

Online Appendix

The Effect of Financial Reporting Quality on Corporate Investment Efficiency: Evidence from the Adoption of SFAS No. 123R

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This appendix provides supplemental analyses that support Section 5 of our manuscript “The Effect of Financial Reporting Quality on Corporate Investment Efficiency: Evidence from the Adoption of SFAS No. 123R.”

Propensity-score matching. One concern with our pooled sample regression approach is that the treatment sample (i.e., heavy ESO users) and the control sample (i.e., light ESO users) may have different firm characteristics. Hence, we employ a propensity-score matching to form a sample to control for differences in relevant dimensions more effectively between the treatment and control samples. To obtain the propensity score for the sample firms, we estimate the following Logit model using data from the first year of our sample period (i.e., 2003):

$$HeavyESO = a_0 + \sum_j a_j ESO\ Determinant_j + d_{ind} + \varepsilon. \quad (A1)$$

The dependent variable, *HeavyESO*, is an indicator variable that takes the value of one if a firm’s ESO expense is above the industry median ESO expense, and zero otherwise. *ESO Determinant* includes all the control variables used in the estimation of equation (1); these variables capture the determinants of being a heavy versus light ESO user, as well as the level of corporate investment. In estimating equation (A1), we control for industry fixed effects by including 48 indicator variables, d_{ind} ($ind=1, \dots, 48$), for the 48 Fama-French industry groups. The results of this first stage regression are reported in panel A of table A1.

We obtain the propensity score for each firm as the predicted value in equation (A1). For each heavy ESO user, we then find (without replacement) one light ESO user that has the closest propensity score within a caliper of 0.25 times the standard deviation of the propensity score (Rosenbaum and Rubin 1985). This matching procedure offers us a control firm that is similar in all specified dimensions to a treatment firm, except that the two firms use different amounts of ESOs. We obtain 347 pairs of matched firms and carry these pairs of firms over the entire sample period 2003-2007. In panel B of table A1, we report the descriptive statistics of the variables that could affect the use of ESOs for both the treatment and the matched groups, and differences between these two groups are insignificant in nearly all dimensions we aim to match.

We re-estimate equation (1) using this propensity-score matched control sample and report the estimation results in panel C of table A1. Our main inference (that the adoption of SFAS No. 123R improves the investment efficiency of heavy ESO users that are prone to underinvestment) continues to hold (the coefficient on $HeavyESO \times Post$ is 0.080 with a t -statistic of 1.99). These results lend further support to hypothesis H1.

Investment effect of voluntary recognition of ESO expense. We supplement our main results reported in Section 4.1 by conducting a falsification test on a sample of industrial firms that voluntarily recognized ESO expense at fair value prior to the adoption of SFAS No. 123R (hereafter, “voluntary adopters”). These voluntary adopters started recognizing ESO expense in 2002 or early 2003 (Aboody et al. 2004). Based on the premise that the recognition of previously disclosed ESO expense improves investment efficiency, we expect that these firms did not change their investment behavior when the recognition of ESO expense became mandatory later in 2005.

We append the voluntary adopters to the original sample and estimate the following regression equation:

$$Investment_{it} = a_0 + a_1 HeavyESO_i \times Post_t + a_2 HeavyESO_i \times Post_t \times OverFirm_{it} + a_3 Voluntary_i \times Post_t + a_4 Voluntary_i \times Post_t \times OverFirm_{it} + a_5 Post_t \times OverFirm_{it} + a_6 HeavyESO_i \times OverFirm_{it} + a_7 Voluntary_i \times OverFirm_{it} + a_8 OverFirm_{it} + \sum_{j=9} a_j Controls_{it} + \delta_i + \mu_t + \varepsilon_{it}, \quad (A2)$$

The variable, *Voluntary*, is an indicator variable that takes the value of one if the firm is a voluntary adopter, and zero otherwise. Naturally, *HeavyESO* is set to zero for voluntary adopters. We include the same sets of control variables as in equation (1) and firm and year fixed effects. We calculate *t*-statistics using standard errors clustered by firm.

Our variables of interest are *HeavyESO* × *Post* and *Voluntary* × *Post*. If the voluntary adopters adjusted their investment behavior when they voluntarily recognized ESO expense in 2002, the estimated coefficient on *Voluntary* × *Post* is expected to be insignificant, and the difference between the estimated coefficients on *HeavyESO* × *Post* and *Voluntary* × *Post* is expected to be significantly positive.

Table A2 summarizes the estimation results of equation (A2). As expected, the estimated coefficient on *Voluntary* × *Post* (-0.010 with a *t*-statistic of -0.27) is indistinguishable from zero, and the difference of the estimated coefficients on *HeavyESO* × *Post* and *Voluntary* × *Post* is indeed positive and significant at the 5% level (*p*-value of 0.04). In other words, this sample of voluntary adopters exhibits an insignificant change in investment efficiency in response to the mandatory adoption of SFAS No. 123R. In sum, the results reported in table A2 corroborate those documented in Section 4.1 and table 3 that the improvement in investment efficiency is attributable to the change from disclosing the fair value of ESO expense in notes to recognizing it in financial statements.

Table A1**A propensity score matching approach**

Panel A reports the first-stage logit estimation of the determinants of the level of ESO usage, as proxied by the ESO expense in 2003. Panel B presents the summary statistics of the variables used in the first-stage estimation for the treatment and matched samples. Panel C presents the estimation of equation (1) based on the propensity-score matched sample. All variables are defined in the Appendix. The *t*-statistics (in parentheses) are computed using standard errors clustered by firm. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Logit model estimates of the first-stage propensity-score matching procedure

	<i>Dep=HeavyESO</i>
	Fiscal year=2003
<i>Institutions</i>	0.370* (1.76)
<i>Analysts</i>	0.031** (2.35)
<i>InvG-Score</i>	0.012 (0.37)
<i>G-Score dummy</i>	-0.050 (-0.15)
<i>AQ</i>	0.979 (0.77)
<i>OverFirm</i>	1.594*** (3.59)
<i>LogAsset</i>	-0.338*** (-3.79)
<i>Mkt-to-Book</i>	-0.112 (-1.50)
$\sigma(CFO)$	3.145* (1.72)
$\sigma(Sales)$	1.618*** (3.19)
$\sigma(Investment)$	0.209 (0.20)
<i>Z-Score</i>	-0.506*** (-4.34)
<i>Tangibility</i>	-0.748 (-1.48)
<i>Leverage</i>	1.045* (1.67)
<i>Ind Leverage</i>	0.303 (0.30)
<i>CFOsale</i>	0.694** (2.14)
<i>Slack</i>	-0.006 (-0.44)
<i>Dividend</i>	-1.137*** (-6.80)
<i>Age</i>	-0.015*** (-2.63)
<i>OperatingCycle</i>	0.038 (0.33)
<i>Loss</i>	0.616*** (2.88)
<i>LogTenure</i>	-0.057

	(-0.68)
Cash comp	-0.602*
	(-1.73)
Vega	0.034*
	(1.81)
Delta	0.050
	(0.69)
Industry FE	Yes
Observations	1196
Pseudo R-squared	0.213

Panel B: Summary statistics by HeavyESO for the matched sample

Variable	HeavyESO=1		HeavyESO=0		Diff t-stats
	Mean	50%	Mean	50%	
Institutions	0.496	0.622	0.483	0.598	0.459
Analysts	6.890	6.000	7.000	5.000	-0.210
InvG-Score	-7.608	-8.000	-7.752	-9.000	0.449
G-Score dummy	0.176	0.000	0.170	0.000	0.200
AQ	-0.062	-0.045	-0.060	-0.042	-0.429
OverFirm	0.515	0.500	0.511	0.500	0.227
LogAsset	7.136	7.020	7.168	7.018	-0.308
Mkt-to-Book	1.960	1.543	2.066	1.658	-1.179
$\sigma(CFO)$	0.058	0.049	0.057	0.047	0.123
$\sigma(Sales)$	0.191	0.144	0.170	0.128	1.845
$\sigma(Investment)$	0.045	0.028	0.041	0.026	1.125
Z-Score	1.381	1.216	1.501	1.444	-1.739
CFOsale	0.109	0.087	0.117	0.109	-0.742
Slack	2.506	0.451	2.110	0.478	0.993
Tangibility	0.268	0.213	0.266	0.203	0.105
Leverage	0.172	0.128	0.165	0.114	0.496
Ind Leverage	0.165	0.137	0.165	0.137	-0.055
Dividend	0.452	0.000	0.487	0.000	-0.912
Age	24.496	19.000	25.660	21.000	-1.006
OperatingCycle	4.561	4.638	4.626	4.702	-1.248
Loss	0.210	0.000	0.179	0.000	1.054
LogTenure	1.566	1.610	1.614	1.565	-0.662
Cash comp	0.499	0.424	0.518	0.448	-0.904
Vega	8.498	11.004	8.632	11.003	-0.342
Delta	12.311	12.232	12.410	12.452	-0.885

Panel C: Investment efficiency around the adoption of SFAS No. 123R: Test of hypothesis H1 based on the propensity-score matched sample

	Dep=Investment
HeavyESO×Post	0.080**
	(1.99)
HeavyESO×Post×OverFirm	-0.132*
	(-1.96)
Controls	Yes
Firm FE	Yes
Year FE	Yes
Observations	3067
Adj. R-squared	0.339

Table A2**Falsification tests: Investment efficiency for firms that voluntarily recognized ESO expense prior to SFAS No. 123R**

The table summarizes the estimation of equation (1) using a sample of firms that voluntarily recognized ESO expense at fair value prior to SFAS No. 123R. *Post* is an indicator variable that is equal to one after adoption of SFAS No. 123R; and zero otherwise. All variables are defined in the Appendix. The *t*-statistics (in parentheses) are computed using standard errors clustered by firm. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	<i>Dep=Investment</i>
<i>HeavyESO</i>×<i>Post</i> (1)	0.066***
	(2.61)
<i>HeavyESO</i> × <i>Post</i> × <i>OverFirm</i>	-0.098**
	(-2.46)
<i>Voluntary</i>×<i>Post</i> (2)	-0.010
	(-0.27)
<i>Voluntary</i> × <i>Post</i> × <i>OverFirm</i>	0.038
	(0.53)
<i>Joint Significance (p-value) of (1)-(2)</i>	0.04
Controls	Yes
Firm FE	Yes
Year FE	Yes
Observations	6439
Adj. R-squared	0.381