Internet Appendix for "Better Kept in the Dark? Portfolio Disclosure and Agency Problems in Mutual Funds"

Table IA1. Placebo Tests on the Semi-annual Fund Sample Using Different Regulation Years

This table presents the results from various time-series placebo tests of our main findings. Panel A reports the placebo tests for the results in Table 5, Panel B reports the placebo tests for the results in Table 6, and Panel C reports the placebo tests for the results in Table 7. We falsely assume the regulation change took place in 2001, 2002, or 2003 instead of the actual regulation year 2004. We drop the pseudo regulation year from the placebo tests instead of the actual regulation year 2004 (as in the original analyses reported in Tables 5, 6, and 7). For comparison purpose, we further report the results of the true regulation change (i.e., year 2004). Control variables and time and fund fixed effects are included in all regressions of the table. For brevity concern, only the regression coefficient of the interaction term, REG*VOL, is reported for all regressions. Standard errors are clustered on the fund and time level and presented in parentheses. ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

	2001	2002	2003	2004
	Dependent Variable: MAN_FEE_y			
VOL(α)	0.005	0.004	0.004	0.009***
	(0.004)	(0.003)	(0.003)	(0.003)
VOL(R-R^M)	0.004	0.005	0.004*	0.006**
	(0.004)	(0.003)	(0.002)	(0.003)
VOL(R-R^{9S})	0.008	0.005*	0.006**	0.008***
	(0.004)	(0.003)	(0.003)	(0.003)
	Dependent Variable: $ACTIVE\_SHARE_q$			
VOL(α)	-0.205	-0.356**	-0.501**	-0.983***
	(0.159)	(0.176)	(0.200)	(0.194)
VOL(R-R^M)	-0.203	-0.362**	-0.523***	-1.095***
	(0.157)	(0.174)	(0.194)	(0.182)
VOL(R-R^{9S})	-0.180	-0.326*	-0.474**	-1.028***
	(0.164)	(0.183)	(0.205)	(0.205)
	Dependent Variable: $ALPHA^Q_q$			
VOL(α)	-0.011	-0.000	-0.005	-0.031***
	(0.007)	(0.007)	(0.007)	(0.008)
VOL(R-R^M)	0.000	0.008	-0.001	-0.015*
	(0.007)	(0.007)	(0.007)	(0.008)
VOL(R-R^{9S})	0.003	0.007	-0.003	-0.023**
	(0.007)	(0.007)	(0.007)	(0.009)

Table IA2. Placebo Tests Based on the Sample of Quarterly Reporting Funds

The table presents the results of a cross-sectional placebo test of our main findings. In Panel A we report the placebo test of the results in Table 5, in Panel B we report the placebo test of the results in Table 6, and in Panel C we present the placebo test of the results in Table 7. In all panels we falsely assume the regulation change affected the sample of quarterly funds instead of the sample of semi-annual funds; that is, we perform our analysis on the sample of quarterly funds instead of the sample of semi-annual funds as in the original analysis reported in Tables 5, 6, and 7. Control variables and time and fund fixed effects are included in all regressions of the table. Standard errors are clustered on the fund and time level and presented in parentheses. ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

Panel A:	Dependent Variable – MAN_FEE_y		
	VOL(α)	VOL(R-R^{M})	VOL(R-R^{9S})
	1	2	3
REG*VOL	-0.002	-0.005*	-0.004
	(0.003)	(0.003)	(0.003)
CSE by fund/time	yes	yes	yes
Controls	yes	yes	yes
Time FE	yes	yes	yes
Fund FE	yes	yes	yes
Obs	4,535	4,535	4,535
R^2	0.866	0.866	0.866

Panel B:	Dependent Variable – $ACTIVE\_SHARE_q$		
	VOL(α)	VOL(R-R^{M})	VOL(R-R^{9S})
	1	2	3
REG*VOL	-0.396	-0.441*	-0.318
	(0.288)	(0.248)	(0.294)
CSE by fund/time	yes	yes	yes
Controls	yes	yes	yes
Time FE	yes	yes	yes
Fund FE	yes	yes	yes
Obs	9,341	9,341	9,341
R^2	0.876	0.878	0.876

Panel C:	Dependent Variable - $ALPHA^{Q}_{q}$		
	VOL(α)	VOL(R-R^{M})	VOL(R-R^{9S})
	1	2	3
REG*VOL	-0.014	0.002	-0.004
	(0.010)	(0.010)	(0.012)
CSE by fund/time	yes	yes	yes
Controls	yes	yes	yes
Time FE	yes	yes	yes
Fund FE	yes	yes	yes
Obs	17,940	17,940	17,940
R^2	0.137	0.136	0.136

Table IA3. Disentangling the Information vs Agency Channels

The table complements the analysis presented in Table 7 with an additional variable – TOP_FUND, and its interaction with the regulatory change dummy REG. To measure TOP_FUND, we first calculate the quintile rank of alpha for all funds in the semi-annual funds sample between 1999 and 2003. Next, we average those ranks for every fund. The indicator variable Top Fund takes the value of 1 if the fund was in the top tercile of the average alpha rank and zero otherwise. Control variables and time and fund fixed effects are included in all regressions of the table. Standard errors are clustered on the fund and time level and presented in parentheses. ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

	Dependent Variable: $ALPHA^{Q}_{q}$		
	VOL(α)	VOL(R-R^{M})	VOL(R-R^{9S})
	1	2	3
REG*VOL	-0.030***	-0.020**	-0.022**
	(0.008)	(0.009)	(0.009)
REG*TOP_FUND	-0.047*	-0.059**	-0.043
	(0.028)	(0.029)	(0.029)
CSE by fund/time	yes	yes	yes
Controls	yes	yes	yes
Time FE	yes	yes	yes
Fund FE	yes	yes	yes
Intercept	yes	yes	yes
Obs	44,862	44,862	44,862
R^2	0.106	0.106	0.106

Table IA4. Main Results Based on Relative Performance Volatility Rank Orthogonalized on the Level of Alpha, Excess Return or Style-Adjusted Return

This table reports sensitivity of our main findings to using alternative relative performance volatility ranks orthogonalized on the level of alpha, excess return or style-adjusted return. Instead of ranking on the standard deviation of past fund performance (i.e., alpha or excess return or style-adjusted return), we orthogonalize each volatility measure on the level of recent fund performance before we calculate the volatility rank. Specifically, each quarter we run a cross-sectional regression of the standard deviation of alpha (or excess return or style-adjusted return) during the past twelve months (up to the last month of that quarter) on the mean alpha (or excess return or style-adjusted return) during the past twelve month and obtain the residual; we then rank on the residual each quarter and calculate the average rank over the 1999-2003 period. We use these alternative volatility measures to repeat the analysis in Table 5 (The Effect of the 2004 Regulation on Management Fees) in Panel A, Table 6 (The Effect of the 2004 Regulation on Active Share) in Panel B, and Table 7 (The Effect of the 2004 Regulation on Net Fund Performance) in Panel C. Control variables and time and fund fixed effects are included in all regressions of the table. Standard errors are clustered on the fund and time level and presented in parentheses. ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

Panel A:	Dependent Variable – MAN_FEE_y		
	VOL(α)	$VOL(R-R^M)$	$VOL(R-R^{9S})$
	1	2	3
REG*VOL	0.011***	0.008**	0.008**
	(0.004)	(0.003)	(0.003)
CSE fund/time	yes	yes	yes
Controls	yes	yes	yes
Time FE	yes	yes	yes
Fund FE	yes	yes	yes
Obs	11,194	11,194	11,194
R^2	0.763	0.763	0.763
Panel B:	**Dependent Variable – $ACTIVE\_SHARE_q$**		
	VOL(α)	$VOL(R-R^M)$	$VOL(R-R^{9S})$
	1	2	3
REG*VOL	-1.004***	-1.202***	-1.018***
	(0.221)	(0.230)	(0.207)
CSE fund/time	yes	yes	yes
Controls	yes	yes	yes
Time FE	yes	yes	yes
Fund FE	yes	yes	yes
Obs	14,962	14,962	14,962
R^2	0.902	0.903	0.902
Panel C:	**Dependent Variable - $ALPHA^Q_q$**		
	VOL(α)	$VOL(R-R^M)$	$VOL(R-R^{9S})$
	1	2	3
REG*VOL	-0.033***	-0.025**	-0.028**
	(0.010)	(0.010)	(0.010)
CSE fund/time	yes	yes	yes
Controls	yes	yes	yes
Time FE	yes	yes	yes
Fund FE	yes	yes	yes
Obs	44,862	44,862	44,862
R^2	0.106	0.106	0.106

Table IA5. Main Results Based on Relative Performance Volatility Rank Orthogonalized on DGTW-Adjusted Portfolio Return Inferred from Fund Holdings

This table reports sensitivity of our main findings to using alternative relative performance volatility ranks orthogonalized on DGTW-adjusted portfolio returns inferred from fund holdings. Instead of using the average volatility ranks of the funds over the 1999-2003 period, we orthogonalize the volatility measures on the level of recent fund performance that can be inferred from fund holdings, the DGTW-adjusted portfolio returns following Daniel, Grinblatt, Titman, and Wermers (1997) and Wermers (2004), before calculating the volatility rank. Specifically, each quarter we run a cross-sectional regression of the standard deviation of alpha (or excess return or style-adjusted return) during the past twelve months (up to the last month of that quarter) on the quarterly DGTW-adjusted portfolio returns inferred from fund holdings at the end of that quarter and obtain the residual; we then rank on the residual each quarter and get the average volatility rank over the 1999-2003 period. We use these alternative volatility measures to repeat the analysis in Table 5 (The Effect of the 2004 Regulation on Management Fees) in Panel A, Table 6 (The Effect of the 2004 Regulation on Active Share) in Panel B, and Table 7 (The Effect of the 2004 Regulation on Net Fund Performance) in Panel C. Standard errors are presented in parentheses. ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

Panel A:	Dependent variable – MAN_FEE_y		
	VOL(α)	VOL(R-R^M)	VOL(R-R^{9S})
	1	2	3
REG*VOL	0.010***	0.006**	0.009***
	(0.003)	(0.003)	(0.003)
CSE fund/time	yes	yes	yes
Controls	yes	yes	yes
Time FE	yes	yes	yes
Fund FE	yes	yes	yes
Obs	11,071	11,071	11,071
R^2	0.762	0.761	0.762
Panel B:	Dependent Variable – $ACTIVE\_SHARE_q$		
	VOL(α)	VOL(R-R^M)	VOL(R-R^{9S})
	1	2	3
REG*VOL	-1.215***	-1.236***	-1.237***
	(0.211)	(0.191)	(0.224)
CSE fund/time	yes	yes	yes
Controls	yes	yes	yes
Time FE	yes	yes	yes
Fund FE	yes	yes	yes
Obs	14,891	14,891	14,891
R^2	0.897	0.898	0.897
Panel C:	Dependent variable - $ALPHA^Q_q$		
	VOL(α)	VOL(R-R^M)	VOL(R-R^{9S})
	1	2	3
REG*VOL	-0.020**	-0.024**	-0.019*
	(0.009)	(0.009)	(0.010)
CSE fund/time	yes	yes	yes
Controls	yes	yes	yes
Time FE	yes	yes	yes
Fund FE	yes	yes	yes
Obs	44,332	44,332	44,332
R^2	0.107	0.106	0.107

Table IA6. Main Results Based on the Rank of Long-Run Relative Performance Volatility Orthogonalized on the Level of Alpha, Excess Return or Style-Adjusted Return

This table reports sensitivity of our main findings to using alternative (pre-regulation) long-run relative performance volatility ranks orthogonalized on long-run fund performance. Instead of ranking the volatility measures each quarter and calculate the average volatility decile rank over the pre-regulation period, we calculate the standard deviation of monthly alpha (or excess return or style-adjusted return) over the entire 1999-2003 pre-regulation period. We next orthogonalize the standard deviation of alpha (or excess return or style-adjusted return) on the average level of monthly alpha (or excess return or style-adjusted return) calculated over the same time period to obtain the orthogonalized volatility measures. We then rank the (semi-annual) sample funds based on the orthogonalized long-run volatility measures into deciles and use the decile ranks to repeat the analysis in Table 5 (The Effect of the 2004 Regulation on Management Fees) in Panel A, Table 6 (The Effect of the 2004 Regulation on Active Share) in Panel B, and Table 7 (The Effect of the 2004 Regulation on Net Fund Performance) in Panel C. Standard errors are presented in parentheses. ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

Panel A:	Dependent variable – MAN_FEE_y		
	VOL(α)	VOL(R-R^M)	VOL(R-R^{9S})
	1	2	3
REG*VOL	0.006**	0.005*	0.005*
	(0.003)	(0.003)	(0.003)
CSE fund/time	yes	yes	yes
Controls	yes	yes	yes
Time FE	yes	yes	yes
Fund FE	yes	yes	yes
Obs	11,192	11,192	11,192
R^2	0.763	0.763	0.763
Panel B:	Dependent Variable – $ACTIVE\_SHARE_q$		
	VOL(α)	VOL(R-R^M)	VOL(R-R^{9S})
	1	2	3
REG*VOL	-0.748***	-0.777***	-0.656***
	(0.149)	(0.152)	(0.146)
CSE fund/time	yes	yes	yes
Controls	yes	yes	yes
Time FE	yes	yes	yes
Fund FE	yes	yes	yes
Obs	14,962	14,962	14,962
R^2	0.902	0.902	0.902
Panel C:	Dependent variable - $ALPHA^Q_q$		
	VOL(α)	VOL(R-R^M)	VOL(R-R^{9S})
	1	2	3
REG*VOL	-0.021***	-0.022***	-0.013*
	(0.007)	(0.007)	(0.007)
CSE fund/time	yes	yes	yes
Controls	yes	yes	yes
Time FE	yes	yes	yes
Fund FE	yes	yes	yes
Obs	44,850	44,850	44,850
R^2	0.106	0.106	0.106

Table IA7. Main Results Excluding Closet Indexing Funds

This table reports sensitivity of our main findings to a sample that excludes closet indexing funds. Following Cremers and Petajisto, we define closet indexers as funds with an active share of less than 0.6. We use the latest available active share for year 2003 in order to identify closet indexers. After excluding them, we recompute VOL(α), VOL(R-R^M), and VOL(R-R^{9S}) and use the restricted sample to repeat the analysis in Table 5 (The Effect of the 2004 Regulation on Management Fees) in Panel A, Table 6 (The Effect of the 2004 Regulation on Active Share) in Panel B, and Table 7 (The Effect of the 2004 Regulation on Net Fund Performance) in Panel C. Control variables and time and fund fixed effects are included in all regressions of the table. Standard errors are clustered on the fund and time level and presented in parentheses. ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

Panel A:	Dependent Variable – MAN_FEE_y		
	VOL(α)	VOL(R-R^M)	VOL(R-R^{9S})
	1	2	3
REG*VOL	0.010***	0.006**	0.009***
	(0.004)	(0.003)	(0.004)
CSE fund/time	yes	yes	yes
Controls	yes	yes	yes
Time FE	yes	yes	yes
Fund FE	yes	yes	yes
Obs	10,179	10,179	10,179
R^2	0.758	0.757	0.758

Panel B:	Dependent Variable – $ACTIVE\_SHARE_q$		
	Vol(α)	Vol(R-R^M)	VOL(R-R^{9S})
	1	2	3
REG*Vol	-0.514**	-0.760***	-0.649***
	(0.209)	(0.204)	(0.231)
CSE fund/time	yes	yes	yes
Controls	yes	yes	yes
Time FE	yes	yes	yes
Fund FE	yes	yes	yes
Obs	12,927	12,927	12,927
R^2	0.857	0.858	0.857

Panel C:	Dependent Variable - $ALPHA^Q_q$		
	VOL(α)	VOL(R-R^M)	VOL(R-R^{9S})
	1	2	3
REG*VOL	-0.037***	-0.021**	-0.030***
	(0.009)	(0.009)	(0.010)
CSE fund/time	yes	yes	yes
Controls	yes	yes	yes
Time FE	yes	yes	yes
Fund FE	yes	yes	yes
Obs	41,504	41,504	41,504
R^2	0.108	0.108	0.108

Table IA8. Main Results Based on the Volatility of Past Relative Fund Performance Rankings

This table reports sensitivity of our main findings to using alternative relative performance volatility ranks based on the volatilities of pre-regulation fund relative performance rankings. At the end of each quarter we rank funds based on their relative performance (alpha or excess return or style-adjusted return) in that quarter. We then calculate the standard deviation of the quarterly relative performance ranks of the fund over the 1999-2003 period and then rank funds on the basis of that standard deviation. We use this alternative relative performance volatility measure to repeat the analysis in Table 5 (The Effect of the 2004 Regulation on Management Fees) in Panel A, Table 6 (The Effect of the 2004 Regulation on Active Share) in Panel B, and Table 7 (The Effect of the 2004 Regulation on Net Fund Performance) in Panel C. Standard errors are presented in parentheses. Control variables are included in all regressions of the table. Depending on the specification, we include time/style/fund fixed effects and/or cluster standard errors on the fund level. ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

	Dependent Variable: MAN_FEE_y	Dependent Variable – $ACTIVE\_SHARE_q$	Dependent Variable: $ALPHA^Q_q$
	1	2	3
REG*VOL	0.007**	-0.619***	-0.023***
	(0.003)	(0.156)	(0.007)
CSE fund/time	yes	yes	yes
Controls	yes	yes	yes
Time FE	yes	yes	yes
Fund FE	yes	yes	yes
Obs	11,013	14,962	44,850
R^2	0.763	0.901	0.106

Table IA9. The Effect of the 2004 Regulation on Net Fund Performance, Using Alternative Performance Measures

The table presents the results of quarterly OLS regressions of fund net returns on lagged variables, using alternative performance measures. In Panel A, we use funds excess returns and in Panel B we use style-adjusted returns, both expressed in percentages per month. In each specification we include a relative performance volatility measure -- VOL(α) in specification (1), VOL(R-R^M) in specification (2), and VOL(R-R^{9S}) in specification (3) and repeat the analysis in Table 7 (The Effect of the 2004 Regulation on Net Fund Performance). Control variables and time and fund fixed effects are included in all regressions of the table. Standard errors are clustered on the fund and time level and presented in parentheses. ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively.

Panel A:	Dependent Variable – $EXCESS\_RETURN_q$		
	VOL(α)	VOL(R-R^M)	VOL(R-R^{9S})
	1	2	3
REG*VOL	-0.077***	-0.087***	-0.074***
	(0.009)	(0.009)	(0.010)
CSE fund/time	yes	yes	yes
Controls	yes	yes	yes
Time FE	yes	yes	yes
Fund FE	yes	yes	yes
Obs	45,535	45,535	45,535
R^2	0.707	0.707	0.707
Panel B:	Dependent Variable - $STYLE\text{-}ADJUSTED\_RETURN_q$		
	VOL(α)	VOL(R-R^M)	VOL(R-R^{9S})
	1	2	3
REG*VOL	-0.064***	-0.063***	-0.050***
	(0.008)	(0.008)	(0.009)
CSE fund/time	yes	yes	yes
Controls	yes	yes	yes
Time FE	yes	yes	yes
Fund FE	yes	yes	yes
Obs	44,808	44,808	44,808
R^2	0.071	0.071	0.071

A Simple Theoretical Framework

The basic intuition of this simple theoretical framework is similar to that in Nagar (1999) and Hermalin and Weisbach (2012). That is, information disclosure triggers shareholders' re-assessment of managerial skill, which in turn imposes uncertainty or risk on the manager. Consider any fund manager with unknown skill level $\mu \sim N(\bar{\mu}, \sigma_\mu^2)$ to mutual fund investors, with $\bar{\mu}$ being investors' ex-ante (prior) perception of the fund's managerial skill and σ_μ^2 being the fund's ex-ante managerial skill uncertainty to investors. Since the realization of μ is unobservable to anyone (including the manager herself), mutual fund investors use the disclosed information on portfolio holdings to evaluate the fund managerial skill. Let investors derive a signal, s, from the fund's portfolio disclosure (e.g., investors infer the fund's current and expected future risk-adjusted gross performance from its current disclosed holdings), based on which they update their perception of managerial stock-picking skill μ. Denote investors' posterior re-assessment of μ upon receiving the signal, s, as $\hat{\mu} \equiv E(\mu|s)$. Let the derived signal s be noisy with $s = \mu + \varepsilon$, with $\varepsilon \sim N(0, \sigma_\varepsilon^2)$ being the white noise in the signal. We then have

$$\hat{\mu} \equiv E(\mu|s) = E(\mu) + \frac{cov(\mu,s)}{var(s)}\big(s - E(s)\big) = \bar{\mu} + \frac{\sigma_\mu^2}{\sigma_\mu^2+\sigma_\varepsilon^2}(s - \bar{\mu}). \qquad \text{(IA1)}$$

From equation (IA1), it is clear that portfolio disclosure induces investors' re-assessment of managerial skill, that is, the term $\frac{\sigma_\mu^2}{\sigma_\mu^2+\sigma_\varepsilon^2}(s - \bar{\mu})$ is generally nonzero.[1] Moreover, $\frac{\sigma_\mu^2}{\sigma_\mu^2+\sigma_\varepsilon^2}$ increases in σ_μ^2 but decreases in σ_ε^2. Thus, the higher the ex-ante skill uncertainty (i.e., the larger is σ_μ^2) and/or the less noisy the signal derived from portfolio disclosure (i.e., the smaller is σ_ε^2), the more investors rely on the signal and the less they rely on their prior perception to update $\hat{\mu}$, their

[1] Note that the ex-post managerial skill uncertainty after the disclosure is $Var(\mu|s) = \frac{\sigma_\mu^2\sigma_\varepsilon^2}{\sigma_\mu^2+\sigma_\varepsilon^2}$. Thus, when disclosure is very noisy and $\sigma_\varepsilon^2 \to \infty$ (which is equivelant to no disclosure), the ex-post uncertainty $ar(\mu|s) \to \sigma_\mu^2$, which is simply the ex-ante uncertainty.

posterior perception of μ from portfolio disclosure. Note that when the noisiness of disclosure, σ_{ε}^2, goes to infinity (i.e., no disclosure), we have $\hat{\mu} = \bar{\mu}$ and there is no skill re-assessment from investors. Thus, the noise in the performance signal slows down investors' learning process. Equation (IA1) implies that the variance of disclosure-induced skill re-assessment $\hat{\mu}$ is simply

$$var(\hat{\mu}) = \left(\frac{\sigma_{\mu}^2}{\sigma_{\mu}^2+\sigma_{\varepsilon}^2}\right)^2 var(s) = \frac{\sigma_{\mu}^4}{\sigma_{\mu}^2+\sigma_{\varepsilon}^2} \quad \text{(IA2)}$$

Thus, the larger the ex-ante skill uncertainty (i.e., the larger the σ_{μ}^2) and/or the less noisy the signal (i.e., the smaller the σ_{ε}^2), the larger the variance of disclosure-induced skill re-assessment $\hat{\mu}$ (again, when $\sigma_{\varepsilon}^2 \rightarrow \infty$ and there is no disclosure, there is no skill re-assessment risk to the manager and $var(\hat{\mu}) = 0$). Since fund investors take monitoring actions (e.g., "vote with their feet") according to their re-assessment of managerial skill from portfolio disclosure, a large variance in $\hat{\mu}$ imposes high levels of holdings-driven flow risk and managerial turnover risk.

Thus, fund companies of high-volatility funds (i.e., funds with ex-ante higher skill uncertainty to mutual fund investors) would opt for lower levels of portfolio disclosure (which results in noisier derived signal with higher σ_{ε}^2) to mitigate the disclosure-induced flow risk and managerial turnover risk. It is well known that providing two signals (in this case: two disclosure reports) with similar precision (similar σ_{ε}^2) is equivalent to providing only one signal with higher precision (lower σ_{ε}^2). Therefore, fund companies of high-volatility funds would be less likely to voluntarily report in quarterly frequency than those of low-volatility funds.

The above theoretical framework allows us to derive intuitive testable predictions regarding the effects of the 2004 SEC regulatory change, our natural experiment. After 2004, funds that are subjected to the new regulation (i.e., those that did not voluntarily report in quarterly frequency prior to the regulatory change) are forced to increase their portfolio disclosure frequency, resulting in a reduction in σ_{ε}^2. More frequent disclosure decreases σ_{ε}^2

because (1) timelier holdings disclosure has higher information value and (2) more frequent holdings disclosure is more difficult to manipulate. Thus, mutual fund investors will naturally increase their reliance on disclosed portfolio holdings to re-assess fund managerial skills and take monitoring actions, which in turn will impose higher disclosed-holdings-driven flow and turnover risks to fund managers *especially for high-volatility funds (which have high ex-ante skill uncertainty)*. This can be clearly seen from equation (IA2) since the variance of disclosure-induced skill re-assessment, $var(\hat{\mu}) = \frac{\sigma_{\mu}^4}{\sigma_{\mu}^2+\sigma_{\varepsilon}^2}$, rises when σ_{ε}^2 falls. Moreover, since $\frac{d(var(\hat{\mu}))}{d(\sigma_{\varepsilon}^2)} = -\frac{\sigma_{\mu}^4}{(\sigma_{\mu}^2+\sigma_{\varepsilon}^2)^2}$, this negative relation between $var(\hat{\mu})$ and σ_{ε}^2 becomes more pronounced (i.e., larger in magnitude) when σ_{μ}^2 gets larger because $\frac{\sigma_{\mu}^4}{(\sigma_{\mu}^2+\sigma_{\varepsilon}^2)^2}$ is a monotonically increasing function of σ_{μ}^2.

We therefore expect that funds subjected to the new regulation experience an increase in holdings-driven flow risk ("vote with their feet"), especially for high-volatility funds. Similarly, we expect that funds subjected to the regulation also experience an increase in disclosed-holdings-driven managerial turnover risk, particularly for high-volatility funds. The reason for this is that potential outflows following a negative signal may prompt the board to fire the fund management (Khorana, 1996). Facing these increased risks caused by the mandatory increase in disclosure, fund managers would demand higher compensation in a competitive labor market, which can leads to greater management fees charged by the fund companies. *Ceteris paribus*, this increase in management fees should be more pronounced for high-volatility funds (with high ex-ante managerial skill uncertainty) than low-volatility funds.

As investors increase their reliance on disclosed portfolio holdings to evaluate fund managers, the holdings-driven flow risk and managerial turnover risk for fund managers increases. Consequently, the expected payoff from managers' risky bets may not be sufficient enough to compensate them for the increased levels of risks, mandated by the increased disclosure frequency. We hence expect these managers to become more myopic, reduce their risk taking (e.g., forgo some investments with high expected (by them) abnormal return that are risky), and move closer to their benchmark indexes subsequent to the new SEC regulation. After the new regulation, high-volatility funds with high ex-ante levels of skill uncertainty face higher skill re-assessment risk from fund investors; hence, they should experience a larger post-regulation reduction in risk-taking relative to a fund with low ex-ante levels of skill uncertainty.

Ceteris paribus, higher management fee and less risk-taking may, in turn, drive down the net returns to the mutual fund investors, especially for high-volatility funds.

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