The Effects of Institutional Investor Objectives on Firm Valuation and Governance: Online Appendix*

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This version: November, 2016

Online Appendix

This appendix contains additional robustness tests of our main findings. In particular, Section I presents findings using an alternative measure of misvaluation based managerial issuance and repurchase behavior following Hirshleifer and Jiang (2010). Section II presents matched-firm results by misvaluation to rule out self-selection of institutional investor types into misvalued firms.

I Alternative Measure for Misvaluation

We test the robustness of our findings by repeating the analysis in Table VI using an alternative measure of overvaluation and misvaluation. Hirshleifer and Jiang (2010) hypothesize that managers who have insider information that their firm is overvalued will issue equity to take advantage of this. Conversely, managers will repurchase equity if they have private information about firm undervaluation. The authors propose an undervalued-minus-overvalued (UMO) factor as a portfolio that takes long positions in equity repurchasers and shorts equity issuers and finds that this factor is able to identify overvalued and undervalued firms by its explanatory power for the firm's returns. We take the negative of the beta on the UMO factor - that is the negative of the coefficient of the firm's exposure to the UMO factor - as our measure of HJ misvaluation to be consistent with

*The ideas in this paper are solely those of the authors and do not necessarily reflect the view of the Federal Reserve System.

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the direction of the RKRV misvaluation measure (i.e., in the direction of overvaluation). This HJ measure is based on managerial repurchase and issuance behavior, rather than on fundamental multiples as with the RKRV measure. Since the HJ measure is derived with respect to a completely different set of information than the RKRV measure, we can expect the two to serve as robustness checks for one another.

To estimate the HJ measure for misvaluation, we estimate the firm's exposure to Hirshleifer and Jiang's (2010) UMO factor using rolling 60-month regressions:

$$r_{i,t} = \alpha_i + \beta_{1,i,t} MKTRF_t + \beta_{2,i,t} SMB_t + \beta_{3,i,t} HML_t + \beta_{4,i,t} UMD_t + \beta_{5,i,t} UMO_t + \varepsilon_{i,t}.$$

A positive coefficient on UMO proxies for undervaluation. However, for consistency with the direction of the RKRV measure, we define the HJ measure of misvaluation as $-\hat{\beta}_5$ such that it remains positive (negative) in the direction of overvaluation (undervaluation). As with the RKRV measure, we take the absolute value of the HJ measure to proxy for the magnitude of misvaluation.

Table I.1 displays the results of estimating equations (2), (3), and (4) for the HJ measure of overvaluation and its absolute value proxying for misvaluation. Column (1) finds results consistent with Column (1) of Table VI, with the lagged level of transient institutional ownership resulting in a positive and significant HJ coefficient, consistent with more overvaluation. Column (2) reports similar results for the absolute value of the factor loading as a proxy for the magnitude of misvaluation. A 100% increase in the level of transient ownership increases the loading on the overvaluation factor by 0.228 and the magnitude of misvaluation by 0.460. This is consistent with prior findings for the RKRV measure for transient institutional ownership. There are no statistically significant effects for dedicated institutional ownership, implying that dedicated institutional investor ownership does not significantly increase overvaluation or misvaluation in the subsequent quarter.

Columns (3) and (4) of Table I.1 repeats the decomposition of the lagged level of ownership into the second lag of the level and the first lag of the change in the level of ownership to estimate the dynamic effect of institutional ownership on overvaluation and misvaluation. The positive coefficient on the overvaluation factor loading is consistent with prior findings in Column (3) of

Table VI, though only the level of transient ownership has a significant effect. However, both the level and change in transient ownership have the expected positive relationship with the magnitude of misvaluation in Column (4), consistent with the results in Column (4) of Table VI.

Finally, columns (5) and (6) of Table I.1 use the HJ valuation measures in the estimation of the full model with controls, as in equation (4). Column (5) of Table I.1 finds the level of transient institutional ownership leading to a subsequent increase in overvaluation significant at the 5% level, consistent with prior results. Column (6) finds stronger results that both the level and change of transient institutional ownership increases the magnitude of misvaluation while the level of dedicated ownership reduces it in the subsequent quarter, all significant at the 1% level.

We therefore establish a robust relationship between institutional investor ownership by type, both in levels and changes of ownership, and both overvaluation and misvaluation at the firm level.

Table I.1: Estimation of misvaluation on types of institutional investors with control variables. Overvaluation and misvaluation are defined based on the Hirshleifer and Jiang (2010) UMO factor. Returns for each firm are regressed on a Carhart (1997) 4-factor along with the Hirshleifer and Jiang (2010) UMO factor. A positive (negative) beta on the UMO factor indicates an under- (over-) valued firm. The HJ firm-specific overvaluation takes the negative of the UMO beta such that a positive (negative) measure indicates an over- (under-) valued firm. The absolute value of the overvaluation captures the magnitude of the misvaluation. Institutional investor types are defined in Section 2.1. Dedicated institutional investors, as defined in Bushee (1998, 2001), are characterized as having concentrated holdings in the firms in their portfolios with low turnover. In contrast, transient institutional investors are characterized as having diversified holdings in the firms in their portfolios with high turnover. Percentage of dedicated or transient institutional investors is relative to the total number of institutional investors within a firm. All controls are defined in Appendix A. Standard errors are reported in the parentheses and clustered by both firm and year-quarter. Significance at the 10% level is indicated by *, 5% level by **, and 1% level by ***.

	HJ Overval. (1)	HJ Misval. (2)	HJ Overval. (3)	HJ Misval. (4)	HJ Overval. (5)	HJ Misval. (6)
% Owned by Dedicated Inst. Investors$_{i,t-1}$	0.0644	0.1093				
	(0.1524)	(0.0938)				
% Owned by Dedicated Inst. Investors$_{i,t-2}$			0.0735	0.1079	0.1838	-0.3379 ***
			(0.1722)	(0.1056)	(0.1882)	(0.1089)
Δ % Owned by Dedicated Inst. Investors$_{i,t-1}$			0.0997	0.1286	0.0906	-0.1448
			(0.1262)	(0.1157)	(0.1260)	(0.0933)
% Owned by Transient Inst. Investors$_{i,t-1}$	0.2278 ***	0.4595 ***				
	(0.0826)	(0.0552)				
% Owned by Transient Inst. Investors$_{i,t-2}$			0.3079 ***	0.5387 ***	0.2718 **	0.6634 ***
			(0.0957)	(0.0653)	(0.1056)	(0.0598)
Δ % Owned by Transient Inst. Investors$_{i,t-1}$			0.0993	0.2742 ***	0.0763	0.3313 ***
			(0.0757)	(0.0527)	(0.0832)	(0.0469)
Log Total Assets$_{i,t-1}$					0.0040	-0.0876 ***
					(0.0101)	(0.0064)
% Owned by Institutional Investors$_{i,t-1}$					-0.0681	-0.2092 ***
					(0.0601)	(0.0325)
HHI-Index of Institutional Investors$_{i,t-1}$					-0.1731 **	0.0847 *
					(0.0768)	(0.0503)
Altman Z-score$_{i,t-1}$					-0.0075 ***	-0.0165 ***
					(0.0026)	(0.0017)
LT Debt / TA$_{i,t-1}$					-0.2088 **	0.2357 ***
					(0.0818)	(0.0471)
Have LT Credit Rating$_{i,t-1}$					0.0024	-0.0044
					(0.0307)	(0.0187)
Cash Flow Dispersion$_{i,t-1}$					-0.0116 *	0.0173 ***
					(0.0067)	(0.0039)
No. of Analyst Estimates$_{i,t-1}$					0.0476 ***	0.0262 ***
					(0.0168)	(0.0102)
Constant	0.2300	0.7606 ***	0.1894	0.7330 ***	0.3474	1.2211 ***
	(0.1938)	(0.1000)	(0.2133)	(0.1091)	(0.2307)	(0.1028)
Quarter Fixed Effects?	Y	Y	Y	Y	Y	Y
Year Fixed Effects?	Y	Y	Y	Y	Y	Y
Industry Fixed Effects?	Y	Y	Y	Y	Y	Y
No. Obs.	167326	167326	162199	162199	136070	136070
Adjusted R^2	0.0476	0.1045	0.0484	0.1056	0.0573	0.1731

II Matched-firm Analysis

In this section, we seek to disentangle two potential explanations for our results: either institutional investor types cause distinct value effects on the firms they own in the subsequent quarter, or they simply choose to own firms that are distinctly different to begin with (i.e., selection bias) and these differences persist. While our analysis is predictive and uses both lagged levels and changes of explanatory variables, we seek to further distinguish between these two potential explanations.

To do this, we use a matching algorithm to find a control firm with a similar prior overvaluation at both the firm and sector levels, but different institutional ownership type for each (treatment) firm held by a particular institutional ownership type around the Regulation FD shock. This is similar to the approach taken by Almeida, Campello, Laranjeira and Wesibenner (2011) and Williamson and Yang (2016). Specifically, we use the Mahalanobis (1936) distance measure to match each firm prior to the enactment of Regulation FD in 2000 that *has* above-median dedicated or transient ownership with a contemporaneous control firm that does *not*, but is similarly misvalued both at the firm and sector levels and has similar size and book-to-market ratio. The advantage of using the Mahalanobis distance matching algorithm is that this algorithm ensures a match on each of the matching characteristics, rather than relying on a propensity score.[1] As summarized in Table II.2, the match quality is good: there are no significant differences between the sample and control firms for above-median dedicated ($isDED$), above-median transient ($isTRA$), or above-median transient and below-median dedicated institutional ownership ($isTvD$) across the characteristics being matched.

We examine differences in next-period misvaluation by ownership type ($isDED$, $isTRA$, TvD) before and after the implementation of Regulation FD. Similarly, we also test this difference for Mahalanobis-matched control firms that are similarly overvalued in the current period, but do not have above-median ownership by the same institutional owner type. Next, we test the difference-in-difference between the treatment and control firms. This difference-in-difference provides us with a cleaner measure of whether there is a significant misvaluation change around RegFD implementation due to each ownership type. Furthermore, our framework allows us to test the difference in

[1]For robustness, we also create propensity scores for each of these ownership types and identify control firms using propensity score matching. This, however, does not necessarily enforce the requirement that ex-ante firm misvaluation be similar across the sample and control firms, only that the propensity scores are similar. Nevertheless, the results are similar to the Mahalanobis approach and are therefore suppressed for brevity.

the difference-in-difference for $isDED$ against the difference-in-difference for $isTRA$, essentially providing us with a difference-in-difference-in-difference. This is the difference between firms with above-median dedicated ownership versus above-median transient ownership, taking into account both the time effect (i.e., pre- and post- RegFD) as well as the selection bias (i.e., relative to their matched control firms). This framework is thus robust against the explanation of institutional self-selection for our findings of the effect of ownership type on next quarter's overvaluation and misvaluation.

Table II.3 summarizes the results of this difference analysis of next quarter's firm-specific overvaluation and misvaluation relative to control firms chosen using Mahalanobis distance matching based on contemporaneous RKRV firm- and sector-specific overvaluation, size, and book to market ratio. Panel A presents the results for next quarter's RKRV firm-specific overvaluation measure. We observe that the firms with high dedicated ownership (isDED=1), in Row (a), have no significant overvaluation one year prior to the implementation of RegFD in Column (1), and substantially higher overvaluation one year post in Column (2). The difference between the two, reported at 0.208 in Column (3), is also statistically significant indicative of an increase in overvaluation after the implementation of RegFD. This result may be due either to an increase in market efficiency as was the intention of RegFD,[2] or to the overall increase in overvaluation in the market. The matched control firms do demonstrate a similar increase in overvaluation between pre- and post- RegFD periods of 0.180 in Column (6). Notably, there are no significant difference-in-differences in the changes in overvaluation of firms held by dedicated investors relative to the controls around RegFD in Column (7), suggesting the absence of an informational effect due to Regulation FD on dedicated institutional investors.

We next consider the future overvaluation of firms with high transient ownership ($isTRA = 1$), in Row (b), which are significantly overvalued both pre- and post- RegFD in Columns (1) and (2) respectively. The difference of 0.083 is significant at the 5% level in Column (3). However, we see a much greater increase in overvaluation for the matched control firms in Columns (4) through (6) with a difference in control firm overvaluation around the implementation of RegFD of 0.306 significant at the 1% level. This larger change in the control firms implies that there is an

[2]By mandating the uniform disclosure of material information, RegFD removes the informational advantage in finding undervalued firms previously enjoyed by dedicated institutions.

overall reduction in the overvaluation of firms held by transients around RegFD in the difference-in-difference test in Column (7), with a magnitude of -0.223 significant at the 1% level. That is, when controlling for the self-selection of institutional types into firms using firm characteristics and contemporaneous firm- and sector-specific overvaluation, we find that the implementation of RegFD results in transient institutional ownership resulting in significantly less future firm-specific overvaluation, consistent with Table IX.

We further compare the difference-in-difference results in Column (7) for transient and dedicated institutions to obtain a difference-in-difference-in-difference between the two institutional investor types relative to matched controls around the implementation of RegFD in Column (8). We find a coefficient of -0.251 significant at the 1% level, implying that the decrease in future overvaluation of firms held by transients relative to matched controls, when compared to that of firms held by dedicated institutions relative to controls, itself decreased markedly around the implementation of the RegFD disclosure requirement. In other words, transient institutional ownership results in less overvaluation after RegFD than dedicated ownership, controlling for contemporaneous overvaluation.

Finally, we refine the sample to exclude firms that have both above-median dedicated and transient ownership, creating the indicator variable TvD which takes the value of 1 only when the firm has above-median transient ownership and below-median dedicated ownership and 0 only when the firm has above-median dedicated ownership and below-median transient ownership. This additional restriction removes potential confounding effects of observing the effects of both institutional investor types on the same firm. The results for TvD, in Row (c), in Columns (1) through (7) closely match those of $isTRA$ firms, with overvaluation falling relative to matched control firms after the implementation of RegFD. These findings for the transient-held firms suggest that transient institutional investors experienced an information effect on future overvaluation around the implementation of RegFD.

Panel B of Table II.3 considers a similar matched-firm analysis for the next quarter's firm-specific RKRV misvaluation. We find that firms with above-median dedicated ownership in Row (a) do not experience a significant change in the absolute magnitude of misvaluation relative to control firms in the difference-in-difference analysis in Column (7) of Panel B. Firms with above-

median transient ownership in Row (b), on the other hand, experience a reduction of 0.175 in the magnitude of misvaluation relative to control firms significant at the 1% level in Column (7). Furthermore, the difference-in-difference-in-difference test in Column (8) also finds a reduction of 0.121 in the absolute magnitude of future firm-specific misvaluation between the transient-held firms and their controls relative to dedicated-held firms and their controls around RegFD. When we exclude firms with both above-median transient and dedicated ownership in the TvD analysis in Row (c) in Panel B, we also observe a 0.164 reduction in the magnitude of misvaluation with a 5% significance level.

The matched-firm tests show that these overvaluation and misvaluation effects are not merely due to institutional self-selection into firms based on current valuation since we select control firms using contemporaneous firm- and sector-specific overvaluation. The overvaluation and misvaluation of firms owned by transient institutions falls relative to that of matched control firms around the implementation of the regulation in the difference-in-difference analysis, and this decrease is significantly greater than that for firms owned by dedicated institutions in the difference-in-difference-in-difference.

Table II.2: Mahalanobis distance matching algorithm. Using Mahalanobis distance matching, the single nearest neighbor is identified as a control firm for each treatment firm. Columns (1), (4), and (7) report the means of matching characteristics for the actual DED, TRA, or TvD firms, respectively. Columns (2), (5), and (8) report the means of matching characteristics for the matched nearest neighbor to the actual DED, TRA, or TvD firms, respectively. Columns (3), (6), and (9) reports the p-values of the t-test of difference in means of matching characteristics for DED, TRA, or TvD matching, respectively. isDED is equal to 1 if the percentage of dedicated institutional investors within a firm falls into the upper tercile and 0 otherwise. isTRA is equal to 1 if the percentage of transient institutional investors within a firm falls into the upper tercile and 0 otherwise. isTvD contrasts isTRA=1 firms against isDED=1 firms and is equal to 1 if the percentage of transient institutional investors within a firm falls into the upper tercile and the percentage of dedicated institutional investors within a firm falls into the bottom tercile and 0 if the percentage of transient institutional investors within a firm falls into the bottom tercile and the percentage of dedicated institutional investors within a firm falls into the upper tercile.

	isDED= 1			isTRA= 1			isTvD= 1		
	Actual (1)	Matched (2)	p-val (3)	Actual (4)	Matched (5)	p-val (6)	Actual (7)	Matched (8)	p-val (9)
RKRV (Firm) Overval$_{i,t-1}$	0.062	0.066	0.609	0.155	0.151	0.574	0.177	0.167	0.399
RKRV Sector Overval$_{i,t-1}$	0.137	0.138	0.927	0.152	0.150	0.464	0.150	0.147	0.528
Log Total Assets$_{i,t-1}$	5.236	5.217	0.254	5.242	5.230	0.532	5.183	5.184	0.986
Book-to-Market Ratio$_{i,t-1}$	0.556	0.551	0.258	0.502	0.504	0.681	0.497	0.499	0.698

Table II.3: Difference-in-difference estimation under Mahalanobis distance matching using Regulation FD enacted in 2000. Using Mahalanobis distance matching algorithm, the single nearest neighbor is identified as a control firm for each treatment firm. Controls are found for treatment firms based on isDED=1, isTRA= 1, and isTvD= 1, respectively. Standard errors are reported in the parentheses and clustered by both firm and year-quarter as in Petersen (2009). Significance at the 10% level is indicated by *, 5% level by **, and 1% level by ***.

	Panel A: RKRV Overvaluation							
	Treatment			Control			Treatment-Control	TRA-DED
	1-yr Pre-RegFD	1-yr Post-RegFD	1-yr Post-Pre	1-yr Pre-RegFD	1-yr Post-RegFD	1-yr Post-Pre	Diff-in-diff	Diff-in-diff-in-diff
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(a) Treatment: isDED=1	0.054	0.262 ***	0.208 ***	0.088 **	0.268 ***	0.180 ***	0.028	
	(0.036)	(0.033)	(0.033)	(0.037)	(0.036)	(0.034)	(0.047)	
(b) Treatment: isTRA=1	0.229 ***	0.312 ***	0.083 **	0.169 ***	0.474 ***	0.306 ***	-0.223 ***	-0.251 ***
	(0.041)	(0.034)	(0.039)	(0.037)	(0.037)	(0.031)	(0.049)	(0.075)
(c) Treatment: isTvD=1	0.308 ***	0.286 ***	-0.022	0.167 ***	0.444 ***	0.277 ***	-0.299 ***	
	(0.062)	(0.056)	(0.054)	(0.051)	(0.053)	(0.042)	(0.068)	
	Panel B: RKRV Misvaluation							
	Treatment			Control			Treatment-Control	TRA-DED
	1-yr Pre-RegFD	1-yr Post-RegFD	1-yr Post-Pre	1-yr Pre-RegFD	1-yr Post-RegFD	1-yr Post-Pre	Diff-in-diff	Diff-in-diff-in-diff
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(a) Treatment: isDED=1	0.625 ***	0.629 ***	0.004	0.616 ***	0.675 ***	0.058 **	-0.054	
	(0.022)	(0.020)	(0.026)	(0.021)	(0.024)	(0.026)	(0.037)	
(b) Treatment: isTRA=1	0.653 ***	0.599 ***	-0.055 *	0.639 ***	0.760 ***	0.121 ***	-0.175 ***	-0.121 **
	(0.026)	(0.023)	(0.029)	(0.022)	(0.024)	(0.027)	(0.040)	(0.059)
(c) Treatment: isTvD=1	0.697 ***	0.641 ***	-0.055	0.629 ***	0.738 ***	0.109 ***	-0.164 ***	
	(0.042)	(0.037)	(0.041)	(0.030)	(0.035)	(0.036)	(0.055)	

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