the disclosed risks and how they relate to common risks identified in the academic literature. We then assess the quality of fund disclosures by estimating the relevance of disclosure, the extent of overdisclosure and the order of disclosure. We find that, on average, the disclosed risks can explain half of variations in future fund returns. Funds overdisclose by about 63%. In addition, when

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<sup>20</sup> We also do the same test for *Overdisclosure* and the results are shown in Table IA9 in the Internet Appendix. There is no significant relation between *Overdisclosure* and future performance.

“market risk” is not considered, the top risks are not significantly more important than the bottom risks.

In addition, we observe large cross-fund variation in the informativeness measure. We find that funds in larger families, riskier funds, and funds with higher expense ratios tend to make more relevant risk disclosures. SEC comment letters lead funds to disclose more risks; such increase causes better relevance but more overdisclosure at the same time. We also find that funds with more relevant disclosure are associated with higher idiosyncratic risk.

Our findings have significant investment, legal and regulatory implications. Whether fund risk disclosure is informative to investors also depends on investors’ knowledge and understanding of the common risk factors. Our evidence shows that sophisticated investors care about fund risk disclosure qualities, but retail investors seem not to respond to them. Thus, financial education about the importance of fund disclosures and how to perceive risk factors would help investors understand risk disclosure, leading to more-informed investment decisions.

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## Appendix: Variable Definition

| Variables          | Definition   |
|--------------------|--|
| # Risks            | The number of risks disclosed by a fund in a quarter   |
| $\Delta$ Risks     | The change in number of risks disclosed by a fund in two consecutive quarters  |
| 3-factor alpha     | Alpha estimated in Fama-French three-factor model  |
| 4-factor alpha     | Alpha estimated in Fama-French-Carhart four-factor model   |
| Beta               | The loading of the market premium in CAPM  |
| CAPM alpha         | One factor alpha of Jensen (1968)  |
| Expense ratio      | Ratio of fees that a fund charges as of a percentage of total net assets   |
| Family TNA         | Total net assets of a fund family, in millions   |
| Flow               | Fund flow calculated as in Equation (1)  |
| Idiosyncratic risk | The standard deviation of the residual in Fama-French three-factor model, estimated by fund and quarter using daily data |
| Institutional pct. | The percentage of institutional-share assets of a fund.  |
| Overdisclosure     | The ratio of the number of insignificant risks to the number of all disclosed risk in a quarter                          |
| Raw return         | Fund after-fee raw returns   |
| RCR                | Risk coverage ratio, estimated in Equation (4)   |
| RCR Bottom         | The RCR estimated with the last three disclosed risks, based on their order in the summary prospectus                    |
| RCR FFC6           | The RCR estimated using Fama-French-Carhart six factors as the benchmark   |
| RCR Top            | The RCR estimated with the first three disclosed risks, based on their order in the summary prospectus                   |
| RCR w/mkt          | The RCR including the market risk  |
| RCR w/mkt Bottom   | The RCR Bottom estimated including “market risk”   |
| RCR w/mkt Top      | The RCR Top estimated including “market risk”  |
| SEC Letter         | An indicator variable that equals to one if a fund receives a comment letter from SEC in a quarter                       |
| TNA                | Total net assets of a fund, in millions  |
| Turnover           | Turnover ratio of a fund   |
| Volatility         | Standard deviation of daily raw returns of a fund in a quarter   |

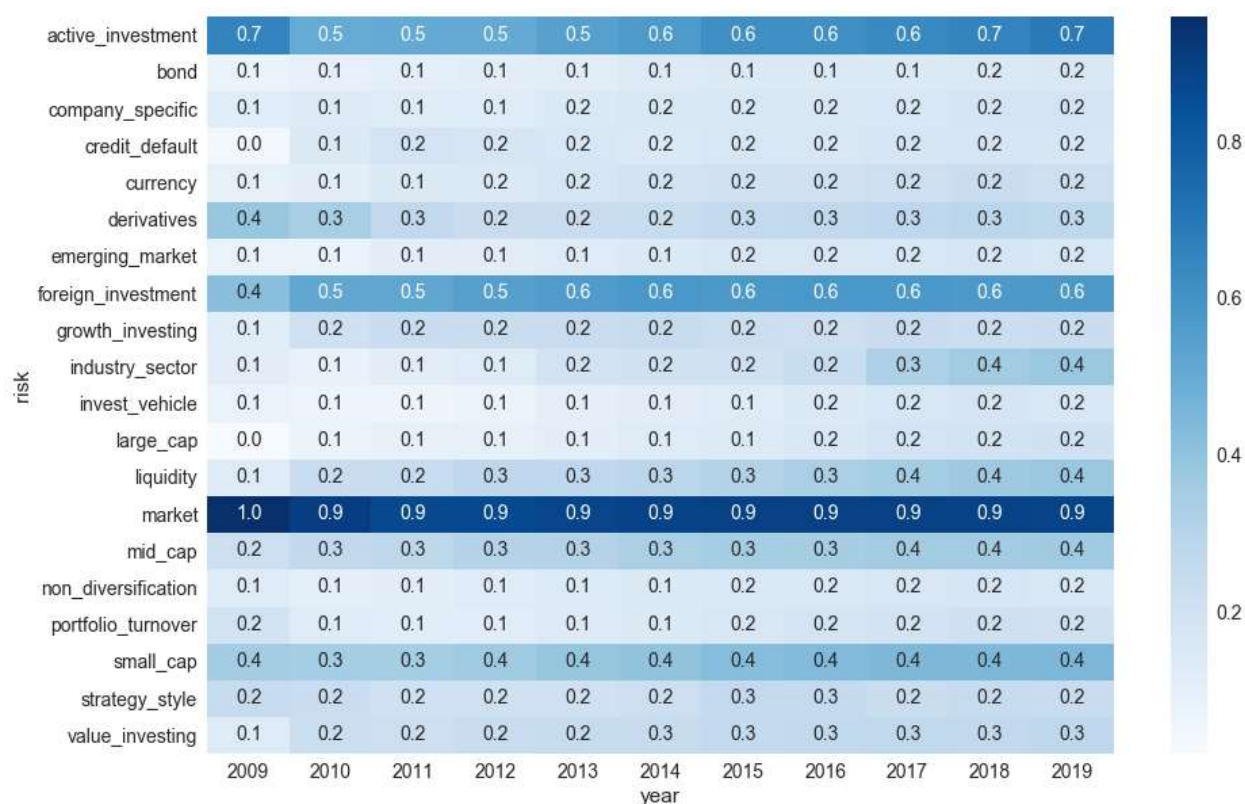
### Figure 1. Word Cloud of the Top 20 Risks Disclosed by Mutual Funds

This figure presents a word cloud of the top 20 risks from 2009 to 2019 as listed in mutual funds' prospectuses. The risks in larger fonts show up more frequently in the prospectuses.



**Figure 2. Heat Map of the Top 20 Risks Disclosed Mutual Funds**

This figure presents a heat map of the top 20 risks from 2009 to 2019. The number is the relative frequency of the disclosed risks in each year. The number is calculated as follows: for each risk in each quarter, we first calculate the number of funds disclosing this risk as a percentage of all funds. Then for each risk, we average this percentage across quarters in each year.



**Table 1. Fund Characteristics**

This table reports the summary statistics for the fund characteristics in the sample of this paper. The numbers are time-series averages of the cross-sectional statistics. The sample includes open-end diversified domestic equity funds from 2009 to 2019. Panel A reports the statistics for individual variables. Performance measures include raw return, the one factor alpha of Jensen (1968), the three-factor alpha of Fama and French (1993) and the four-factor alpha of Carhart (1997). The measures reported in Panel A are compounded by monthly measures within a quarter. Monthly alphas are estimated from rolling window regressions using data from previous 36 months. TNA is the quarter-end total net assets, in millions of dollars. Family TNA is the total net assets of a family, in millions of dollars. Volatility is the standard deviation of a fund's daily return within a quarter. All variables are winsorized at the 1% and 99% level. Panel B reports the correlation between each of the two variables.

Panel A: Summary Statistics

| Variable       | Mean     | StdDev   | Min     | Median   | Max       |
|----------------|----------|----------|---------|----------|-----------|
| Raw return     | 2.99%    | 2.65%    | -4.40%  | 2.99%    | 9.90%     |
| CAPM alpha     | -0.54%   | 2.34%    | -6.69%  | -0.50%   | 5.31%     |
| 3-factor alpha | -0.42%   | 1.98%    | -6.05%  | -0.39%   | 4.85%     |
| 4-factor alpha | -0.42%   | 1.98%    | -6.06%  | -0.41%   | 4.91%     |
| TNA            | 1909.81  | 3969.18  | 6.65    | 529.38   | 25840.31  |
| Family TNA     | 43238.56 | 82054.26 | 27.81   | 15291.67 | 504877.55 |
| Expense ratio  | 1.05%    | 0.35%    | 0.18%   | 1.05%    | 2.03%     |
| Flow           | -0.57%   | 11.13%   | -28.57% | -1.97%   | 60.79%    |
| Turnover       | 69.26%   | 66.47%   | 3.70%   | 51.43%   | 430.26%   |
| Volatility     | 0.93%    | 0.19%    | 0.26%   | 0.93%    | 1.36%     |

Panel B: Correlation

| Variable       | Raw<br>return | CAPM<br>alpha | 3-factor<br>alpha | 4-factor<br>alpha | TNA   | Family<br>TNA | Expense<br>ratio | Turnove<br>r | Flow  | Volatilit<br>y |
|----------------|---------------|---------------|-------------------|-------------------|-------|---------------|------------------|--------------|-------|----------------|
| Raw return     | 1.00          |               |                   |                   |       |               |                  |              |       |                |
| CAPM alpha     | 0.87          | 1.00          |                   |                   |       |               |                  |              |       |                |
| 3-factor alpha | 0.69          | 0.78          | 1.00              |                   |       |               |                  |              |       |                |
| 4-factor alpha | 0.69          | 0.76          | 0.96              | 1.00              |       |               |                  |              |       |                |
| TNA            | 0.02          | 0.05          | 0.03              | 0.03              | 1.00  |               |                  |              |       |                |
| Family TNA     | 0.02          | 0.04          | 0.03              | 0.03              | 0.48  | 1.00          |                  |              |       |                |
| Expense ratio  | -0.05         | -0.05         | -0.03             | -0.03             | -0.33 | -0.37         | 1.00             |              |       |                |
| Turnover       | -0.09         | -0.03         | -0.04             | -0.05             | -0.17 | -0.09         | 0.31             | 1.00         |       |                |
| Flow           | 0.04          | 0.07          | 0.07              | 0.07              | -0.01 | 0.02          | -0.03            | -0.01        | 1.00  |                |
| Volatility     | 0.16          | -0.07         | 0.00              | 0.00              | -0.09 | -0.09         | 0.06             | -0.09        | -0.05 | 1.00           |

**Table 2. Disclosed Risks from Fund Prospectus**

This table reports the risks disclosed by mutual funds in their summary prospectuses. The column “Disclosed Risk” lists the risks in the final sample. The column “No. of disclosing funds” reports the average number of funds that disclose the risk per quarter in the sample.

| Disclosed Risks                       | Avg. # Disclosing Funds per Quarter |
|---------------------------------------|-------------------------------------|
| market risk                           | 961.9                               |
| active investment risk                | 646.4                               |
| foreign investment risk               | 615.0                               |
| small cap risk                        | 448.8                               |
| mid cap risk                          | 362.4                               |
| liquidity risk                        | 341.9                               |
| derivatives risk                      | 289.7                               |
| value investing risk                  | 277.3                               |
| industry/sector risk                  | 266.0                               |
| strategy/style risk                   | 255.2                               |
| growth investing risk                 | 251.8                               |
| currency risk                         | 211.5                               |
| portfolio turnover risk               | 185.0                               |
| credit/default/counterparty risk      | 183.2                               |
| company specific risk                 | 173.8                               |
| emerging market risk                  | 164.4                               |
| non-diversification risk              | 162.6                               |
| large cap risk                        | 162.2                               |
| bond risk                             | 149.4                               |
| investment in investment vehicle risk | 144.7                               |
| interest rate risk                    | 134.1                               |
| leverage risk                         | 126.5                               |
| real estate investing risk            | 106.2                               |
| political/regulatory risk             | 102.4                               |
| valuation risk                        | 84.2                                |
| cash management risk                  | 80.9                                |
| securities lending risk               | 74.1                                |
| manager/advisor risk                  | 73.9                                |
| depository receipts risk              | 66.2                                |
| short position risk                   | 63.0                                |
| investment risk                       | 62.2                                |
| market capitalization risk            | 55.9                                |
| economic risk                         | 55.0                                |
| cyber security risk                   | 52.1                                |
| event risk                            | 51.9                                |
| prepayment/extension/call risk        | 49.3                                |
| custody/operation risk                | 47.9                                |
| income risk                           | 43.1                                |
| volatility risk                       | 41.7                                |
| IPO/SEO risk                          | 40.5                                |
| index/passive investing risk          | 38.2                                |
| market trading risk                   | 36.1                                |

**Table 3. Risk Disclosure Measures**

This table reports the summary statistics for the measures of risk disclosure. RCR is defined as in Equation (4). RCR w/mkt is the RCR including the “market risk”. RCR FFC6 is estimated using Fama-French-Carhart six factors as the benchmark. Overdisclosure is the ratio of the number of insignificant risks to the number of all disclosed risk in a quarter.  $\# \text{ Risks}$  is the number of risks disclosed by a fund in a quarter.  $\Delta \text{Risks}$  is the change in number of risks disclosed by a fund in two consecutive quarters. All variables are winsorized at the 1% and 99% level. Panel A reports the time-series average of the cross-sectional statistics. Panel B reports the time-series average correlation between each two variables.

Panel A: Summary Statistics

| Variable              | Mean | StdDev | Min    | Median | Max   |
|-----------------------|------|--------|--------|--------|-------|
| RCR                   | 0.53 | 0.26   | 0.01   | 0.56   | 0.94  |
| RCR w/mkt             | 0.91 | 0.16   | 0.14   | 0.96   | 1.00  |
| RCR FFC6              | 1.33 | 1.17   | 0.02   | 1.10   | 7.72  |
| Overdisclosure        | 0.63 | 0.27   | 0.00   | 0.68   | 1.00  |
| $\# \text{ Risks}$    | 6.95 | 3.74   | 1.00   | 6.32   | 23.05 |
| $\Delta \text{Risks}$ | 0.06 | 0.88   | -10.08 | 0.00   | 10.68 |

Panel B: Correlation

| Variable              | RCR   | RCR w/mkt | RCR FFC6 | Overdisclosure | $\# \text{ Risks}$ | $\Delta \text{Risks}$ |
|-----------------------|-------|-----------|----------|----------------|--------------------|-----------------------|
| RCR                   | 1.00  |           |          |                |                    |                       |
| RCR w/mkt             | 0.34  | 1.00      |          |                |                    |                       |
| RCR FFC6              | 0.30  | 0.14      | 1.00     |                |                    |                       |
| Overdisclosure        | -0.17 | 0.06      | 0.02     | 1.00           |                    |                       |
| $\# \text{ Risks}$    | 0.49  | 0.31      | 0.48     | 0.38           | 1.00               |                       |
| $\Delta \text{Risks}$ | 0.07  | 0.08      | 0.06     | 0.06           | 0.14               | 1.00                  |

**Table 4. The Order of Disclosed Risks**

Panel A reports the summary statistics for the measures related to risk disclosure. RCR Top is defined the same as RCR, but estimated with the first three disclosed risks, based on their order in the summary prospectus. RCR Bottom is defined the same as RCR, but estimated with the last three disclosed risks, based on their order in the summary prospectus. RCR w/mkt Top and RCR w/mkt Bottom are estimated including the “market risk”. All variables are winsorized at the 1% and 99% level. Panel B reports the  $t$ -test results for RCR Top minus RCR Bottom. Within each fund in each quarter, we first take difference between RCR Top and RCR Bottom. The difference is first averaged across funds, then we conduct  $t$ -test for the time series, adjust for Newey-West standard errors two lags. The mean of RCR Top minus RCR Bottom,  $t$ -statistics and  $p$ -value are reported. The second row reports the result of the same procedure for RCR w/mkt Top minus RCR w/mkt Bottom.

Panel A: Summary Statistics for RCR Top and RCR Bottom

| Variable         | Mean | StdDev | Min  | Median | Max  |
|------------------|------|--------|------|--------|------|
| RCR Top          | 0.38 | 0.24   | 0.01 | 0.35   | 0.90 |
| RCR Bottom       | 0.38 | 0.24   | 0.01 | 0.35   | 0.89 |
| RCR w/mkt Top    | 0.82 | 0.21   | 0.09 | 0.91   | 0.99 |
| RCR w/mkt Bottom | 0.64 | 0.26   | 0.06 | 0.67   | 0.99 |

Panel B:  $t$ -test of RCR order

| Variable                   | Mean | $t$ -Statistics | $p$ -value |
|----------------------------|------|-----------------|------------|
| RCR Top Minus Bottom       | 0.00 | 0.86            | 0.40       |
| RCR w/mkt Top Minus Bottom | 0.23 | 23.77           | 0.00       |



**Table 5. Risk Disclosure Measures over Years**

This table reports the cross-sectional mean of #Risks, RCR, Overdisclosure, RCR Top, RCR Bottom and RCR Top minus RCR Bottom by years. #Risks is the number of risks disclosed by a fund in a quarter. RCR is defined as in Equation (4). Overdisclosure is the ratio of the number of insignificant risks to the number of all disclosed risks in a quarter. RCR Top is defined the same as RCR, but estimated with the first three disclosed risks, based on their order in the summary prospectus. RCR Bottom is defined the same as RCR, but estimated with the last three disclosed risks, based on their order in the summary prospectus. We first calculate the mean across funds in each quarter, then take average of the mean over quarter within each year. The first row includes the last quarter in 2009 and the whole year 2010. All variables are winsorized at the 1% and 99% level.

| Year      | #Risks | RCR  | Overdisclosure | RCR Top | RCR Bottom | RCR Top-<br>RCR Bottom |
|-----------|--------|------|----------------|---------|------------|------------------------|
| 2009-2010 | 5.79   | 0.47 | 0.61           | 0.36    | 0.35       | 0.02                   |
| 2011      | 5.94   | 0.50 | 0.59           | 0.39    | 0.37       | 0.02                   |
| 2012      | 6.14   | 0.47 | 0.65           | 0.35    | 0.34       | 0.01                   |
| 2013      | 6.46   | 0.49 | 0.65           | 0.36    | 0.36       | 0.01                   |
| 2014      | 6.81   | 0.53 | 0.65           | 0.40    | 0.40       | 0.01                   |
| 2015      | 7.15   | 0.53 | 0.64           | 0.37    | 0.37       | 0.00                   |
| 2016      | 7.43   | 0.54 | 0.64           | 0.37    | 0.37       | 0.00                   |
| 2017      | 7.78   | 0.56 | 0.66           | 0.39    | 0.39       | 0.00                   |
| 2018      | 8.06   | 0.59 | 0.65           | 0.40    | 0.41       | 0.00                   |
| 2019      | 8.18   | 0.61 | 0.62           | 0.42    | 0.42       | 0.00                   |

**Table 6. SEC Comment Letters and Risk Disclosure**

This table reports the regression results of the effects of SEC comment letters on mutual fund risk disclosure. The analysis is at the fund family level since the SEC comment letter data is at fund family level. Log # Risks is log number of risks disclosed. RCR is defined as in Equation (4). Overdisclosure is the ratio of the number of insignificant risks to the number of all risks. Dependent variables are calculated in quarter  $q$ . SEC Letter Dummy equals to one if a fund family received comment letter from SEC in quarter  $q - 1$ . Log family size and expense ratio are the value at the end of quarter  $q - 1$ . Volatility is the standard deviation of a fund's daily return in quarter  $q - 1$ . Flow is the percentage flow in quarter  $q - 1$ . Alpha is average quarterly four-factor alpha from  $q - 4$  to  $q - 1$ . The test is a Fama-MacBeth regression and adjusts for Newey-West standard errors for two lags. The superscripts\*, \*\*, and \*\*\* indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

|                 | (1)<br>Log # Risks    | (2)<br>RCR           | (3)<br>Overdisclosure |
|-----------------|-----------------------|----------------------|-----------------------|
| SEC Letter      | 0.073***<br>(4.15)    | 0.034***<br>(6.40)   | 0.012**<br>(2.04)     |
| Log family size | -0.008**<br>(-2.53)   | 0.011***<br>(9.61)   | -0.003<br>(-1.65)     |
| Expense ratio   | 0.263***<br>(12.39)   | 0.129***<br>(8.97)   | 0.034***<br>(2.82)    |
| Volatility      | -10.995***<br>(-3.91) | 6.457***<br>(3.93)   | -5.812***<br>(-4.33)  |
| Flow            | -0.080<br>(-0.69)     | 0.023<br>(0.74)      | -0.115**<br>(-2.49)   |
| Turnover        | 0.078***<br>(5.58)    | -0.007<br>(-1.03)    | 0.024***<br>(5.07)    |
| Alpha           | -3.355***<br>(-3.90)  | -0.890***<br>(-3.21) | -0.140<br>(-0.36)     |
| Constant        | 1.555***<br>(20.80)   | 0.216***<br>(14.68)  | 0.658***<br>(20.62)   |
| N               | 11,185                | 11,048               | 11,048                |
| R-sq            | 0.088                 | 0.080                | 0.063                 |

**Table 7. Determinants of Risk Disclosure**

This table reports the regression results of RCR, Overdisclosure and Log # Risks on lagged fund characteristics. RCR is defined as in Equation (4). Overdisclosure is the ratio of the number of insignificant risks to the number of all disclosed risks in a quarter. Log # Risks is log number of risks disclosed. Dependent variables are calculated in quarter  $q$ . Log family size, log size and expense ratio are the value at the end of quarter  $q - 1$ . Volatility is the standard deviation of a fund's daily return in quarter  $q - 1$ . Flow is the percentage flow in quarter  $q - 1$ . Alpha is average quarterly Fama-French-Carhart four-factor alpha from  $q - 4$  to  $q - 1$ . The test is a Fama-MacBeth regression and adjusts for Newey-West standard errors for two lags. The superscripts\*, \*\*, and \*\*\* indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

|                 | (1)<br>RCR           | (2)<br>Overdisclosure | (3)<br>Log # Risks   |
|-----------------|----------------------|-----------------------|----------------------|
| Log family size | 0.014***<br>(13.70)  | 0.002<br>(1.39)       | 0.010***<br>(3.46)   |
| Log size        | 0.000<br>(0.16)      | -0.006***<br>(-4.81)  | 0.009<br>(1.63)      |
| Expense ratio   | 0.073***<br>(8.30)   | 0.026***<br>(3.01)    | 0.188***<br>(12.67)  |
| Volatility      | 0.436***<br>(11.21)  | -0.300***<br>(-16.93) | -0.313***<br>(-7.28) |
| Flow            | 0.031<br>(1.19)      | -0.054***<br>(-2.98)  | 0.036<br>(0.68)      |
| Turnover        | -0.008***<br>(-2.73) | 0.007**<br>(2.12)     | 0.014<br>(1.43)      |
| Alpha           | -0.363<br>(-0.71)    | -0.138<br>(-0.69)     | -2.436**<br>(-2.51)  |
| Constant        | -0.048<br>(-1.03)    | 0.880***<br>(41.61)   | 1.648***<br>(15.66)  |
| N               | 28,832               | 28,832                | 29,081               |
| R-sq            | 0.124                | 0.052                 | 0.034                |

**Table 8. Risk Disclosure and Fund Flow**

This table reports the results of regression of funds' future flow on current RCR controlling for fund characteristics. RCR is defined as in Equation (4). Flow[ $q+4$ ] is percentage flow in the quarter one year after the disclosure. Institutional pct. is the percentage of institutional-share assets of a fund. Column (1) reports the result for the full sample. Column (2) presents the results for the subsample of institutional funds. Column (3) reports the results for the full sample that includes an interaction term between RCR and Institutional pct. The test is Fama-MacBeth regression and adjusts for Newey-West standard errors for two lags. All the variables are winsorized at the 1% level. The superscripts\*, \*\*, and \*\*\* indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

|                                 | Flow[ $q+4$ ]        |                            |                      |
|---------------------------------|----------------------|----------------------------|----------------------|
|                                 | (1)<br>All Funds     | (2)<br>Institutional Funds | (3)<br>All Funds     |
| RCR                             | 0.000<br>(0.01)      | 0.021***<br>(3.14)         | -0.006<br>(-1.39)    |
| Institutional pct.              |                      |                            | -0.016**<br>(-2.49)  |
| RCR $\times$ Institutional pct. |                      |                            | 0.021***<br>(2.90)   |
| Log family size                 | 0.006***<br>(8.70)   | 0.003**<br>(2.62)          | 0.006***<br>(8.99)   |
| Log size                        | -0.007***<br>(-8.85) | -0.004***<br>(-2.96)       | -0.008***<br>(-8.86) |
| Expense ratio                   | -0.626**<br>(-2.07)  | -1.071*<br>(-1.84)         | -0.805**<br>(-2.40)  |
| Volatility                      | 0.098<br>(0.11)      | -0.701<br>(-0.72)          | 0.042<br>(0.05)      |
| Lag 4-f alpha                   | 0.512***<br>(7.40)   | 0.629***<br>(7.44)         | 0.508***<br>(7.06)   |
| Turnover                        | -0.012***<br>(-6.63) | -0.021***<br>(-6.21)       | -0.012***<br>(-6.42) |
| Constant                        | -0.007<br>(-0.77)    | 0.001<br>(0.08)            | 0.003<br>(0.32)      |
| N                               | 25,648               | 5,842                      | 25,648               |
| R-sq                            | 0.063                | 0.110                      | 0.070                |

**Table 9. Risk Disclosure and Funds' Future Risk Taking**

This table reports the results of regression of fund risks in the next quarter on the current disclosure measures. RCR is defined as in Equation (4). Overdisclosure is the ratio of the number of insignificant risks to the number of all risks. Volatility  $[q+1]$  is the standard deviation of a fund's daily return in quarter  $q+1$ . Beta $[q+1]$  is the market beta in quarter  $q+1$ . Idiosyncratic risk $[q+1]$  is the idiosyncratic risk in quarter  $q+1$ . Independent variables are calculated in quarter  $q$ . Alpha is 4-factor alpha in quarter  $q$ . The test is Fama-MacBeth regression and adjusts for Newey-West standard errors for two lags. The superscripts\*, \*\*, and \*\*\* indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

|                          | Volatility $[q+1]$  |                     | Beta $[q+1]$        |                      | Idiosyncratic risk $[q+1]$ |                      |
|--------------------------|---------------------|---------------------|---------------------|----------------------|----------------------------|----------------------|
|                          | (1)                 | (2)                 | (3)                 | (4)                  | (5)                        | (6)                  |
| RCR                      | 0.018<br>(1.59)     |                     | 0.497<br>(1.25)     |                      | 0.004***<br>(2.71)         |                      |
| Overdisclosure           |                     | -0.012**<br>(-2.25) |                     | -0.767***<br>(-3.25) |                            | -0.004**<br>(-2.22)  |
| Volatility $[q]$         | 1.001***<br>(17.09) | 0.999***<br>(16.85) |                     |                      |                            |                      |
| Beta $[q]$               |                     |                     | 0.913***<br>(80.45) | 0.912***<br>(79.98)  |                            |                      |
| Idiosyncratic risk $[q]$ |                     |                     |                     |                      | 0.841***<br>(33.01)        | 0.842***<br>(33.02)  |
| Log family size          | 0.002*<br>(1.84)    | 0.002*<br>(1.90)    | 0.033<br>(0.88)     | 0.041<br>(0.99)      | -0.001***<br>(-3.41)       | -0.001***<br>(-3.25) |
| Log size                 | -0.003<br>(-1.58)   | -0.003<br>(-1.58)   | 0.000<br>(0.01)     | -0.009<br>(-0.23)    | 0.001***<br>(3.23)         | 0.001***<br>(3.14)   |
| Expense ratio            | 0.076<br>(0.13)     | 0.288<br>(0.50)     | 5.534<br>(0.22)     | 10.662<br>(0.42)     | 1.825***<br>(5.40)         | 1.854***<br>(5.46)   |
| Flow                     | -0.005<br>(-0.51)   | -0.005<br>(-0.55)   | 0.283<br>(0.42)     | 0.236<br>(0.35)      | 0.002<br>(0.40)            | 0.001<br>(0.31)      |
| Lag 4-f alpha            | 0.065<br>(0.38)     | 0.069<br>(0.40)     | 22.013**<br>(2.58)  | 22.182**<br>(2.57)   | 0.066**<br>(2.06)          | 0.070**<br>(2.21)    |
| Turnover                 | -0.011**<br>(-2.31) | -0.011**<br>(-2.32) | -0.407**<br>(-2.09) | -0.403**<br>(-2.07)  | 0.000<br>(0.36)            | 0.000<br>(0.38)      |
| Constant                 | 0.100**<br>(2.19)   | 0.113**<br>(2.34)   | 7.898***<br>(5.68)  | 8.671***<br>(6.37)   | 0.024***<br>(5.56)         | 0.028***<br>(6.41)   |
| N                        | 27,973              | 27,973              | 28,413              | 28,413               | 28,413                     | 28,413               |
| R-sq                     | 0.824               | 0.819               | 0.832               | 0.832                | 0.717                      | 0.717                |

**Table 10. Risk Disclosure and Fund Future Performance**

This table reports the results of regression of funds' future performance on current RCR, controlling for fund characteristics. RCR is defined as in Equation (4). Performance measures include raw return, the one factor alpha of Jensen (1968), the three-factor alpha of Fama and French (1993) and the four-factor alpha are of Carhart (1997). Future performances are cumulative from quarter  $q+1$  to quarter  $q+4$ . The test is Fama-MacBeth regression and adjusts for Newey-West standard errors for two lags. The superscripts\*, \*\*, and \*\*\* indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

|                 | (1)                          | (2)                          | (3)                         | (4)                          |
|-----------------|------------------------------|------------------------------|-----------------------------|------------------------------|
|                 | Raw return<br>[ $q+1, q+4$ ] | CAPM alpha<br>[ $q+1, q+4$ ] | FF3 alpha<br>[ $q+1, q+4$ ] | FFC4 alpha<br>[ $q+1, q+4$ ] |
| RCR             | -0.023***<br>(-3.36)         | -0.023***<br>(-3.48)         | -0.004<br>(-1.38)           | -0.003<br>(-1.14)            |
| Log family size | 0.002***<br>(3.39)           | 0.001**<br>(2.70)            | 0.001***<br>(4.17)          | 0.001***<br>(4.07)           |
| Log size        | 0.001<br>(0.59)              | 0.001<br>(1.22)              | -0.001*<br>(-1.98)          | -0.001<br>(-1.42)            |
| Expense ratio   | -0.983***<br>(-3.46)         | -0.640**<br>(-2.51)          | -0.570**<br>(-2.23)         | -0.492*<br>(-1.90)           |
| Volatility      | 10.104***<br>(2.94)          | -1.733<br>(-0.88)            | -0.077<br>(-0.09)           | 0.003<br>(0.00)              |
| Flow            | 0.019<br>(1.02)              | 0.023<br>(1.37)              | 0.010**<br>(2.64)           | 0.009**<br>(2.12)            |
| Turnover        | -0.008***<br>(-4.87)         | -0.003<br>(-1.48)            | -0.006***<br>(-2.72)        | -0.006***<br>(-3.51)         |
| Constant        | 0.024<br>(1.19)              | -0.010<br>(-0.50)            | -0.014*<br>(-1.71)          | -0.015*<br>(-1.97)           |
| N               | 26,570                       | 25,673                       | 25,673                      | 25,673                       |
| R-sq            | 0.255                        | 0.139                        | 0.064                       | 0.061                        |

**Internet Appendix  
for**

**“Do Mutual Funds Walk the Talk? A Textual Analysis of Risk Disclosure by  
Mutual Funds”**

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## A. Examples of the Risk Disclosure Section in Funds' Summary Prospectuses

### Example 1. American Growth Fund Series One

#### **Principal risks of investing in the fund**

The primary risks of investing in the Fund are:

- ~ Stock Market Risk - the value of an investment may fluctuate,
- ~ Industry and Security Risk - risks relating to an industry as a whole or a company's prospects for business success,
- ~ Management Risk - risks that the Adviser's assessment of a company's growth prospects may not be accurate,
- ~ Liquidity Risk - a given security or asset may not be readily marketable,
- ~ Small Cap Risk - small cap stocks tend to have a high exposure to market fluctuations and failure,
- ~ Mid Cap Risk - mid cap stocks tend to have a greater exposure to market fluctuations and failure.

Loss of some or all of the money you invest is a risk of investing in the Fund.

### Example 2. Federated Kaufmann Small Cap Fund

#### **What are the Main Risks of Investing in the Fund?**

All mutual funds take investment risks. Therefore, it is possible to lose money by investing in the Fund. The primary factors that may reduce the Fund's returns include:

- **Stock Market Risk.** The value of equity securities in the Fund's portfolio will fluctuate and, as a result, the Fund's Share price may decline suddenly or over a sustained period of time. Information publicly available about a company, whether from the company's financial statements or other disclosures or from third parties, or information available to some but not all market participants, can affect the price of a company's shares in the market. Among other factors, equity securities may decline in value because of an increase in interest rates or changes in the stock market. Recent and potential future changes in industry and/or economic trends, as well as changes in monetary policy made by central banks and/or their governments, also can affect the level of interest rates and contribute to the development of or increase in volatility, illiquidity, shareholder redemptions and other adverse effects (such as a decline in a company's stock price), which could negatively impact the Fund's performance.
- **Risk Related to Investing for Growth.** Due to their relatively high valuations, growth stocks are typically more volatile than value stocks. For instance, the price of a growth stock may experience a larger decline on a forecast of lower earnings, a negative fundamental development, or an adverse market development. Further, growth stocks may not pay dividends or may pay lower dividends than value stocks. This means they depend more on



price changes for returns and may be more adversely affected in a down market compared to value stocks that pay higher dividends.

- **Small-Cap Company Risk.** The Fund may invest in small capitalization (or “small-cap”) companies. Small-cap companies may have less liquid stock, a more volatile share price, unproven track records, a limited product or service base, and limited access to capital. The above factors could make small-cap companies more likely to fail than larger companies, and increase the volatility of the Fund’s portfolio, performance and Share price.
- **Sector Risk.** Because the Fund may allocate relatively more assets to certain industry sectors than others, the Fund’s performance may be more susceptible to any developments which affect those sectors emphasized by the Fund.
- **Liquidity Risk.** Liquidity risk refers to the possibility that the Fund may not be able to sell a security or close out a derivative contract when it wants to. If this happens, the Fund will be required to continue to hold the security or keep the position open, and the Fund could incur losses. OTC derivative contracts generally carry greater liquidity risk than exchange-traded contracts.
- **Risk of Foreign Investing.** Because the Fund invests in securities issued by foreign companies, the Fund’s Share price may be more affected by foreign economic and political conditions, taxation policies and accounting and auditing standards than could otherwise be the case.
- **Risk of Investing in American Depositary Receipts and Domestically Traded Securities of Foreign Issuers.** Because the Fund may invest in American Depositary Receipts and other domestically traded securities of foreign companies, the Fund’s Share price may be more affected by foreign economic and political conditions, taxation policies and accounting and auditing standards than would otherwise be the case.
- **Custodial Services and Related Investment Costs.** Custodial services and other costs relating to investment in international securities markets generally are more expensive due to differing settlement and clearance procedures than those of the United States. The inability of the Fund to make intended securities purchases due to settlement problems could cause the Fund to miss attractive investment opportunities. In addition, security settlement and clearance procedures in some emerging market countries may not fully protect the Fund against loss of its assets.
- **Currency Risk.** Exchange rates for currencies fluctuate daily. Foreign securities are normally denominated and traded in foreign currencies. As a result, the value of the Fund’s foreign investments and the value of the shares may be affected favorably or unfavorably by changes in currency exchange rates relative to the U.S. dollar.
- **Eurozone Related Risk.** A number of countries in the European Union (EU) have experienced, and may continue to experience, severe economic and financial difficulties. Additional EU member countries may also fall subject to such difficulties. These events could negatively affect the value and liquidity of the Fund’s investments in euro-denominated securities and derivatives contracts, securities of issuers located in the EU or with significant exposure to EU issuers or countries.

- **Risk of Investing in Derivative Contracts and Hybrid Instruments.** Derivative contracts and hybrid instruments involve risks different from, or possibly greater than, risks associated with investing directly in securities and other traditional investments. Specific risk issues related to the use of such contracts and instruments include valuation and tax issues, increased potential for losses and/or costs to the Fund and a potential reduction in gains to the Fund. Each of these issues is described in greater detail in this Prospectus. Derivative contracts and hybrid instruments may also involve other risks described in this Prospectus or the Fund's Statement of Additional Information, such as stock market, credit, currency, liquidity and leverage risks.
- **Credit Risk.** Credit risk includes the possibility that a party to a transaction (such as a derivative transaction) involving the Fund will fail to meet its obligations. This could cause the Fund to lose money or to lose the benefit of the transaction or prevent the Fund from selling or buying other securities to implement its investment strategy.
- **Leverage Risk.** Leverage risk is created when an investment (such as a derivative transaction) exposes the Fund to a level of risk that exceeds the amount invested. Changes in the value of such an investment magnify the Fund's risk of loss and potential for gain.
- **Interest Rate Risk.** Prices of fixed-income securities generally fall when interest rates rise. The longer the duration or maturity of a fixed-income security, the more susceptible it is to interest-rate risk. Recent and potential future changes in monetary policy made by central banks and/or their governments are likely to affect the level of interest rates.
- **Technology Risk.** The Adviser uses various technologies in managing the Fund, consistent with its investment objective and strategy described in this prospectus. For example, proprietary and third-party data and systems are utilized to support decision making for the Fund. Data imprecision, software or other technology malfunctions, programming inaccuracies and similar circumstances may impair the performance of these systems, which may negatively affect Fund performance.

## B. Details of Textual Data

**Extraction.** We first randomly select two hundred sample summary prospects and manually read them to get familiar with the content and format. We start by considering some key words related to risk, including “risk”, “uncertainty”, “volatility”, “fluctuation” and the plural or other part of the speech of each word. In randomly selected samples, the frequencies of “uncertainty”, “volatility”, “fluctuation” and their transformations are trivial. As a result, we focus on “risk”. We begin from the word “risk” or “risks” and go backward until a punctuation, or until we obtain eight words including the word “risk” or “risks” itself. The choice of eight is based on our experience from manually reading. Since the summary prospectus usually first lists a risk and then explain it, the phrase of the risk name is rarely longer than eight words. One additional word will cause disproportionate increase in difficulty processing the textual data, therefore we believe eight is the optimal.

**Combination.** Since funds may choose different wording to express the same meaning, we manually read the extracted phrases and combine the phrases with similar meaning to one risk category. The risk categories are the risks we use in the final sample. We show some examples of the risk categories and the extracted risks they cover.

Example 1. Active Investment Risk: active allocation risk, active investment risk, active investor risk, active management risk, allocation risk, asset allocation risk, capital controls and sanctions risk, capital controls risk, control of portfolio funds risk, fund also faces selection risk, investment selection and allocation risk, investment selection risk, managed portfolio risk, management risk, of the fundasset allocation risk, portfolio management risk, portfolio selection risk, portfolio-specific risk, replication management risk, security selection risk, selection risk, stock selection risk, tactical allocation risk, target risk, active investment management risk, active management and selection risk, active risk, fund is exposed to management risk, investment management risk, liquidity and management risk, p active management risk, sector allocation risk, sector and industry weightings risk, sector and securities selection risk, securities or sector selection risk

Example 2. Large Cap Risk: large cap companies risk, large cap company risk, large cap risk, large cap stock risk, large capitalization companies risk, large capitalization company risk, large company risk, large-cap companies risk, large-cap company investment risk, large-cap company risk, large-cap risk, large-cap securities risk, large-cap stock risk, large-capitalization companies risk, large-capitalization company risk, large-capitalization risk, large-capitalization securities risk, large-capitalization stock risk, larger company securities risk, large capitalization risk, large capitalization securities risk, large capitalization stock risk, large companies risk, large market capitalization companies risk, large-capitalization investing risk, larger company risk

Example 3. Portfolio Turnover Risk: active and frequent trading risk, active trading risk, active trading strategy risk, frequent trading risk, frequent trading/portfolio turnover risk, high portfolio turnover rate risk, high portfolio turnover risk, portfolio turnover rate risk, portfolio turnover risk, turnover risk, frequent trading by fund shareholders poses risk, portfolio turnover (active trading) risk, summary prospectus/portfolio turnover risk, turnover rate risk

**Split.** Since funds may disclose two risks in one phrase, we manually read the extracted phrases and split the phrases consisting different meanings to two risk categories. The risk categories are the risks we use in the final sample. We show some examples of the risk categories and the extracted risk phrases before the split.

Example 1. Growth Investing Risk, Value Investing Risk: growth and value investing risk, growth and value stock risk, value or growth orientation risk

Example 2. Large Cap Risk, Mid Cap Risk: large- and mid-cap risk, large-cap and mid-cap risk, medium and large size company securities risk, mid- and large-cap companies risk, mid- and large-cap stock risk

Example 3. Liquidity Risk, Market Risk: liquidity and market risk, market and illiquidity risk, market and liquidity risk, market or liquidity risk

### **C. Example of SEC Comment Letters**

#### **SEC's Comment Letter to Columbia Acorn Trust (April 26, 2018)**

*"In the Summary of the Fund - Principal Risks section of the prospectus, please describe any principal strategy that gives rise to the derivatives, futures contracts and swaps risk disclosure. Otherwise, please move the disclosure to the section entitled Transactions in Derivatives within the More Information About the Fund - Additional Investment Strategies section...."*

*In the Summary of the Fund - Principal Risks section of the prospectus, the discussion of "select portfolio" risk states that "because the Fund may invest in more than one company concentrated in a similar industry, sector or geographic region, the Fund may be even more concentrated than the number of companies it may hold would suggest." Please indicate whether the Fund will concentrate its investments in any industry and, if so, identify in the principal risks any industry where it will concentrate and disclose the risks of such concentration. In addition, please disclose that the Fund will look through to the underlying Portfolio Funds for purposes of determining compliance with the Fund's concentration policy since the Portfolio Funds are all affiliated with the Fund."*

#### D. Comparison between Disclosed Risks and Academic Risk Measures

In this section, we try to link the fund disclosed risks to academic risk measures. We start by proposing an academic risk measure that makes the most economic sense for each disclosed risk and then regress the return associated with each disclosed risk on all the proposed risk measures.

We then regress this each risk associated return on all the proposed academic risk measures as in Equation IA1 below. For fund-specific risk measures, such as turnover, return volatility, Index Concentration Index (ICI) (Kacperczyk, Sialm, and Zheng (2005)) and active share (Cremers and Petajisto (2009)), we construct the factor returns by ourselves. At the end of June in each year, we sort funds on these variables and then form a long portfolio consisting of the top 30% of funds, as well as a short portfolio with the bottom 30% of the funds. The long and short portfolio will be held for the next twelve months and the return of each portfolio is calculated as beginning value-weighted average return of each fund in that portfolio. Finally, the return associated with this specific risk will be the return of the Long-Short portfolio. Idiosyncratic risk is constructed in the same way but using stocks and the idiosyncratic measure is estimated following (Ang et al. (2006)).

$$\begin{aligned} Return\_diff_i = & \beta_0 + \beta_1 \times RiskMeasure_1 + \beta_2 \times RiskMeasure_2 + \dots + \beta_{31} \times RiskMeasure_{31} \\ & + e_i \end{aligned} \tag{IA1}$$

**Table IA1. List of Proposed Academic Risk Measures**

This table reports the proposed academic risk measure for each corresponding disclosed risk. Missing cells implies that for this risk, we couldn't come up with a corresponding measure.

| <b>Disclosed Risk</b>                 | <b>Proposed Academic Risk Measures</b>        |
|---------------------------------------|---|
| market risk                           | CAPM market premium                           |
| active investment risk                | fund active share                             |
| foreign investment risk               | MSCI ACWI ex USA ALL CAP index                |
| small cap risk                        | Fama French size factor                       |
| mid cap risk                          | Fama French size factor                       |
| liquidity risk                        | Pastor-Stambaugh Liquidity Factor             |
| derivatives risk                      | CBOE S&P 500 Volatility Index                 |
| value investing risk                  | Fama French value factor                      |
| industry/sector risk                  | industry concentration index                  |
| strategy/style risk                   |   |
| growth investing risk                 | Fama French value factor                      |
| currency risk                         | Invesco DB US Dollar Index Bullish Fund (UUP) |
| portfolio turnover risk               | fund turnover                                 |
| credit/default risk                   | Fama-French bond factors                      |
| company specific risk                 | idiosyncratic risk                            |
| emerging market risk                  | MSCI emerging market index                    |
| non-diversification risk              | industry concentration index                  |
| large cap risk                        | Fama French size factor                       |
| bond risk                             | S&P 500 Bond Index                            |
| investment in investment vehicle risk |   |
| interest rate risk                    | 3-Month LIBOR (USD)                           |
| leverage risk                         | Tyler Muir leverage factor                    |
| real estate investing risk            | Case-Shiller index                            |
| political regulatory risk             | economic policy uncertainty index             |
| valuation risk                        |   |
| cash management risk                  |   |
| securities lending risk               |   |
| manager/advisor risk                  | fund turnover                                 |
| depository receipts risk              |   |
| short position risk                   |   |
| investment risk                       |   |
| market capitalization risk            | Fama French size factor                       |
| economic risk                         | CAPM market premium                           |
| cyber security risk                   |   |
| event risk                            | CAPM market premium                           |
| prepayment/extension/call risk        | S&P 500 Bond Index                            |
| custody/operation risk                |   |
| income risk                           |   |
| volatility risk                       | fund volatility                               |
| IPO/SEO risk                          | Jay Ritter IPO Avg. first-day return          |
| index/passive investing risk          | fund active share                             |
| market trading risk                   | trading volume of S&P 500                     |

**Table IA2. Disclosed Risks and Academic Measures**

This table reports the top academic measure related to the 42 disclosed risks in fund summary prospectus. The column “Disclosed Risk” lists all the risks studied in this paper. Column “Academic Measure” reports the most significant measures in Regression (IA1), if there is one. Column “*t*-statistics” reports the corresponding *t*-statistics for each measure in the regression.

|    | Disclosed Risk                        | Academic Measure                     | <i>t</i> -statistics |
|----|---------------------------------------|--------------------------------------|----------------------|
| 1  | active investment risk                | Idiosyncratic risk                   | 2.41                 |
| 2  | bond risk                             | CAPM market premium                  | (5.71)               |
| 3  | cash management risk                  | Case-Shiller index                   | 2.15                 |
| 4  | company specific risk                 | Pastor-Stambaugh Liquidity Factor    | 4.35                 |
| 5  | credit/default/counterparty risk      | Fund active share                    | 1.68                 |
| 6  | currency risk                         | Jay Ritter IPO Avg. first-day return | (3.60)               |
| 7  | custody/operation risk                | Fund turnover                        | (2.53)               |
| 8  | cyber security risk                   | Fund turnover                        | (3.48)               |
| 9  | depository receipts risk              | Fund volatility                      | (3.17)               |
| 10 | derivatives risk                      | Fund turnover                        | 4.31                 |
| 11 | economic risk                         | Fama French size factor              | (2.62)               |
| 12 | emerging market risk                  | Idiosyncratic risk                   | 2.51                 |
| 13 | event risk                            | Fund active share                    | (2.55)               |
| 14 | foreign investment risk               | Fama French size factor              | (6.97)               |
| 15 | <b>growth investing risk</b>          | <b>Fama French value factor</b>      | <b>(6.75)</b>        |
| 16 | income risk                           | CAPM market premium                  | (3.93)               |
| 17 | <b>index/passive investing risk</b>   | <b>Industry concentration index</b>  | <b>(4.15)</b>        |
| 18 | industry/sector risk                  | Pastor-Stambaugh Liquidity Factor    | 2.61                 |
| 19 | interest rate risk                    | CAPM market premium                  | (6.99)               |
| 20 | Investment in investment vehicle risk | CAPM market premium                  | (4.51)               |
| 21 | investment risk                       | Fund active share                    | (3.06)               |
| 22 | IPO/SEO risk                          | Fama French size factor              | 5.02                 |
| 23 | <b>large cap risk</b>                 | <b>Fama French size factor</b>       | <b>(8.03)</b>        |
| 24 | leverage risk                         | fund turnover                        | 2.82                 |
| 25 | <b>liquidity risk</b>                 | <b>Fund turnover</b>                 | <b>4.03</b>          |
| 26 | manager/advisor risk                  | MSCI emerging market index           | (1.75)               |
| 27 | market capitalization risk            | Industry concentration index         | 3.07                 |
| 28 | market risk                           | Jay Ritter IPO Avg. first-day return | 2.55                 |
| 29 | market trading risk                   | Economic policy uncertainty index    | 2.16                 |
| 30 | <b>mid cap risk</b>                   | <b>Fama French size factor</b>       | <b>(5.39)</b>        |
| 31 | non-diversification risk              | Fama French size factor              | (3.12)               |
| 32 | political/regulatory risk             | Case-Shiller index                   | 2.20                 |
| 33 | <b>portfolio turnover risk</b>        | <b>Fund turnover</b>                 | <b>5.88</b>          |
| 34 | prepayment/extension/call risk        | CAPM market premium                  | (8.82)               |
| 35 | real estate investing risk            | Fama French value factor             | 5.17                 |
| 36 | securities lending risk               | Jay Ritter IPO Avg. first-day return | 2.84                 |
| 37 | short position risk                   | CAPM market premium                  | (8.90)               |
| 38 | <b>small cap risk</b>                 | <b>Fama French size factor</b>       | <b>11.05</b>         |
| 39 | strategy style risk                   | S&P 500 Bond Index                   | 2.27                 |
| 40 | valuation risk                        | Fama French size factor              | (3.60)               |
| 41 | <b>value investing risk</b>           | <b>Fama French value factor</b>      | <b>9.53</b>          |
| 42 | volatility risk                       | Fund turnover                        | (1.73)               |

## E. Additional Tables

**Table IA3. Main Measures of Risk Disclosure Using Adjusted  $R^2$**

This table reports the summary statistics for the measures of risk disclosure. RCR adj. is defined similarly as in Equation (4) but based on adjusted  $R^2$ . RCR adj. w/mkt is the RCR adj. including the market risk. RCR adj. FFC6 is estimated using Fama-French-Carhart 6-factor model as the benchmark. Overdisclosure is the ratio of the number of insignificant risks to the number of all disclosed risk in a quarter. # Risks is the number of risks disclosed by a fund in a quarter.  $\Delta$ Risks is the change in number of risks disclosed by a fund in two consecutive quarters. All variables are winsorized at the 1% and 99% level. Panel A reports the time-series average of the cross-sectional statistics. Panel B reports the time-series average correlation between each two variables.

Panel A: Summary Statistics

| Variable       | Mean | StdDev | Min    | Median | Max   |
|----------------|------|--------|--------|--------|-------|
| RCR adj.       | 0.62 | 0.34   | -0.23  | 0.68   | 1.55  |
| RCR adj. w/mkt | 0.92 | 0.16   | 0.10   | 0.98   | 1.03  |
| RCR adj. FFC6  | 1.24 | 3.46   | -16.58 | 1.07   | 18.50 |
| Overdisclosure | 0.63 | 0.27   | 0.00   | 0.68   | 1.00  |
| # Risks        | 6.95 | 3.74   | 1.00   | 6.32   | 23.05 |
| $\Delta$ Risks | 0.06 | 0.88   | -10.08 | 0.00   | 10.68 |

Panel B: Correlation

| Variable       | RCR adj. | RCR adj. w/mkt | RCR adj. FFC6 | Overdisclosure | # Risks | $\Delta$ Risks |
|----------------|----------|----------------|---------------|----------------|---------|----------------|
| RCR adj.       | 1.00     |                |               |                |         |                |
| RCR adj. w/mkt | 0.31     | 1.00           |               |                |         |                |
| RCR adj. FFC6  | 0.15     | 0.05           | 1.00          |                |         |                |
| Overdisclosure | -0.15    | 0.08           | -0.02         | 1.00           |         |                |
| # Risks        | 0.41     | 0.31           | 0.17          | 0.38           | 1.00    |                |
| $\Delta$ Risks | 0.05     | 0.07           | 0.03          | 0.06           | 0.14    | 1.00           |



**Table IA4. Determinants of Risk Disclosure Using Alternative Methods**

Panel A reports the results of RCR, Overdisclosure and Log # Risks on lagged fund characteristics. The test is a panel regression with time fixed effects and the standard errors are double clustered at fund and time level. Panel B presents regression results of RCR adj, Overdisclosure and Log # Risks on lagged fund characteristics. The test is Fama-MacBeth regression and adjusts for Newey-West standard errors for two lags. RCR is defined as in Equation (4). RCR adj. is defined similarly as in Equation (4) but based on adjusted  $R^2$ . Overdisclosure is the ratio of the number of insignificant risks to the number of all disclosed risks in a quarter. Log # risks is log number of risks disclosed. Dependent variables are calculated in quarter  $q$ . Log family size, log size and expense ratio are the value at the end of quarter  $q - 1$ . Volatility is the standard deviation of a fund's daily return in quarter  $q - 1$ . Flow is the percentage flow in quarter  $q - 1$ . Alpha is average quarterly four-factor alpha from  $q - 4$  to  $q - 1$ . The superscripts\*, \*\*, and \*\*\* indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Panel Regression with Time Fixed Effects

|                 | (1)<br>RCR         | (2)<br>Overdisclosure | (3)<br>Log # Risks   |
|-----------------|--------------------|-----------------------|----------------------|
| Log family size | 0.015***<br>(3.89) | 0.000<br>(0.14)       | 0.006<br>(0.61)      |
| Log size        | -0.001<br>(-0.17)  | -0.006*<br>(-1.76)    | 0.009<br>(0.67)      |
| Expense ratio   | 0.084***<br>(3.64) | 0.017<br>(1.11)       | 0.191***<br>(3.14)   |
| Volatility      | 0.350***<br>(7.81) | -0.250***<br>(-9.13)  | -0.254***<br>(-3.45) |
| Flow            | 0.030<br>(0.86)    | -0.046*<br>(-1.98)    | 0.019<br>(0.26)      |
| Turnover        | -0.009<br>(-0.98)  | 0.009<br>(1.31)       | 0.018<br>(0.72)      |
| Alpha           | -0.377<br>(-0.96)  | -0.169<br>(-0.67)     | -2.732***<br>(-3.37) |
| Constant        | -0.005<br>(-0.08)  | 0.873***<br>(21.66)   | 1.658***<br>(11.07)  |
| N               | 28,832             | 28,832                | 29,081               |
| Adj. R-sq       | 0.128              | 0.046                 | 0.050                |

Panel B: Fama-MacBeth Regression with Measures based on Adjusted  $R^2$

|                 | (1)<br>RCR adj.     | (2)<br>Overdisclosure | (3)<br>Log # Risks   |
|-----------------|---------------------|-----------------------|----------------------|
| Log family size | 0.012***<br>(8.47)  | 0.002<br>(1.39)       | 0.010***<br>(3.46)   |
| Log size        | -0.001<br>(-0.43)   | -0.006***<br>(-4.81)  | 0.009<br>(1.63)      |
| Expense ratio   | 0.111***<br>(9.19)  | 0.026***<br>(3.01)    | 0.188***<br>(12.67)  |
| Volatility      | 0.393***<br>(10.23) | -0.300***<br>(-16.93) | -0.313***<br>(-7.28) |
| Flow            | 0.020<br>(0.53)     | -0.054***<br>(-2.98)  | 0.036<br>(0.68)      |
| Turnover        | -0.010**<br>(-2.20) | 0.007**<br>(2.12)     | 0.014<br>(1.43)      |
| Alpha           | -0.173<br>(-0.32)   | -0.138<br>(-0.69)     | -2.436**<br>(-2.51)  |
| Constant        | 0.079*<br>(1.72)    | 0.880***<br>(41.61)   | 1.648***<br>(15.66)  |
| N               | 28,832              | 28,832                | 29,081               |
| R-sq            | 0.074               | 0.052                 | 0.034                |

**Table IA5. Fund Flow and RCR Using Alternative Methods**

Panel A reports the regression results of funds' future flow on current RCR controlling for fund characteristics. The test is a panel regression with time fixed effects and the standard errors are double clustered at fund and time level. Panel B reports the results of regression of funds' future flow on current RCR adj. controlling for fund characteristics. The test is Fama-MacBeth regression and adjusts for Newey-West standard errors for two lags. RCR is defined as in Equation (4). RCR adj. is defined similarly as in Equation (4) but based on adjusted  $R^2$ . Flow[ $q+4$ ] is percentage flow in the quarter one year after the disclosure. Institutional pct. is the percentage of institutional-share assets of a fund. Column (1) reports the result for the full sample. Column (2) presents the results for the subsample of institutional funds. Column (3) reports the results for the full sample that includes an interaction term between RCR and Institutional pct. All the variables are winsorized at the 1% level. The superscripts\*, \*\*, and \*\*\* indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Panel Regression with Time Fixed Effects

|                                 | Flow[ $q+4$ ]        |                            |                      |
|---------------------------------|----------------------|----------------------------|----------------------|
|                                 | (1)<br>All Funds     | (2)<br>Institutional Funds | (3)<br>All Funds     |
| RCR                             | -0.001<br>(-0.30)    | 0.020**<br>(2.47)          | -0.009*<br>(-1.75)   |
| Institutional pct.              |                      |                            | -0.021***<br>(-3.46) |
| RCR $\times$ Institutional pct. |                      |                            | 0.025***<br>(2.74)   |
| Log family size                 | 0.006***<br>(7.49)   | 0.004***<br>(3.05)         | 0.006***<br>(7.46)   |
| Log size                        | -0.007***<br>(-7.61) | -0.005***<br>(-2.82)       | -0.007***<br>(-7.72) |
| Expense ratio                   | -0.636*<br>(-1.79)   | -1.406*<br>(-1.84)         | -0.855**<br>(-2.34)  |
| Volatility                      | -0.188<br>(-0.24)    | -1.079<br>(-0.90)          | -0.181<br>(-0.23)    |
| Lag 4-f alpha                   | 0.508***<br>(10.94)  | 0.589***<br>(8.06)         | 0.509***<br>(10.97)  |
| Turnover                        | -0.011***<br>(-5.14) | -0.019***<br>(-4.90)       | -0.010***<br>(-5.02) |
| Constant                        | -0.007<br>(-0.76)    | -0.009<br>(-0.54)          | 0.003<br>(0.30)      |
| N                               | 25,648               | 5,842                      | 25,648               |
| Adj. R-sq                       | 0.062                | 0.071                      | 0.064                |

Panel B: Fama-MacBeth Regression with Measures based on adjusted  $R^2$

|                                      | Flow[ $q+4$ ]        |                            |                      |
|--------------------------------------|----------------------|----------------------------|----------------------|
|                                      | (1)<br>All Funds     | (2)<br>Institutional Funds | (3)<br>All Funds     |
| RCR adj.                             | -0.001<br>(-0.44)    | 0.011***<br>(3.13)         | -0.004<br>(-1.54)    |
| Institutional pct.                   |                      |                            | -0.015**<br>(-2.61)  |
| RCR adj. $\times$ Institutional pct. |                      |                            | 0.019***<br>(3.22)   |
| Log family size                      | 0.006***<br>(8.67)   | 0.004***<br>(3.67)         | 0.005***<br>(9.05)   |
| Log size                             | -0.007***<br>(-8.91) | -0.004***<br>(-2.87)       | -0.008***<br>(-8.81) |
| Expense ratio                        | -0.616**<br>(-2.07)  | -1.017<br>(-1.66)          | -0.813**<br>(-2.49)  |
| Volatility                           | 0.133<br>(0.15)      | -0.175<br>(-0.19)          | -0.038<br>(-0.04)    |
| Lag 4-f alpha                        | 0.515***<br>(7.51)   | 0.621***<br>(7.23)         | 0.511***<br>(7.21)   |
| Turnover                             | -0.012***<br>(-6.66) | -0.021***<br>(-6.30)       | -0.012***<br>(-6.45) |
| Constant                             | -0.006<br>(-0.76)    | -0.007<br>(-0.64)          | 0.003<br>(0.41)      |
| N                                    | 25,648               | 5,842                      | 25,648               |
| R-sq                                 | 0.063                | 0.107                      | 0.070                |

**Table IA6. Fund Flow and Overdisclosure**

This table reports the results of regression of funds' future flow on current Overdisclosure controlling for fund characteristics. Overdisclosure is the ratio of the number of insignificant risks to the number of all disclosed risks in a quarter. Flow[ $q+4$ ] is percentage flow in the quarter one year after the disclosure. Institutional pct. is the percentage of institutional-share assets of a fund. Column (1) reports the result for the full sample. Column (2) presents the results for the subsample of institutional funds. Column (3) reports the results for the full sample that includes an interaction term between Overdisclosure and Institutional pct. The test is Fama-MacBeth regression and adjusts for Newey-West standard errors for two lags. All the variables are winsorized at the 1% level. The superscripts\*, \*\*, and \*\*\* indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

|                                      | Flow[ $q+4$ ]        |                               |                      |
|--------------------------------------|----------------------|-------------------------------|----------------------|
|                                      | (1)<br>All Funds     | (2)<br>Institutional<br>Funds | (3)<br>All Funds     |
| Overdisclosure                       | -0.002<br>(-1.00)    | -0.006<br>(-1.09)             | 0.002<br>(0.68)      |
| Institutional pct.                   |                      |                               | 0.003<br>(0.53)      |
| Overdis. $\times$ Institutional pct. |                      |                               | -0.012*<br>(-1.82)   |
| Log family size                      | 0.006***<br>(8.48)   | 0.004***<br>(4.38)            | 0.006***<br>(8.94)   |
| Log size                             | -0.007***<br>(-9.01) | -0.004***<br>(-2.86)          | -0.008***<br>(-8.84) |
| Expense ratio                        | -0.662**<br>(-2.26)  | -0.801<br>(-1.23)             | -0.870**<br>(-2.54)  |
| Volatility                           | 0.026<br>(0.03)      | 0.215<br>(0.22)               | 0.117<br>(0.14)      |
| Lag 4-f alpha                        | 0.516***<br>(7.39)   | 0.616***<br>(7.13)            | 0.513***<br>(7.24)   |
| Turnover                             | -0.012***<br>(-6.57) | -0.022***<br>(-6.40)          | -0.012***<br>(-6.32) |
| Constant                             | -0.006<br>(-0.63)    | -0.005<br>(-0.38)             | -0.003<br>(-0.35)    |
| N                                    | 25,648               | 5,842                         | 25,648               |
| R-sq                                 | 0.063                | 0.111                         | 0.070                |

**Table IA7. Risk Disclosure and Funds' Future Risk Taking Using Alternative Methods**

Panel A reports the regression results of fund risks in the next quarter on the current RCR and Overdisclosure. The test is a panel regression with time fixed effects and the standard errors are double clustered at fund and time level. Panel B reports the regression results of fund risks in the next quarter on the current RCR adj. and Overdisclosure. The test is Fama-MacBeth regression and adjusts for Newey-West standard errors for two lags. RCR is defined as in Equation (4). RCR adj. is defined similarly as in Equation (4) but based on adjusted  $R^2$ . Overdisclosure is the ratio of the number of insignificant risks to the number of all risks. Volatility [ $q+1$ ] is the standard deviation of a fund's daily return in quarter  $q+1$ . Beta[ $q+1$ ] is the market beta in quarter  $q+1$ . Idiosyncratic risk[ $q+1$ ] is the idiosyncratic risk in quarter  $q+1$ . Independent variables are calculated in quarter  $q$ . Alpha is 4-factor alpha in quarter  $q$ . The test is a panel regression with time fixed effects and the standard errors are double clustered at fund and time level. The superscripts\*, \*\*, and \*\*\* indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Panel Regression with Time Fixed Effects

|                           | Volatility[ $q+1$ ] |                      | Beta[ $q+1$ ]       |                      | Idiosyncratic risk[ $q+1$ ] |                     |
|---------------------------|---------------------|----------------------|---------------------|----------------------|-----------------------------|---------------------|
|                           | (1)                 | (2)                  | (3)                 | (4)                  | (5)                         | (6)                 |
| RCR                       | 0.035**<br>(2.61)   |                      | 0.590<br>(1.33)     |                      | 0.005*<br>(1.77)            |                     |
| Overdisclosure            |                     | -0.022***<br>(-3.64) |                     | -0.874***<br>(-3.34) |                             | -0.005*<br>(-1.81)  |
| Volatility[ $q$ ]         | 0.815***<br>(14.13) | 0.822***<br>(14.40)  |                     |                      |                             |                     |
| Beta[ $q$ ]               |                     |                      | 0.898***<br>(43.65) | 0.897***<br>(43.59)  |                             |                     |
| Idiosyncratic risk[ $q$ ] |                     |                      |                     |                      | 0.736***<br>(9.57)          | 0.737***<br>(9.58)  |
| Log family size           | 0.001<br>(1.56)     | 0.002*<br>(2.02)     | 0.053<br>(1.03)     | 0.062<br>(1.21)      | -0.002***<br>(-2.71)        | -0.001**<br>(-2.63) |
| Log size                  | -0.002<br>(-1.42)   | -0.002<br>(-1.52)    | -0.019<br>(-0.24)   | -0.025<br>(-0.33)    | 0.001*<br>(1.78)            | 0.001*<br>(1.71)    |
| Expense ratio             | 1.107<br>(1.62)     | 1.446*<br>(1.95)     | -12.588<br>(-0.32)  | -6.457<br>(-0.16)    | 2.443***<br>(4.13)          | 2.499***<br>(4.13)  |
| Flow                      | 0.004<br>(0.27)     | 0.004<br>(0.24)      | -0.030<br>(-0.05)   | -0.070<br>(-0.12)    | 0.003<br>(0.87)             | 0.003<br>(0.83)     |
| Lag 4-f alpha             | 0.202<br>(1.00)     | 0.197<br>(0.97)      | 28.944**<br>(2.53)  | 28.786**<br>(2.51)   | 0.071<br>(1.65)             | 0.069<br>(1.62)     |
| Turnover                  | -0.009*<br>(-2.01)  | -0.009**<br>(-2.05)  | -0.492*<br>(-1.76)  | -0.495*<br>(-1.77)   | -0.000<br>(-0.05)           | -0.000<br>(-0.07)   |
| Constant                  | 0.169***<br>(3.17)  | 0.188***<br>(3.50)   | 9.423***<br>(3.45)  | 10.261***<br>(3.82)  | 0.040***<br>(2.79)          | 0.045***<br>(2.82)  |
| N                         | 27,973              | 27,973               | 28,413              | 28,413               | 28,413                      | 28,413              |
| Adj. R-sq                 | 0.942               | 0.941                | 0.815               | 0.815                | 0.670                       | 0.670               |

Panel B: Fama-MacBeth Regression with Adjusted  $R^2$  based Measures

|                           | Volatility[ $q+1$ ] |                     | Beta[ $q+1$ ]       |                      | Idiosyncratic risk[ $q+1$ ] |                      |
|---------------------------|---------------------|---------------------|---------------------|----------------------|-----------------------------|----------------------|
|                           | (1)                 | (2)                 | (3)                 | (4)                  | (5)                         | (6)                  |
| RCR adj.                  | 0.016<br>(1.56)     |                     | 0.294<br>(1.10)     |                      | 0.001<br>(1.02)             |                      |
| Overdisclosure            |                     | -0.012**<br>(-2.25) |                     | -0.767***<br>(-3.25) |                             | -0.004**<br>(-2.22)  |
| Volatility[ $q$ ]         | 0.998***<br>(17.16) | 0.999***<br>(16.85) |                     |                      |                             |                      |
| Beta[ $q$ ]               |                     |                     | 0.913***<br>(80.12) | 0.912***<br>(79.98)  |                             |                      |
| Idiosyncratic risk[ $q$ ] |                     |                     |                     |                      | 0.841***<br>(33.17)         | 0.842***<br>(33.02)  |
| Log family size           | 0.002*<br>(1.86)    | 0.002*<br>(1.90)    | 0.035<br>(0.91)     | 0.041<br>(0.99)      | -0.001***<br>(-3.31)        | -0.001***<br>(-3.25) |
| Log size                  | -0.002<br>(-1.57)   | -0.003<br>(-1.58)   | 0.001<br>(0.04)     | -0.009<br>(-0.23)    | 0.001***<br>(3.16)          | 0.001***<br>(3.14)   |
| Expense ratio             | 0.070<br>(0.12)     | 0.288<br>(0.50)     | 4.906<br>(0.20)     | 10.662<br>(0.42)     | 1.854***<br>(5.40)          | 1.854***<br>(5.46)   |
| Flow                      | -0.006<br>(-0.57)   | -0.005<br>(-0.55)   | 0.355<br>(0.52)     | 0.236<br>(0.35)      | 0.002<br>(0.39)             | 0.001<br>(0.31)      |
| Lag 4-f alpha             | 0.065<br>(0.38)     | 0.069<br>(0.40)     | 22.184**<br>(2.60)  | 22.182**<br>(2.57)   | 0.068**<br>(2.12)           | 0.070**<br>(2.21)    |
| Turnover                  | -0.011**<br>(-2.30) | -0.011**<br>(-2.32) | -0.402**<br>(-2.07) | -0.403**<br>(-2.07)  | 0.000<br>(0.35)             | 0.000<br>(0.38)      |
| Constant                  | 0.101**<br>(2.20)   | 0.113**<br>(2.34)   | 7.928***<br>(5.69)  | 8.671***<br>(6.37)   | 0.025***<br>(5.67)          | 0.028***<br>(6.41)   |
| N                         | 27,973              | 27,973              | 28,413              | 28,413               | 28,413                      | 28,413               |
| R-sq                      | 0.822               | 0.819               | 0.832               | 0.832                | 0.717                       | 0.717                |

**Table IA8. Fund Future Performance and RCR Using Alternative Methods**

Panel A reports the results of regression of funds' future performance on current RCR, controlling for fund characteristics. The test is a panel regression with time fixed effects and the standard errors are double clustered at fund and time level. Panel B reports the results of regression of funds' future performance on current RCR adj., controlling for fund characteristics. The test is Fama-MacBeth regression and adjusts for Newey-West standard errors for two lags. RCR is defined as in Equation (4). RCR adj. is defined similarly as in Equation (4) but based on adjusted  $R^2$ . Performance measures include raw return, the one factor alpha of Jensen (1968), the three-factor alpha of Fama and French (1993) and the four-factor alpha are of Carhart (1997). Future performances are estimated from quarter  $q+1$  to quarter  $q+4$ . The superscripts\*, \*\*, and \*\*\* indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Panel Regression with Time Fixed Effects

|                 | Raw return           | CAPM alpha           | FF3 alpha           | FFC4 alpha           |
|-----------------|----------------------|----------------------|---------------------|----------------------|
|                 | (1)                  | (2)                  | (3)                 | (4)                  |
|                 | $[q+1, q+4]$         | $[q+1, q+4]$         | $[q+1, q+4]$        | $[q+1, q+4]$         |
| RCR             | -0.025***<br>(-4.13) | -0.024***<br>(-4.30) | -0.004<br>(-1.32)   | -0.004<br>(-1.53)    |
| Log family size | 0.002***<br>(3.64)   | 0.001**<br>(2.59)    | 0.001***<br>(3.40)  | 0.001***<br>(2.99)   |
| Log size        | -0.000<br>(-0.21)    | 0.001<br>(1.07)      | -0.001<br>(-1.58)   | -0.001<br>(-1.13)    |
| Expense ratio   | -1.212***<br>(-3.60) | -0.785**<br>(-2.46)  | -0.485*<br>(-1.92)  | -0.427*<br>(-1.72)   |
| Volatility      | 8.969***<br>(5.91)   | -1.402<br>(-1.43)    | -0.028<br>(-0.05)   | -0.031<br>(-0.06)    |
| Flow            | -0.005<br>(-0.56)    | 0.007<br>(0.68)      | 0.007<br>(1.27)     | 0.005<br>(0.95)      |
| Turnover        | -0.009***<br>(-4.65) | -0.003*<br>(-1.73)   | -0.005**<br>(-2.61) | -0.005***<br>(-3.22) |
| Constant        | 0.036**<br>(2.12)    | -0.011<br>(-0.82)    | -0.017**<br>(-2.22) | -0.016**<br>(-2.39)  |
| N               | 26,570               | 25,673               | 25,673              | 25,673               |
| Adj. R-sq       | 0.742                | 0.111                | 0.093               | 0.095                |



Panel B: Fama-MacBeth Regression with Adjusted  $R^2$  based Measures

|                 | Raw return           | CAPM alpha           | FF3 alpha            | FFC4 alpha           |
|-----------------|----------------------|----------------------|----------------------|----------------------|
|                 | (1)                  | (2)                  | (3)                  | (4)                  |
|                 | $[q+1, q+4]$         | $[q+1, q+4]$         | $[q+1, q+4]$         | $[q+1, q+4]$         |
| RCR adj.        | -0.010**<br>(-2.39)  | -0.010***<br>(-2.72) | -0.000<br>(-0.29)    | -0.000<br>(-0.07)    |
| Log family size | 0.001***<br>(2.89)   | 0.001**<br>(2.12)    | 0.001***<br>(4.08)   | 0.001***<br>(4.04)   |
| Log size        | 0.001<br>(0.54)      | 0.001<br>(1.15)      | -0.001**<br>(-2.13)  | -0.001<br>(-1.55)    |
| Expense ratio   | -1.012***<br>(-3.46) | -0.679**<br>(-2.57)  | -0.580**<br>(-2.23)  | -0.501*<br>(-1.88)   |
| Volatility      | 9.458***<br>(2.74)   | -2.326<br>(-1.18)    | -0.210<br>(-0.26)    | -0.144<br>(-0.18)    |
| Flow            | 0.019<br>(1.00)      | 0.023<br>(1.35)      | 0.010**<br>(2.55)    | 0.009**<br>(2.04)    |
| Turnover        | -0.008***<br>(-4.88) | -0.003<br>(-1.48)    | -0.006***<br>(-2.73) | -0.006***<br>(-3.53) |
| Constant        | 0.025<br>(1.22)      | -0.009<br>(-0.42)    | -0.014*<br>(-1.75)   | -0.015*<br>(-2.02)   |
| N               | 26,570               | 25,673               | 25,673               | 25,673               |
| R-sq            | 0.246                | 0.129                | 0.061                | 0.059                |

**Table IA9. Fund Future Performance and Overdisclosure**

This table reports the results of regression of funds' future performance on current Overdisclosure, controlling for fund characteristics. Overdisclosure is the ratio of the number of insignificant risks to the number of all disclosed risks in a quarter. Performance measures include raw return, the one factor alpha of Jensen (1968), the three-factor alpha of Fama and French (1993) and the four-factor alpha are of Carhart (1997). Future performances are estimated from quarter  $q+1$  to quarter  $q+4$ . The test is Fama-MacBeth regression and adjusts for Newey-West standard errors for two lags. The superscripts\*, \*\*, and \*\*\* indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

|                 | Raw return           | CAPM alpha           | FF3 alpha           | FFC4 alpha           |
|-----------------|----------------------|----------------------|---------------------|----------------------|
|                 | (1)                  | (2)                  | (3)                 | (4)                  |
|                 | $[q+1, q+4]$         | $[q+1, q+4]$         | $[q+1, q+4]$        | $[q+1, q+4]$         |
| Overdisclosure  | 0.000<br>(0.25)      | 0.002<br>(0.86)      | -0.003<br>(-1.60)   | -0.003<br>(-1.43)    |
| Log family size | 0.001**<br>(2.70)    | 0.001*<br>(1.79)     | 0.001***<br>(4.02)  | 0.001***<br>(4.04)   |
| Log size        | 0.001<br>(0.56)      | 0.001<br>(1.16)      | -0.001**<br>(-2.08) | -0.001<br>(-1.49)    |
| Expense ratio   | -1.118***<br>(-3.57) | -0.797***<br>(-2.74) | -0.576**<br>(-2.16) | -0.494*<br>(-1.82)   |
| Volatility      | 8.993**<br>(2.57)    | -2.698<br>(-1.32)    | -0.339<br>(-0.44)   | -0.262<br>(-0.35)    |
| Flow            | 0.019<br>(1.00)      | 0.023<br>(1.36)      | 0.010**<br>(2.53)   | 0.009*<br>(2.00)     |
| Turnover        | -0.008***<br>(-4.89) | -0.002<br>(-1.38)    | -0.006**<br>(-2.69) | -0.006***<br>(-3.48) |
| Constant        | 0.023<br>(1.10)      | -0.012<br>(-0.56)    | -0.011<br>(-1.35)   | -0.013<br>(-1.63)    |
| N               | 26,570               | 25,673               | 25,673              | 25,673               |
| R-sq            | 0.236                | 0.118                | 0.059               | 0.056                |