

# Do Mutual Funds Walk the Talk?

## A Textual Analysis of Risk Disclosure by Mutual Funds

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### Abstract

Do risk disclosures by mutual funds reflect funds' actual investment risks? Using textual analysis, we examine risk disclosures in funds' summary prospectuses to determine whether funds do accurately disclose their risks. We first document the types of risks disclosed by funds and study the relation between fund-disclosed risks and risk factors documented in academic studies. We find that most disclosed risks can be linked to meaningful and well-known academic risk factors. In our main tests, we develop fund-level measures to evaluate the informativeness of funds' risk disclosure, including risk coverage, conciseness, and uniqueness. Our findings suggest that disclosed risks in general reflect a large proportion of funds' investment risks but with substantial cross-fund heterogeneity. Interestingly, we find that funds tend to overdisclose risks; half of the disclosed risks are not significant in explaining the variations in fund returns. Further tests show that less skilled funds and riskier funds tend to disclose more. However, new money flows are not related to risk coverage. Overall, this paper provides novel evidence on the informativeness of risk disclosure in summary prospectus.

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

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# 1. Introduction

Approximately 50 percent 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, individuals' 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 make 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 (or risk-adjusted returns) than on risk. However, asset allocation, which builds on appropriate risk assessment, is most important in determining the long-term outcome of an investment portfolio.<sup>2</sup> Investors rely primarily on a fund's prospectus to provide information about the fund's risks.<sup>3</sup> They need to know how much risk and what types of risk they are assuming when investing in a mutual fund. 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 implications for investors and regulators.

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 by the investment industry. We start our analysis by using textual analysis to document various risks disclosed by mutual funds in their summary prospectuses. We also report their relative disclosure frequency and changes in the

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<sup>1</sup> In 2019, 46.4 percent 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> For example, many investors use information provider such as Morningstar. Some information on Morningstar is based on fund prospectus.

disclosures over time. Some disclosed risks are prevalent in disclosures—for example, “active investment risk” and “market risk.” Other disclosed risks are less common and only pertain to specific types of funds—for example, “arbitrage risk” and “micro-cap risk.” The relative frequency of the disclosed risks remains quite stable over our sample period. A few disclosed risks, such as “foreign investment” and “liquidity,” are disclosed by more funds in recent years than in earlier years.

Next, we try to understand the meaning of the disclosed risks in an academic context. For each disclosed risk, we begin by proposing a corresponding risk factor that makes the most economic sense. We then regress the return of the disclosed risk, which is the return of a portfolio of funds that disclosed the specific risk minus the return of a portfolio that did not disclose this risk, on all the proposed academic risk factors. We map each disclosed risk to the three most significant risk factors. The resulting mapping is largely consistent with our economic intuition. For example, “equity risk” is mapped to stock market beta; “growth investing risk” is mapped to the Fama-French HML factor. Thus our evidence suggests a good correspondence between the industry and academic perspectives on risk.

In our main test, for each fund we examine the quality of fund disclosure. To assess the coverage of the overall risk disclosure, we estimate what proportion of variations in actual fund returns can be explained by a fund’s disclosed risks. We then compare this proportion with the proportion that can be explained by all risks disclosed by all funds. We call the ratio of the two proportions the “risk coverage ratio” (RCR). The higher the explained proportion, the higher the overall risk disclosure coverage is. To proxy for the returns of disclosed risks, for each fund we construct the return of a specific risk as the return of the portfolio of all other funds that disclosed the risk minus the return of the portfolio of funds that did not disclose this risk. We find an overall

RCR of 80 percent. In addition, we observe large cross-fund variation in RCR. This finding shows that risk disclosures by mutual funds in general explain a large proportion of the risks in funds' actual investment strategies.

A 2019 SEC proposal emphasizes ordering the risks by importance and providing a concise summary of information. To investigate the ordering of disclosed risks, we examine the explanatory power of each fund's first three disclosed risks.<sup>4</sup> For the top three risks, we find an RCR of 67 percent. The findings suggest that the top risks account for a predominant proportion of the return variations relative to all 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. The smaller the percentage, the more concise the overall disclosure is. Our estimate shows an average overdisclosure measure of 48 percent, suggesting room for improvement in streamlining the list of risks in the summary prospectus.

Since we observe substantial cross-fund variation in the risk coverage ratio, we examine what types of funds have a higher risk coverage ratio. Using Fama-Macbeth regression, we show that younger funds, larger funds, riskier funds, and funds with higher expense ratios tend to have a higher risk coverage ratio. Interestingly, funds with worse performance also have a higher risk coverage ratio. The performance result is consistent with the hypothesis that disclosure cost is lower for managers with less proprietary information or the hypothesis that funds with worse performance disclose more risks to explain their inferior performance.

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<sup>4</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>

How does the risk coverage ratio relate to future fund risk and performance? In further analysis, we find that funds with a higher risk coverage ratio exhibit higher risk in the future. We also find that funds with a higher risk coverage ratio exhibit worse performance in the future. These findings are consistent with our earlier results on the determinants of fund disclosure.

Finally, we study whether investors pay attention to the risk coverage ratio. We find that fund flows are not related to past risk coverage. This is not a surprising result because the risk coverage ratio is not easily observable by investors. This finding does not mean that investors do not pay attention to risk disclosure per se, but that they do not react to measures of risk disclosure quality.

Our analyses help to inform long-lasting and ongoing policy discussions regarding mutual fund disclosure requirements, especially for risk disclosure. In 1995, the U.S. Securities and Exchange Commission (SEC) issued a Concept Release and Request for Comments on "Improving Descriptions of Risk by Mutual Funds and Other Investment Companies," which received much attention (SEC, 1995).<sup>5</sup> In 2009, the SEC adopted amendments to Form N-1A that "will require every prospectus to include a summary section at the front of the prospectus, consisting of key information about the fund, including investment objectives and strategies, risks, costs, and performance." These amendments are intended to improve mutual fund disclosure by "providing investors with key information in plain English in a clear and concise format."<sup>6</sup> In 2019, the SEC published Accounting and Disclosure Information recommendations, aiming to improve mutual fund risk disclosures for investors.<sup>7</sup> But despite decades of effort by the SEC and others to improve

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<sup>5</sup> SEC S7-10-95: <https://www.sec.gov/rules/concept/mfrisk.txt>.

<sup>6</sup> SEC S7-28-07: <https://www.sec.gov/rules/final/2009/33-8998.pdf>

<sup>7</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>

fund risk disclosure, the basic question of whether fund disclosure is informative remains understudied. Using textual analysis of fund disclosure statements, we provide empirical evidence about the overall risk coverage, the coverage of top risks, tailored risk disclosure, as well as conciseness of risk disclosure.

Our paper contributes to several strands of literature. First, it adds to the broad mutual fund literature by evaluating an important and understudied topic, the quality of mutual fund disclosure. Unlike most of the academic literature on mutual funds, the variables of interest in this study are qualitative rather than quantitative in nature. Moreover, the main variables reflect the perspective of investors rather than that of the researcher. Note that measuring risk using return data is straightforward for researchers but could be difficult for unsophisticated investors, who rely on information disclosed by funds. As a result, this study yields novel evidence and unique insights on an important question: how well does mutual fund disclosure serve the needs of investors? In a study of the readability of S&P 500 index fund prospectuses, deHaan et al. (2020) find that statutory prospectuses are complex and not easy for investors to understand. SEC had the same concern and required funds to provide summary prospectus, which aims to provide a concise summary of the statutory prospectus to mitigate the lack of readability problem mentioned above. Our study examines this new form of required disclosure. While textual analysis of corporate disclosures is a large literature, its application in mutual fund studies is still limited. Abis and Line (2020) categorize mutual funds based on the strategy descriptions in their prospectuses and show that fund industry caters to distinct investor clienteles. Krakow and Schäfer (2021) use textual uniqueness of fund prospectus within fund families as a proxy for disclosure informativeness.<sup>8</sup>

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<sup>8</sup> Several papers also examine the text of letters to shareholders of mutual funds (Hillert et al., 2014; Du et al., 2020) and media coverage of mutual funds (Kaniel and Parham, 2017).

Our paper complements to these studies by providing a comprehensive list of risks disclosed in the fund prospectus and examining whether funds' risk disclosure accurately reflects their actual investment risks.

This study provides new evidence on the benefits and costs of disclosure. Consistent with the hypothesis that disclosure is more costly for entities with more proprietary information, our empirical findings suggest that low-skill funds tend to offer more informative risk disclosure. Ge and Zheng (1996) examine the costs and benefits of frequent mutual fund portfolio disclosure by looking at both the determinants and the potential effects of portfolio disclosure frequency. Wermers (2001) discusses in detail the potential costs of frequent portfolio disclosure, including dissemination of private information and the possibility of being “front-run.” In another study, Frank, Poterba, Shackelford, and Shoven (2004) document that the cost of revealing private information can be substantial since the after-expense returns of “copycat” funds are statistically indistinguishable from those of the underlying actively managed funds. Agarwal, Mullally, Tang, and Yang (2015) find that mandatory disclosure improves stock liquidity but imposes costs on informed investors. Brown, Goetzmann, Liang, and Schwarz (2008) examine the value of hedge fund disclosure through the SEC Form ADV requirement. Schwarz and Potter (2016) finds that mutual funds' voluntary disclosure of portfolio holdings is likely motivated by convenience and advertising. Evans and Sun (2018) show how mandatory benchmark disclosure affects aggregate risk adjustment by retail investors. Dyakov, Harford, and Qiu (2020) find that increased disclosure requirements could be costly to investors due to agency implications.

Our paper also contributes to a general understanding of the economic interpretations of risk factors and how risk perceptions differ in industry and academia (Chinco et al., 2021). Analyzing fund summary prospectuses, we provide novel evidence on the risk perspectives of the

investment industry. There is a large academic literature on what risk factors help explain fund performance.<sup>9</sup> In this paper, we examine the connection between industry risk perspectives and risk factors documented in the academic literature. In addition, this paper fits into the literature on textual analysis in finance. Prior literature has focused on studying corporate disclosures such as annual reports (e.g., Li, 2008; Loughran and McDonald, 2011; Buehlmaier and Whited, 2018; Lopez-Lira, 2020) and news articles (e.g., Tetlock, 2007; Manela and Moreira, 2017; Fisher, Martineau, and Sheng, 2021). Unlike these studies, we focus on the content and economic meaning of text disclosure in depth and bridge the gap between textual variables and quantitative variables. This approach allows a better understanding of the economic implications of textual disclosure beyond general readability and sentiment.

This paper also contributes to the literature on predicting fund performance. A large literature is devoted to uncovering factors that can forecast fund performance.<sup>10</sup> Many of the predictors are based on signals extracted from fund holdings information.<sup>11</sup> Our finding that informativeness of fund disclosures predicts fund performance is a novel finding based on a stable fund characteristic. This paper also contributes to the literature on understanding mutual funds' risk-taking behavior. Prior researchers have studied how funds shift risk as a way to attract cashflow and win performance tournaments.<sup>12</sup>

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<sup>9</sup> See, for example, Ferson and Schadt (1996); Fama and French (2010); Sheng, Simutin, and Zhang (2020).

<sup>10</sup> See, for example, Brown and Goetzmann (1995); Gruber (1996); Chevalier and Ellison (1999); and Zheng (1999). See Ferson (2010) and Wermers (2011) for a review.

<sup>11</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); Amihud and Goyenko (2013); and Jiang and Zheng (2018).

<sup>12</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 (2007), Huang, Sialm, and Zhang (2011); and Schwarz (2011).



## **2. Data and Background**

### **2.1 Mutual Fund Data**

For mutual fund data, we link the CRSP Survivor-Bias-Free U.S. Mutual Fund Database with the Thomson Reuters Mutual Fund Holdings Database using the MFLINKS table (Wermers, 2000). Following Kacperczyk, Sialm, and Zheng (2008), we apply several filters to form our sample. We first examine fund names and index fund indicators in order to identify active index funds and remove passive funds from the sample. We then 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 and remove others from the sample. We eliminate balanced funds and highly leveraged funds, which hold less than 80 percent or more than 105 percent of their assets in equity. We remove funds with a time-series average size smaller than \$10 million. To estimate factor-adjusted performance for each fund, we require at least three years of return history.

For funds with multiple share classes, we aggregate information from the different classes. Fund-level returns and expense ratios are the class size-weighted averages. Fund size is the aggregate of all share classes. We define fund age as the age of its oldest share class in our sample. Fund flow is calculated as a percentage of beginning total net assets. Finally, we use funds' management company name to identify funds that are in the same fund family and calculate fund family size as the sum of total assets of its affiliated funds.

### **2.2 Background on Fund Summary Prospectus**

The SEC requires funds to provide proper disclosure to investors under the Investment Company Act of 1940. Specifically, each fund must provide this information in its prospectus.

There are two kinds of prospectuses: (1) the statutory prospectus and (2) the summary prospectus. The statutory prospectus is the traditional, long-form prospectus with which most mutual fund investors are familiar. Starting from March 31, 2009, the SEC requires funds to also provide a summary prospectus, which is only a few pages long and contains key information about a fund. This new requirement is motivated by the concern of investor advocates, representatives of the fund industry, and others that the statutory fund prospectus is too long and complicated, thus difficult for investors to understand. 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>13</sup>

To implement the new disclosure framework, the SEC adopted amendments to Form N-1A that require every prospectus to include a summary section at the front of the prospectus consisting of key information about the fund, including investment objectives and strategies, risks, costs, and performance. In this study, we focus on the disclosure of risks in the summary prospectus.

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

To get information about a fund’s risk disclosure, we use the summary prospectuses available from the SEC EDGAR website.<sup>14</sup> Funds talk about their risk exposure in various ways. The Appendix presents examples of the risk discussion in two funds’ summary prospectus. Some funds disclose many risks with detailed 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

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<sup>13</sup> The full text of this rule can be found here: <https://www.sec.gov/rules/final/2009/33-8998.pdf>.

<sup>14</sup> The risk disclosure section title may differ from fund to fund. Using various titles to locate fund’s risk disclosures, we are able to capture the information for almost all funds.

two examples is the type of risks the funds are exposed to. 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, which we will explore in the rest of this paper.

To capture funds' disclosures about their risk exposure, we extract the phrases that contain the key word "risk" or "risks." 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. For example, "small cap risk" encompasses 33 similar phrases, including "smaller company risk," "small company risk," "small capitalization risk," and so on. For funds that make adjustments to their summary prospectus, we combine such disclosures with the main one. Finally, we use the Central Index Key (CIK) of the SEC to match the textual data with the CRSP fund data.

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, 2021). This method is particularly useful when researchers have good prior knowledge about what they are looking for and the list of words is straightforward. Other method such as unsupervised machine learning method Latent Dirichlet Allocation (LDA) is useful when there is no clear prior about what is looking for from texts. In our paper, we have a clear target and search for words related to risks. Therefore, the dictionary-based method is more proper.

After merging the data on SEC Edgar and the CRSP, we are able to download the summary prospectuses for 1,782 unique funds. Funds with no disclosures after the data cleaning are excluded. Our final sample contains 1,620 funds and spans the period from 2009 to 2016. Panel A of Table 1 reports fund-level summary statistics for our final sample, which is comparable to the summary statistics in the literature.

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

The academic literature has identified hundreds of return/risk factors, leading to a so-called “zoo” of equity factors (Cochrane, 2011). Which factors are deemed important by the investment industry? Which factors appear in funds’ disclosure to investors? In this section, we report the disclosed risks by mutual funds, their relative frequency, and the time trend.

Once we identify the disclosed risks in the summary prospectus for each fund in each period, we rank the risks based on the average number of funds that disclose the corresponding risk. The cleaning of textual data leaves a total of 70 risks disclosed by the funds in our sample. Table 2 reports the top 20 frequently disclosed risks. The most frequently disclosed fund risk is “active investment risk,” which is not surprising given our sample choice of actively managed funds. The second frequently disclosed risk is “market risk,” which is also not surprising given that all the funds in our sample are subject to market risk. We also see disclosure of some less common types of risks, such as derivatives risk. To better visualize the top 20 risks, we plot them as a word cloud in Figure 1, where higher-ranked risks are plotted in bigger fonts.

In general, we see three broad categories of risk. The first type is portfolio-specific risk, for example, active investment risk, portfolio turnover risk, and non-diversification risk. The second type is systematic risk, such as market risk, interest rate risk, and liquidity risk. The third type, which is the largest category, is asset class risk, including foreign investment risk, small cap risk, value investing risk, and derivatives risk. These frequently disclosed risks are also well-known risk factors in the academic literature.

Next, we study the correspondence between fund-disclosed risks and academic risk factors. For each disclosed risk, we propose a corresponding risk factor that makes the most economic sense to the best of our knowledge. Among the 70 risks, we were able to map 50 of them, as reported in Table 3. We use these subjectively mapped risk factors as proxies for the returns of the disclosed risk in one of our specifications to estimate risk coverage. Although we call this “subjective” mapping, it is based on common knowledge in the finance literature. For example, we match market risk with market beta.

To understand the meaning of disclosed risks, we use empirical estimation to identify the most relevant risk factors among all empirical measures in Appendix B. Before the estimation, we further narrow the risk universe by excluding the risks disclosed by fewer than 30 funds per quarter. The most common risk, active investment risk, is disclosed by 651.09 funds on average per quarter. We then map the disclosed risks to the most closely related academic risk factors. Specifically, we regress the return difference of the disclosed risk, which is the difference between the return of a portfolio of all funds that disclosed this specific risk and the return of a portfolio of all funds that did not disclose this risk, on the subjective risk factors. For fund-specific risk factors, such as turnover, return volatility, Index Concentration Index (ICI) (Kacperczyk, Sialm, and Zheng, 2005), active share, and idiosyncratic risk, we construct the factor returns as the equally weighted average return of the top 30% of funds minus the equally weighted average return of the bottom 30% of funds, sorted on each of these variables. We then map each disclosed risk to the most significant risk factors. Table 3 reports the resulting mapping with the top three significant factors (if any). The outcomes are reasonably consistent with our economic intuition. For example, equity risk is mapped to stock market beta; growth-investing-risk is mapped to the Fama-French HML factor. We see that some of the fund-level factors—for example, active share and industry concentration

index—are mapped to a number of disclosed risks, indicating that these fund-level factors serve as a proxy for different types of risks. Size beta is also mapped to a number of different disclosed risks, suggesting that it serves as a proxy for different disclosed risks. Overall, our evidence suggests that there is a good correspondence between the industry and academic perspectives on risk.

The heat map in Figure 2 allows us to visualize the relative frequencies and the changes over time. We observe that the relative frequencies of the disclosed risks remain quite stable over time. A few disclosed risks, such as foreign investment and liquidity, are disclosed by more funds in recent years. Over time, we see an increase in the number of risks being disclosed.

## **4. How Informative Are Funds' Risk Disclosures?**

In this section, we examine several properties of the risks disclosed by mutual funds. Motivated by the guidelines of the SEC, we construct three measures to assess the quality of risk disclosures in a fund's summary prospectus: overall risk coverage ratio (RCR), risk coverage ratio of the top three risks, and conciseness (overdisclosure).

### **4.1 Risk Coverage Ratio**

To assess the quality of risk disclosure in a fund's summary prospectus, a natural question is whether the disclosure reflects the fund's actual risk—in other words, whether mutual funds walk the talk. Although all funds are required to disclose risks properly, funds may have various reasons to hide their risk taking. 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).

We first construct a measure that examines the coverage of all disclosed risks. Because investors need information to assess sources of future risk, we examine 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 related risk factors. The higher the explained proportion, the greater the coverage of the overall disclosure. Our general method is to regress future fund returns on the return proxy of disclosed risks and construct our main measures with R-squared from the regression. Specifically, for each fund, we run the following regression:

$$FundReturn_t = \alpha + \beta_1 \times RiskFactor_{1t} + \dots + \beta_k \times RiskFactor_{kt} + e_t \quad (1)$$

where  $RiskFactor_{1t}$  to  $RiskFactor_{kt}$  are  $k$  risk factors disclosed by the fund at time  $t - 1$ . The R-squared from this regression measures the fraction of future returns that can be explained by the returns of disclosed risks. We call this  $R^2\_Disclose_i(r_t, d_{t-1})$ . We also run a regression with all risk factors that are disclosed by all funds, not just one fund.

$$FundReturn_t = \alpha + \beta_1 \times RiskFactor_{1t} + \dots + \beta_n \times RiskFactor_{nt} + e_t \quad (2)$$

where  $RiskFactor_{1t}$  to  $RiskFactor_{nt}$  are  $n$  risk factors disclosed by all funds during the whole sample period.

The R-squared from this regression captures the fraction of variations in returns that can be explained by all risk factors that are disclosed in the mutual fund domain. We call this

$R^2_{All_i}(r_t, d)$ . It establishes a base case (upper bound) for the risk coverage since we include all disclosed risks by all funds.

We estimate our main measure, Risk Coverage Ratio (RCR) as follows:

$$RCR_i(r_t, d_{t-1}) = \frac{R^2_{Disclose_i}(r_t, d_{t-1})}{R^2_{All_i}(r_t, d)} \quad (3)$$

RCR captures the comprehensiveness of risk disclosure because it measures the explanatory power of disclosed risks in a fund relative to the explanatory power of all risks by all funds. Benchmarking against  $R^2_{All_i}(r_t, d)$  allows a comparison across funds with different levels of risk. In general, low-risk funds have low  $R^2_{Disclose_i}(r_t, d_{t-1})$ , but they do not necessarily underdisclose risks. Benchmarking  $R^2_{Disclose_i}(r_t, d_{t-1})$  against  $R^2_{All_i}(r_t, d)$  mitigates the problem because  $R^2_{All_i}(r_t, d)$  is also low for low-risk funds. A high RCR suggests that the risk coverage by the fund's disclosure is higher than the hypothetical risk coverage when we include all disclosed risks by all funds.

One challenge in the above procedure is to estimate the returns of disclosed risks. We construct a proxy for risk returns by using funds' actual returns. Specifically, for each fund in each quarter, the return of disclosed risk is constructed as the return of the portfolio of all other funds that disclose this risk minus the return of the portfolio of all funds that do not disclose this risk. The portfolio return is the equally weighted average return of individual funds in the portfolio. We exclude the observations if the disclosing portfolio contains fewer than five funds. Finally, since our main measures are forward-looking, for the disclosure at time  $t$  we estimate the returns of disclosed risks using the fund's daily returns in quarter  $t + 1$ .



Table 4 shows the summary statistics for the risk coverage ratio and other disclosure measures. The average  $R^2_{Disclose_i}(r_t, d_{t-1})$  is 79 percent. The average RCR is about 80 percent. These numbers suggest that funds' risk disclosure explains a substantial proportion of future return variations. However, we also observe large cross-sectional variations: the cross-sectional standard deviation is 19 percent; the minimum is 11 percent, and the maximum is 99 percent. We further study the determinants and implications of the cross-sectional differences in section 5.

As a robustness check, we also estimate RCR using the subjective mapped factors as proxies for returns of disclosed risks. To the extent that the mapping is imperfect and we misrepresent the returns of the disclosed risks, we would likely underestimate the explanatory power of the disclosed risks. The resulting RCR is similar to our earlier estimates, with a mean RCR of 86 percent and a standard deviation of 20 percent.

## 4.2 Top Risks

Not all risks disclosed in the summary prospectus are equally important. The SEC suggests that funds order the risks by importance.<sup>15</sup> In other words, the risks listed first are more important than the risks further down the list. To test whether funds disclose important risks first, we re-estimate RCR by focusing on the first three risks.

Specifically, we extract the first three risks disclosed by each fund in its summary prospectus and calculate the RCR measures using the same method as previously. We call this RCR Top. Table 4 shows that RCR Top is 67 percent on average, compared to 80 percent for all

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<sup>15</sup> See the document here [https://www.sec.gov/investment/accounting-and-disclosure-information/principal-risks/adi-2019-08-improving-principal-risks-disclosure#\\_ftn1](https://www.sec.gov/investment/accounting-and-disclosure-information/principal-risks/adi-2019-08-improving-principal-risks-disclosure#_ftn1)

risks. Overall, the top three disclosed risks are indeed important and explain a large fraction of fund returns.

### 4.3 Overdisclosure

While it is important to disclose all risks that funds are exposed to, one question is whether funds may also disclose risks that they are *not* exposed to. 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 not exposed to, 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, high-skill funds may want to disclose many risks to hide their true exposure. We examine whether funds overdisclose risks in their summary prospectus.

Specifically, we run regression equation (1) with all disclosed risks. We count the number of risks that are statistically significant (with  $p\text{-value} \leq 0.05$ ). 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 does not significantly affect the fund's returns. Table 4 shows that, on average, 48 percent of risks are not statistically significant. This finding suggests that although funds' disclosures appear comprehensive, they also overdisclose, suggesting that the SEC may require funds to disclose relevant information only.

In addition to these measures, we construct two other measures of risk disclosure. First, we count the number of disclosed risks. Table 4 Panel A shows that an average fund discloses about seven risks. There is large cross-fund dispersion in the number of disclosed risks. While a fund at 25th percentile discloses 4 risks, a fund at 75th percentile discloses about 9 risks. Second,

we examine the change in the number of disclosed risks over time for each fund. On average, the number of risks disclosed per fund increases by about 0.04 per quarter. The 25th percentile and the 75th percentile are both zero, implying that most funds do not change the number of disclosed risks over time.

Overall, we find that the risks a fund discloses in its summary prospectus can explain a large proportion of variations in the fund's future returns. Top risks are important as they explain a disproportionately high fraction of fund returns. However, we also find that funds overdisclose risks since half of the disclosed risks are not useful in explaining the variations in fund returns.

## **5. Discussion**

Once we construct measures to capture the coverage and conciseness of funds' risk disclosures, we examine how these measures relate to fund characteristics, risk taking, and performance.

### **5.1 Determinants of Risk Disclosure**

Given that we observe substantial cross-fund variation in the quality of risk disclosure, we now examine how disclosure quality relates to fund characteristics. We use Fama-MacBeth regression where the dependent variables are RCR, RCR Top, log number of risks, overdisclosure, and whether a fund disclosed unique risks. Table 5 Column 1 shows that younger funds, larger funds, riskier funds, and funds with higher expense ratios tend to have higher risk coverage ratios. Interestingly, funds with worse performance also have high risk coverage ratios. Why do these funds tend to have higher risk coverage? One possible explanation is that disclosure cost is lower for managers with less proprietary information. Fund managers who possess proprietary

information may be reluctant to reveal their edge, which is common in the hedge fund industry. Another possible explanation is that funds with worse performance disclose more risks as a way of explaining their inferior performance.<sup>16</sup> In other words, they blame these risks for their underperformance. Table 5 Column 2 shows that riskier funds tend to have higher risk coverage ratios as constructed by the top three risks.

We also look at other features of risk disclosures. Table 5 Column 3 shows that funds in smaller fund families, larger funds, funds with higher expense ratios, less risky funds, and younger funds tend to overdisclose risks. Table 5 Column 4 shows that larger funds, funds with higher expense ratios, younger funds, and funds with worse past performance and higher flow tend to disclose a larger number of risks. We also look at what types of funds are more likely to disclose risks that are unique. We define a risk as unique if it is in the bottom 5% of disclosures in a period across all funds. The dependent variable in Table 5 Column 5 is a dummy variable defined at the fund level that takes a value of one if the fund discloses at least one unique risk as defined above, and zero otherwise. The result suggests that funds in smaller families, funds with higher expense ratios, riskier funds, younger funds, and funds with worse past performance are more likely to disclose unique risks in their summary prospectus. This finding is consistent with the economic intuition that smaller and younger funds are more likely to be exposed some unique risks.

## **5.2. Risk Disclosure and Future Risk Taking and Performance**

Is the quality of funds' risk disclosure related to their future risk-taking behavior and performance? In this subsection, we look at two important dimensions of mutual funds: risk-taking

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<sup>16</sup> Barth, Joenvaara, Kauppila, and Wermers (2020) also find that hedge funds with worse performance tend to disclose more.

behavior and performance. We use the standard deviation of a fund's return to proxy its risk. To test this idea, we regress the standard deviation of a fund's return in the next period on the several textual measures we discussed above, controlling for size, fund family size, expense ratios, age, flow, and performance. Table 6 shows that funds with higher risk coverage ratios for all disclosed risks (Column 1) and for the top three disclosed risks (Column 3) exhibit higher risk in the future; funds with more overdisclosure exhibit lower risk in the future (Column 2). The results in Column 2 suggest that funds with more comprehensive risk disclosures take on more risk in the future. The results in Column 4 are consistent with the hypothesis that a fund manager who overdiscloses risks is more conservative and assumes less investment risk. Column 5 shows that funds that disclose unique risks tend to take more risks.

How does risk coverage relate to future fund performance? We examine this question by looking at the association between funds' current disclosures and their performance in the next year, measured by 4-factor alpha (Fama and French, 1992; Carhart, 1996). Table 7 shows that funds with higher risk coverage ratios perform worse in the future (Column 1). Similarly, funds with more overdisclosure tend to underperform in the future (Column 2). Moreover, funds that disclose more risks tend to perform poorly in the subsequent year (Column 5). These findings suggest that risk disclosure quality can predict fund performance. A one standard deviation increase in RCR is associated with a 20-basis point decrease in annualized alpha.

### **5.3. Funds' Risk Disclosures and Fund Flow**

Our findings show that fund risk coverage ratio is generally high and predicts future risks and performance. A natural question is whether investors respond to these measures of disclosure quality. This question is particularly interesting because the SEC's primary goal in requiring funds

to provide a summary prospectus is to give investors better access to this type of information. To test whether this goal is achieved, we examine whether funds with a high risk coverage ratio attract more funding from investors, measured by flow.<sup>17</sup> Table 8 shows the results of this test. We find that fund flows are not related to a fund's past risk coverage ratio. This is not a surprising result because the informativeness measure is not easily observed by investors. This finding does not mean that investors do not pay attention to risk disclosures per se; rather it suggests that they do not react to the coverage of risk disclosures. Interestingly, the result in Column 5 implies that funds that disclose unique risks attract less flow in the subsequent quarter. When investors notice uncommon risks disclosed in a fund's summary prospectus, they may decide to avoid that fund in order to minimize their risk. This is consistent with the theory in Goldstein and Yang (2019) that disclosure makes decision maker better off only when she already knows well about the variables in the disclosures.

## 6. 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 content of risk disclosures in detail, 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

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<sup>17</sup> Flow is calculated as the new money from investors in each quarter as a percentage of the total net assets at the beginning of that quarter (see Zheng, 1999).

risk coverage, top risk coverage, and the extent of overdisclosure. While we find that, on average, the disclosed risks can explain a large percentage of variations in future fund returns; we also find that, on average, funds overdisclose by about 50 percent.

In addition, we observe large cross-fund variation in the informativeness measure. We find that younger funds, larger funds, riskier funds, and funds with higher expense ratios tend to make more comprehensive risk disclosures. We also find that higher risk coverage in funds' disclosures is associated with higher risk and inferior performance in the future.

Our findings have significant regulatory and legal implications. Whether fund risk disclosure is informative to investors also depends on investors' knowledge and understanding of the common risk factors. Financial education about risk factors would help investors understand risk disclosure and make better-informed investment decisions.

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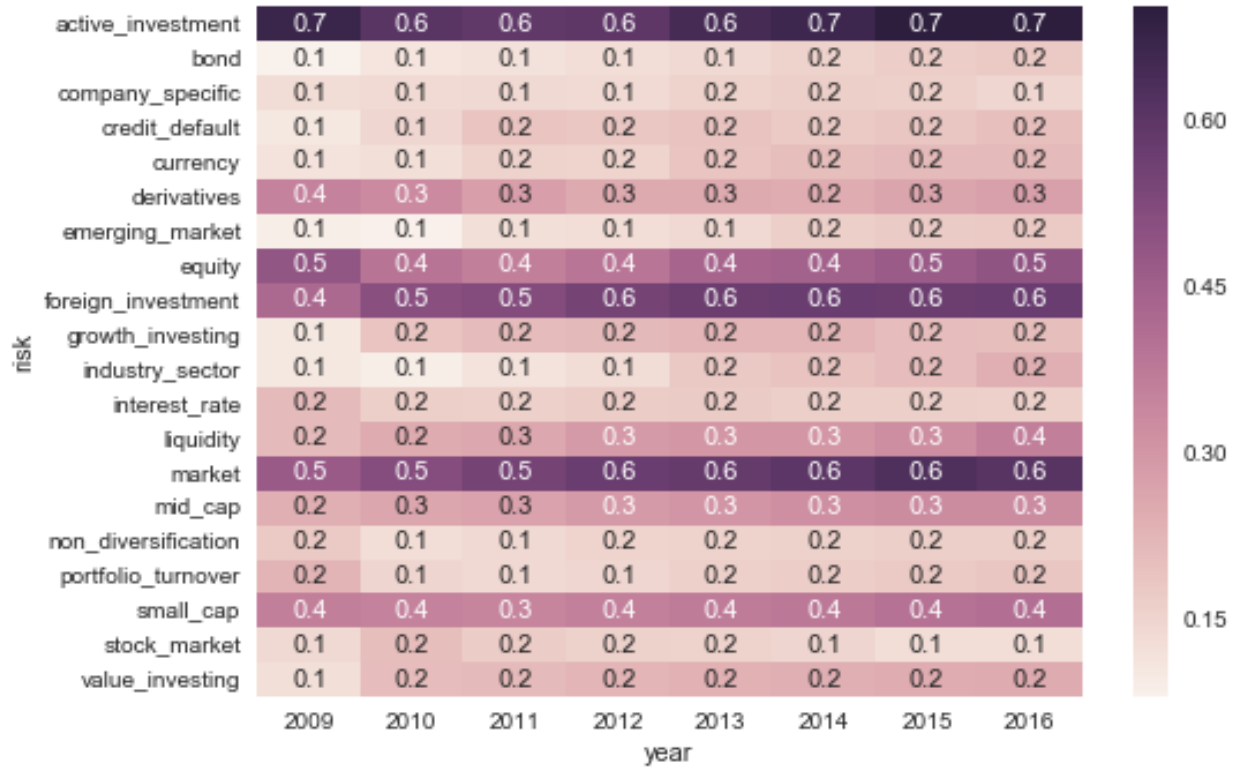
**Figure 1. Word Cloud of the Top 20 Risks Disclosed by Actively Managed Mutual Funds**

This table presents a word cloud of the top 20 risks (Table 2) from 2009 to 2016 as listed in funds' prospectuses. The risks in larger fonts show up more frequently in the prospectuses.



### Figure 2. Heat Map of the Top 20 Risks Disclosed by Actively Managed Mutual Funds

This figure presents a heat map of the top 20 risks (Table 2) from 2009 to 2016. 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 for each year.



**Table 1: Fund Characteristics**

This table reports the summary statistics for the fund characteristics used in 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 2016. The funds are selected using methods in the literature. Panel A reports the statistics for individual variables. Alpha is average quarterly 4-factor alpha within a year. family size is total net assets of a family, in millions of dollars. Size is quarter-end total net assets. Activeshare measures the deviation in holdings from a fund's benchmark. ICI captures the concentration of holdings within industries. Volatility is the standard deviation of a fund's daily return within a quarter. Panel B reports the correlation between each of the two variables. All the variables are winsorized at the 1% level.

Panel A: Summary Statistics

Variable	Mean	Min	P25	Median	P75	Max	StdDev
Alpha	-0.0034	-0.0356	-0.0097	-0.0031	0.0029	0.0263	0.0109
Expense ratio	0.0109	0.0013	0.0089	0.0109	0.0130	0.0216	0.0038
Flow	0.0022	-0.3415	-0.0440	-0.0168	0.0191	0.7578	0.1340
Age	183.3613	2.6207	88.3966	160.9483	237.4828	618.0000	134.2695
Family size	80564.22	7.96	3604.99	20926.43	58368.02	1000182	162422
Size	1867.50	0.68	119.02	442.56	1418.99	88164.19	5565.76
Activeshare	0.7983	0.2453	0.7162	0.8275	0.9143	0.9932	0.1484
Turnover	0.7771	0.0317	0.2946	0.5370	0.9153	5.6640	0.8756
ICI	0.0421	0.0012	0.0185	0.0326	0.0506	0.2932	0.0433
Volatility	0.0099	0.0017	0.0089	0.0098	0.0111	0.0188	0.0025

Panel B: Correlation

Variable	alpha	activeshare	turnover	ICI	size	family size	flow	expense ratio	age	volatility
Alpha	1.00									
Activeshare	0.00	1.00								
Turnover	-0.05	-0.01	1.00							
ICI	-0.01	0.34	0.00	1.00						
Size	0.04	-0.09	-0.11	0.00	1.00					
Family size	0.05	-0.16	-0.07	-0.05	0.30	1.00				
Flow	0.21	0.01	0.03	0.04	-0.01	0.01	1.00			
Expense ratio	-0.07	0.32	0.29	0.12	-0.26	-0.36	0.00	1.00		
Age	-0.01	-0.07	-0.17	-0.04	0.29	0.00	-0.15	-0.12	1.00	
Volatility	-0.03	0.09	-0.07	0.05	-0.12	0.00	-0.06	0.13	0.05	1.00

**Table 2: Top 20 Common Risks**

This table reports the top 20 most common risks disclosed by mutual funds in their prospectuses. The column “Disclosed Risk” lists the risks. The column “No. of disclosing funds” reports the average number of funds that disclose the the risk per quarter in the sample.

Disclosed Risk	No. of disclosing funds
active investment risk	651.09
market risk	587.16
foreign investment risk	555.88
equity risk	432.56
small cap risk	375.31
mid cap risk	304.75
liquidity risk	302.25
derivatives risk	267.13
value investing risk	233.09
growth investing risk	212.53
currency risk	185.00
credit default risk	184.13
industry sector risk	173.81
interest rate risk	166.66
portfolio turnover risk	164.56
non diversification risk	154.66
stock market risk	152.06
company specific risk	150.69
bond risk	147.41
emerging market risk	147.25

**Table 3: Mapping between Disclosed Risks and Empirical Measures**

This table reports the top three factor loadings mapped to 40 risks disclosed by mutual funds. The column “Disclosed Risk” lists all the risks studied in this paper. To find the mapping, for each risk we regress the difference in returns of funds that disclose such risk and the returns of non-disclosing funds on the returns of all the proposed factors. For fund-specific risks, such as active share, ICI, turnover, volatility, and idiosyncratic risks, the factor returns are constructed as the equally weighted average return of the top 30% of funds minus the equally weighted average return of the bottom 30% of funds, ranked on each of these variables. Columns “beta1” to “beta3” report the three most significant loadings for these proposed factors, as well as the corresponding *t* statistics. For the risks with fewer than three significant loadings, only significant ones are reported.

	<b>Disclosed Risk</b>	<b>Beta 1</b>	<b>Beta 2</b>	<b>Beta 3</b>
1	active investment risk	turnover	profitability beta	beta of loan outstanding (flow of fund data)
2	bond risk	market beta	beta of bond index	size beta
3	company specific risk	market beta	profitability beta	beta of S&P 500 trading volume
4	credit/default/counterparty risk	turnover	active share	investment beta
5	currency risk	market beta	active share	investment beta
6	depository receipts risk	ICI	turnover	beta of bond index
7	derivatives risk	turnover	market beta	investment beta
8	economic risk	idiosyncratic risk	active share	DEF
9	emerging market risk	market beta	beta of Asia, emerging, and Euro markets	ICI
10	equity risk	turnover	investment beta	market beta
11	event risk	active share	market beta	ICI
12	foreign investment risk	size beta	profitability beta	market beta
13	growth investing risk	value beta	beta of bond index	turnover
14	index/passive investing risk	active share	turnover	beta of loan outstanding (flow of fund data)
15	industry/sector risk	ICI	TERM beta in FF(1993)	profitability beta
16	interest rate risk	market beta	turnover	active share
17	invest vehicle risk	market beta	ICI	beta of Indices of currencies
18	investment risk	interest	idiosyncratic risk	active share
19	ipo/seo risk	size beta	ICI	turnover
20	large cap risk	size beta	active share	ICI
21	leverage risk	ICI	idiosyncratic risk	investment beta
22	liquidity risk	turnover	investment beta	
23	manager/advisor risk	volatility		
24	market capitalization risk	beta of Indices of currencies	volatility	ICI



25	market risk	beta of ABS index	beta of loan outstanding (flow of fund data)	
26	market trading risk	active share	beta of loan outstanding (flow of fund data)	turnover
27	mid cap risk	size beta	active share	ICI
28	non diversification risk	active share	beta of Asia, emerging, and Euro markets	turnover
29	political regulatory risk	beta of Indices of currencies	beta of S&P 500 trading volume	beta of VIX
30	portfolio turnover risk	turnover	investment beta	
31	prepayment/extension/call	market beta	active share	investment beta
32	real estate investing risk	beta of bond index	value beta	beta of ABS index
33	securities lending risk	beta of bond index	investment beta	
34	short position risk	market beta	size beta	ICI
35	small cap risk	size beta	active share	investment beta
36	stock market risk	active share	beta of ABS index	DEF
37	strategy style risk	turnover		
38	valuation risk	size beta	ICI	beta of VIX
39	value investing risk	active share	value beta	turnover
40	volatility risk	beta of Indices of currencies	beta of Asia, emerging, and Euro markets	

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**Table 4: Main Measures of Risk Disclosure**

This table reports the summary statistics for the main measures used in this paper.  $R^2\_Disclose$  is the R-squared from the regression of fund return on the disclosed risk factor return. RCR is the ratio of  $R^2\_Disclose$  over  $R^2\_All$ . Overdisclosure is the ratio of the number of insignificant risk factors to the number of all risk factors. RCR Top is defined the same as RCR, but the estimation focuses on the first three disclosed risks, based on their order in the summary prospectus. No. of risks is the number of risks disclosed by a fund. Change in no. of risks is the change in number of risks disclosed by a fund in two consecutive quarters. Panel A reports the time-series average of the cross-sectional statistics. Panel B reports the time-series average correlation between each two variables. All the variables are winsorized at the 1% level.

Panel A: Summary Statistics

Variable	Mean	Min	P25	Median	P75	Max	StdDev
$R^2\_Disclose$	0.7870	0.0915	0.7234	0.8552	0.9214	0.9829	0.1961
RCR	0.8012	0.1053	0.7399	0.8708	0.9328	0.9879	0.1929
Overdisclosure	0.4810	0.0000	0.3207	0.4948	0.6564	0.9951	0.2535
RCR Top	0.6656	0.0645	0.5613	0.7179	0.8182	0.9428	0.2058
No. of risks	6.8386	1.0000	4.0000	6.4310	8.8276	23.6552	3.7935
Change in no. of risks	0.0399	-6.2414	0.0000	0.0000	0.0000	6.6207	0.6285

Panel B: Correlation

Variable	$R^2\_Disclose$	RCR	Overdisclosure	RCR Top	No. of risks	Change in no. of risks
$R^2\_Disclose$	1.0000					
RCR	0.9953	1.0000				
Overdisclosure	0.0299	0.0605	1.0000			
RCR Top	0.7259	0.7154	-0.0898	1.0000		
No. of risks	0.5215	0.5506	0.5105	0.2093	1.0000	
Change in no. of risks	0.0487	0.0510	0.0531	0.0135	0.1077	1.0000

**Table 5: Determinants of Risk Disclosure**

This table reports the regression results of R-squared measures and other disclosure measures on lagged fund characteristics. Log no. of risks is the logged number of risks disclosed by a fund. Unique fund is a dummy variable that takes value of one if a fund disclosed a risk that has a frequency lower than 5% in a quarter, and zero otherwise. Dependent variables are calculated in quarter  $t$ . Log family size, log size, expense ratio, and log age are the value at the end of quarter  $t - 1$ . Volatility is the standard deviation of a fund's daily return in quarter  $t - 1$ . Flow is the percentage flow in quarter  $t - 1$ . Alpha is average quarterly 4-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. All the variables are winsorized at the 1% level. The superscripts\*, \*\*, and \*\*\* indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1) RCR	(2) RCR Top	(3) Overdisclosure	(4) log no. of risks	(5) Unique fund
Log family size	0.001 (0.48)	0.004* (1.92)	-0.003*** (-3.25)	0.008* (1.74)	-0.002* (-1.92)
Log size	0.006*** (6.33)	0.001 (0.95)	0.003** (2.17)	0.019*** (5.76)	-0.001 (-0.24)
Expense ratio	1.902*** (2.81)	-0.313 (-0.42)	7.250*** (16.44)	18.585*** (28.40)	2.634*** (3.51)
Volatility	21.459*** (11.91)	23.595*** (9.41)	-19.778*** (-19.91)	0.697 (0.38)	7.001*** (2.82)
Flow	0.036** (2.67)	0.005 (0.33)	0.017 (1.25)	0.146*** (3.59)	0.013 (0.51)
Log age	-0.009** (-2.07)	0.008* (2.02)	-0.032*** (-4.80)	-0.100*** (-8.64)	-0.014*** (-4.45)
Alpha	-0.627* (-2.00)	-0.020 (-0.07)	-0.225 (-0.64)	-3.003** (-2.61)	-0.739*** (-3.22)
Constant	0.586*** (15.75)	0.370*** (8.04)	0.758*** (16.72)	1.848*** (15.49)	0.053* (1.82)
N	25384	25384	25384	25392	25392
Avg. R-sq	0.0811	0.0875	0.0612	0.0342	0.0353

**Table 6: 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. Next volatility is the standard deviation of a fund's daily return in quarter  $t + 1$ . Log no. of risks is the logged number of risks disclosed by a fund. Unique fund is a dummy variable that takes a value of one if a fund discloses a risk that has a frequency lower than 5% in a quarter, and zero otherwise. Independent variables are calculated in quarter  $t$ . Alpha1 is 4-factor alpha in quarter  $t$ . 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.

	(1) next volatility	(2) next volatility	(3) next volatility	(4) next volatility	(5) next volatility
RCR	0.279*** (4.53)				
Overdisclosure		-0.138*** (-8.52)			
RCR Top			0.288*** (4.76)		
Log no. of risks				-0.005* (-1.91)	
Unique fund					0.038** (2.54)
Log family size	0.011*** (5.97)	0.011*** (5.82)	0.010*** (4.99)	0.012*** (5.97)	0.012*** (6.12)
Log size	-0.026*** (-5.84)	-0.024*** (-5.76)	-0.025*** (-5.68)	-0.026*** (-5.68)	-0.026*** (-5.58)
Expense ratio	7.317*** (6.94)	8.624*** (7.68)	7.826*** (7.70)	7.869*** (6.43)	7.593*** (6.40)
Log age	0.059*** (10.70)	0.054*** (9.90)	0.055*** (10.14)	0.060*** (10.00)	0.060*** (10.05)
Flow	-0.023 (-0.71)	-0.016 (-0.47)	-0.022 (-0.62)	-0.016 (-0.47)	-0.016 (-0.47)
Alpha1	0.109 (0.44)	0.087 (0.31)	0.098 (0.37)	0.040 (0.16)	0.069 (0.27)
Turnover	-0.018** (-2.49)	-0.020*** (-2.88)	-0.019** (-2.58)	-0.023*** (-3.36)	-0.024*** (-3.42)
Constant	0.406*** (11.67)	0.705*** (8.78)	0.450*** (12.97)	0.636*** (8.30)	0.625*** (8.16)
N	25192	25192	25192	25192	25192
Avg. R-sq	0.1482	0.1281	0.1599	0.1066	0.1098

**Table 7: Risk Disclosure and Fund Future Performance**

This table reports the results of regression of funds' future performance on current R-squared measures and disclosures, controlling for fund characteristics. Future performance is measured as 4-factor alpha in the year subsequent to the risk disclosure. Overdisclosure is the ratio of the number of insignificant risk factors to the number of all risk factors. Unique fund is a dummy variable that takes a value of one if a fund discloses a risk that has a frequency lower than 5% in a quarter, and zero otherwise. Log no. of risks is the logged number of risks disclosed by a fund. 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.

	(1)	(2)	(3)	(4)	(5)
	annualized alpha	annualized alpha	annualized alpha	annualized alpha	annualized alpha
RCR	-0.012*** (-4.40)				
RCR Top		-0.001 (-0.32)			
Overdisclosure			-0.008*** (-4.62)		
Unique fund				-0.007 (-1.61)	
Log no. of risks					-0.005*** (-6.53)
Log family size	0.001 (1.68)	0.001 (1.66)	0.001 (1.51)	0.001 (1.56)	0.001 (1.70)
Log size	-0.000 (-0.20)	-0.000 (-0.28)	-0.000 (-0.16)	-0.000 (-0.20)	-0.000 (-0.06)
Expense ratio	-0.280 (-1.34)	-0.294 (-1.44)	-0.229 (-1.07)	-0.296 (-1.40)	-0.193 (-0.89)
Volatility	-0.342 (-0.61)	-0.556 (-0.98)	-0.781 (-1.39)	-0.638 (-1.14)	-0.637 (-1.17)
Log age	0.000 (0.28)	0.000 (0.34)	0.000 (0.16)	0.000 (0.25)	-0.000 (-0.08)
Flow	-0.000 (-0.07)	-0.000 (-0.11)	-0.001 (-0.24)	-0.001 (-0.22)	-0.001 (-0.22)
Turnover	-0.003** (-2.17)	-0.002** (-2.09)	-0.002* (-1.95)	-0.002* (-1.99)	-0.002* (-1.96)
Constant	-0.005 (-0.74)	-0.012 (-1.68)	-0.007 (-0.89)	-0.011 (-1.50)	-0.003 (-0.39)
N	25067	25067	25067	25067	25067
Avg. R-sq	0.0464	0.0453	0.0448	0.0459	0.0487

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

This table reports the results of regression of funds' future flow on current R-squared measures and disclosures, controlling for fund characteristics. Next flow is percentage flow in the quarter subsequent to the disclosure. Log no. of risks is the logged number of risks disclosed by a fund. Unique fund is a dummy variable that takes a value of one if a fund discloses a risk that has a frequency lower than 5% in a quarter, and zero otherwise. 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.

	(1)	(2)	(3)	(4)	(5)
	next flow	next flow	next flow	next flow	next flow
RCR	0.011 (1.48)				
Overdisclosure		-0.003 (-1.02)			
RCR Top			0.008 (1.37)		
Log no. of risks				0.001 (1.02)	
Unique fund					-0.008* (-1.99)
Log family size	0.001 (0.74)	0.001 (0.80)	0.001 (0.76)	0.001 (0.73)	0.001 (0.80)
Log size	-0.000 (-0.31)	-0.000 (-0.15)	-0.000 (-0.27)	-0.000 (-0.28)	-0.000 (-0.19)
Expense ratio	-0.405 (-1.29)	-0.404 (-1.30)	-0.424 (-1.34)	-0.446 (-1.36)	-0.404 (-1.24)
Log age	-0.015*** (-8.34)	-0.015*** (-8.74)	-0.015*** (-8.24)	-0.015*** (-8.45)	-0.015*** (-8.47)
Volatility	-0.497 (-0.79)	-0.284 (-0.51)	-0.381 (-0.61)	-0.245 (-0.44)	-0.203 (-0.35)
Alpha1	0.766*** (11.26)	0.773*** (12.01)	0.772*** (11.93)	0.766*** (11.21)	0.766*** (11.79)
Turnover	-0.003 (-1.66)	-0.003* (-1.79)	-0.003* (-1.71)	-0.003* (-1.83)	-0.003* (-1.76)
Constant	0.067*** (3.85)	0.076*** (3.98)	0.069*** (3.77)	0.073*** (3.73)	0.074*** (3.72)
N	25183	25183	25183	25183	25183
Avg. R-sq	0.0583	0.0573	0.0580	0.0569	0.0578

## Appendix 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.

The Shares offered by this Prospectus are not deposits or obligations of any bank, are not endorsed or guaranteed by any bank and are not insured or guaranteed by the U.S. government, the Federal Deposit Insurance Corporation, the Federal Reserve Board or any other government agency.

## Appendix B. List of empirical measures used in mapping

Empirical measures	
Active share	Market beta
Beta of ABS index	Beta of squared excess market return
Beta of loan outstanding (flow of fund data)	Beta of Trading volume of SP500
Beta of bond index	Size factor
Market beta	Momentum factor
Beta of commodity index-CBOE	EPU from Nick Bloom
Idiosyncratic risk	Fund turnover
Betas of Asia, emerging, and Euro markets	Beta of bond index
Bond factors (FF 1993)	Beta of Case-Shiller index
Beta of Indices of currencies	Beta of bond index
Beta of Cyber security risk ETF	Beta of interest rates
Beta of inflation	Market beta
Beta of COBE index	Beta of Size factor
Market beta	Market beta
Beta of emerging market	R squared of 4 factor model
Market beta	Beta of tax rate
Market beta	Beta of Investment factor
EPU from Nick Bloom	Beta of Value factor
Betas of Asia, emerging, and Euro markets	STD of fund return
Betas of Asia, emerging, and Euro markets	Beta of Size factor
EPU from Nick Bloom	Fund turnover
Beta of Value factor	
Active share	
Industry concentration	
Beta of interest rate	
Beta of Jay Ritter IPO index	
Beta of Size factor	
Beta of loan outstanding (flow of fund data)	
Beta of Liquidity factor	