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Yes, Discounts on Closed-End Funds Are a Sentiment Index

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CHEN, KAN AND MILLER (1993, best pronounced CheK'M) provide a detailed critique of our earlier paper (Lee, Shleifer, and Thaler (1991)). CKM accuse Lee *et al.* of trying to kill two birds—the closed-end fund puzzle and the small firm effect—with one stone and missing both. Their approach is to throw at Lee *et al.* every stone they can, presumably hoping that one will hit. This reply shows that none does.

CKM focus on four empirical issues: 1) the role of utilities in the Lee *et al.* sample of small institutional ownership firms, 2) the robustness of the relationship between fund discounts and the returns on high versus low ownership firms (their Table I), 3) the appropriate way to specify the regression in Table IV of Lee *et al.* (their Table II), and 4) the regressions using one closed-end fund—TriContinental (their Table III). We address these criticisms in turn.

CKM begin with the finding of Lee *et al.* that even during the second half of their sample, when the relationship between closed-end fund discounts and small firm returns weakens, there is a significant relationship between return on stocks with low institutional ownership and changes in discounts. CKM describe as a concession the finding of Lee *et al.* that most of these low ownership stocks are public utilities. However, this finding makes even more vivid the main claim of Lee *et al.* that stocks with similar ownership structures but very different fundamentals move together in the market. After all, what do public utilities have in common with closed-end funds other than a similar ownership structure? The one plausible common factor that might similarly affect closed-end fund discounts and prices of public utility stocks is small investor sentiment.

CKM also say that they "tested a portfolio of NYSE public utility firms with *more* than 10 percent institutional ownership," and that their "results were essentially the same as for the sample with *less* than 10 percent ownership." They do not report these results, but have kindly provided us with their data. To investigate their claim, we divided all utilities into three groups of equal numbers of firms with high, low, and medium institutional ownership. We then ran regressions like those in Table VIII of Lee *et al.* for each group. The results in Table I of this paper show that low institutional

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Table I

The Monthly Time Series Relations between Utility-Institutional Ownership Portfolio Returns, Market Returns and Changes in Closed-End Fund Discounts over 1965/8 to 1985/12

This table presents the monthly regressions of equally weighted utility portfolio returns on the market return (VWNY) and changes in a monthly value-weighted discount index (ΔVWD). All NYSE utility companies with data available for the full period are included. The portfolios are formed on the basis of Low (L), Medium (M), and High (H) institutional holdings as of the beginning of 1985 as reported in the S & P Stock Report. A total of 42, 45, and 44 firms are in the L, M, H portfolios respectively. The *F*-statistics are for multivariate tests of the null hypothesis that the estimated coefficient on ΔVWD in the Low (L) ownership portfolio is greater than or equal to the corresponding coefficient in the High (H) institutional ownership portfolio.

	Intercept	VWNY	*t*-Statistic	ΔVWD	*t*-Statistic	Adj. R^2	Mean Institutional Ownership (%)
Full Period (8/65–12/85)							
L	0.002974	0.6592	16.568	−0.00377	−4.764	54.6	9.81
M	0.003283	0.6314	15.357	−0.00332	−4.056	50.5	23.45
H	0.002882	0.9778	27.717	−0.00168	−2.401	76.0	50.64
				F-statistic = 10.28 ($F_{1,242}$; p-value = 0.001)			
First 123 months (8/65–9/75)							
L	−0.000527	0.7634	14.222	−0.00455	−4.554	63.5	
M	−0.000793	0.7047	12.094	−0.00426	−3.935	55.7	
H	0.000912	1.1159	22.855	−0.00257	−2.833	81.0	
				F-statistic = 5.30 ($F_{1,119}$; p-value = 0.023)			
Second 123 months (10/75–12/85)							
L	0.007702	0.5288	9.160	−0.00305	−2.450	43.2	
M	0.008284	0.5361	9.387	−0.00220	−1.784	43.4	
H	0.006303	0.8171	16.987	−0.00090	−0.872	70.7	
				F-statistic = 4.33 ($F_{1,120}$; p-value = 0.040)			

ownership utilities comove more strongly with closed-end fund discounts than do high institutional ownership utilities (i.e., for a given reduction in the discount, they have a higher return). The *F*-tests in Table I show that this difference is statistically significant in the whole sample and in subsamples. Consistent with the hypothesis of Lee *et al.*, the evidence clearly shows that for utilities, lower institutional ownership firms returns are more negatively correlated with discount changes.

The next argument of CKM also concerns the relationship between changes in discounts and returns on "not more than 10%" and "more than 10%" institutional ownership small firms (their Table I). They report that changes in the discounts on closed-end funds are as strongly correlated with returns on "high" institutional ownership small firms as with returns on "low" institutional ownership small firms. It is nice to see a confirmation of our

earlier finding that changes in the discounts on closed-end funds are strongly correlated with returns on small firms. The interpretation of the results by CKM as suggesting that ownership does not matter is, however, far too aggressive. The point is that even the firms that they call "high" institutional ownership in fact have low institutional ownership. For example, in 1970, the average institutional ownership of their "high" ownership sample is 16 percent compared to 26 percent for the average NYSE firm (and obviously much higher for large firms). In 1985, the average institutional ownership of their "high" ownership firms is 24 percent, compared to over 35 percent for the average NYSE firm.[1] Put differently, their "high" institutional ownership firms have 76 percent individual ownership in 1985, and "low" institutional ownership firms have 94 percent individual ownership. The samples they claim to be very different are in fact very similar: they are both overwhelmingly individual ownership firms. It is not at all surprising, then, that CKM find that both "high" and "low" institutional ownership small firms comove so strongly with discounts on closed end funds. These are all extremely high *individual* ownership firms.[2] To be fair, CKM cannot be blamed for calling firms with less than 10 percent institutional ownership "high individual ownership firms," since Lee *et al.* also used this definition to isolate firms with very high individual ownership. But the inference of CKM that small firms with over 10 percent institutional ownership must have *low* individual ownership is simply factually wrong. Their criticism of Lee *et al.* is therefore invalid.

Nonetheless, CKM are right to demand more evidence on the relationship between institutional ownership of stocks and comovement between their returns and changes in discounts. In this spirit, we have compiled a database using Spectrum data of 13–F SEC filings of institutional holdings in all NYSE and AMEX firms between 1981 and 1990. At the beginning of each year, we divided all the firms in this sample into size decile portfolios by market capitalization. We then ranked the firms within each decile by institutional ownership, and formed for each decile three equal groups with high, medium, and low institutional holdings. This procedure yielded 30 size-institutional ownership portfolios that are rebalanced annually. With these data, we can directly examine the relationship between returns and changes in discounts by institutional ownership within each size decile.

Table II reports the results of weekly regressions using this data. Again, we will say that a portfolio comoves more strongly with the discounts if the coefficient in the regression of the return on this portfolio on the change in the value-weighted discount is lower. Table II shows very clearly that, *within every size decile but the first*, low institutional ownership firms comove more

[1] The source for an average NYSE stock is Jean Tobin of NYSE.

[2] CKM point out in their footnote 2 that Lee *et al.* have removed from their sample of low institutional ownership firms those with high insider ownership. The idea of Lee *et al.* was to focus on firms with significant individual ownership and active trading, so that the effect of sentiment on prices is more pronounced. Many low institutional ownership firms in fact have dominant insider ownership, and so may not have large and liquid individual holdings.

Table II

The Weekly Time Series Relations between Size-Institutional Ownership Portfolio Returns, Market Returns and Changes in Closed-End Fund Discounts over 1/2/81 to 12/28/90

Weekly regression of equally weighted "size-institutional holding" portfolio returns on the market return (VWNY) and changes in a value-weighted weekly discount index (ΔVWD). All NYSE and AMEX firms with institutional ownership data from the Spectrum database are included. At the beginning of each year, firms are size ranked and divided into Low (L), Medium (M), and High (H) institutional ownership portfolios within each size decile. Portfolios are rebalanced annually. The average number of firms for each portfolio is 64 to 67. Results are based on 10 years (522 weeks) of data: 1/2/81 to 12/28/90. *F*-statistics are for a multivariate test of the null hypothesis that the coefficient on ΔVWD in the Low (L) ownership portfolio is equal to the High (H) ownership portfolio. Two-tailed *p*-values are in parentheses.

Size	Inst.	Intercept	VWNY	*t*-Statistic	ΔVWD	*t*-Statistic	Adj. R^2	Mean Institutional Ownership (%)	*F*-Statistic on ΔVWD (H_0:L = H)
1	L	0.00105	0.718	16.57	−0.00206	−2.85	0.3507	0.99	0.018
1	M	0.00031	0.711	17.31	−0.00233	−3.39	0.3712	5.05	(0.892)
1	H	0.00031	0.671	16.79	−0.00216	−3.22	0.3570	16.83	
2	L	−0.00044	0.712	20.98	−0.00249	−4.38	0.4653	2.73	1.550
2	M	0.00021	0.811	25.30	−0.00166	−3.08	0.5586	8.60	(0.214)
2	H	0.00002	0.802	24.79	−0.00192	−3.54	0.5481	23.64	
3	L	−0.00001	0.825	26.42	−0.00228	−4.35	0.5794	3.64	1.340
3	M	−0.00068	0.878	29.28	−0.00186	−3.71	0.6290	12.21	(0.248)
3	H	−0.00024	0.892	30.84	−0.00179	−3.70	0.6531	30.41	
4	L	−0.00082	0.808	29.26	−0.00212	−4.58	0.6285	4.82	1.177
4	M	−0.00070	0.910	34.71	−0.00199	−4.54	0.7045	16.82	(0.279)
4	H	−0.00006	0.966	33.95	−0.00164	−3.44	0.6957	36.06	
5	L	−0.00035	0.814	32.09	−0.00176	−4.15	0.6707	6.64	1.123
5	M	−0.00015	0.899	35.86	−0.00105	−2.50	0.7193	21.73	(0.290)
5	H	−0.00005	0.968	36.05	−0.00132	−2.93	0.7210	42.89	
6	L	0.00004	0.830	36.78	−0.00151	−4.00	0.7284	9.30	3.264
6	M	0.00016	0.932	41.63	−0.00131	−3.49	0.7751	27.76	(0.071)
6	H	−0.00004	0.996	39.97	−0.00080	−1.92	0.7619	50.16	
7	L	−0.00012	0.838	41.21	−0.00137	−4.01	0.7713	10.80	0.866
7	M	0.00030	0.997	48.46	−0.00094	−2.71	0.8245	32.21	(0.352)
7	H	−0.00013	1.095	47.04	−0.00097	−2.48	0.8157	53.25	
8	L	0.00032	0.870	45.21	−0.00123	−3.80	0.8026	15.37	8.706
8	M	0.00010	1.054	66.78	−0.00038	−1.43	0.9000	38.36	(0.003)
8	H	0.00015	1.126	56.89	−0.00002	−0.05	0.8679	58.44	
9	L	0.00005	0.934	51.72	−0.00070	−2.31	0.8429	22.85	6.946
9	M	0.00020	1.048	76.11	−0.00014	−0.61	0.9215	45.16	(0.009)
9	H	−0.00026	1.167	67.28	0.00035	1.20	0.9024	62.21	
10	L	0.00032	0.963	71.10	−0.00008	−0.34	0.9111	28.42	3.490
10	M	0.00019	1.117	95.67	0.00023	1.17	0.9491	49.46	(0.062)
10	H	−0.00026	1.118	78.43	0.00065	2.74	0.9267	66.50	

strongly with changes in discounts than medium and high institutional ownership firms (CKM looked at only the first decile). The difference in coefficients on change in the value-weighted discount between "high" and "low" institutional ownership groups is significant in the 6th, 8th, 9th, and 10th size deciles. For all ten size deciles put together, the F-test of the hypothesis that the coefficients for low and high institutional ownership firms are the same has the value of 22.70 and a p-value of 0.0001! This result confirms, using much better and independently constructed data than that used either by Lee *et al.* or by CKM, the earlier result of Lee *et al.* that low institutional ownership stocks rise more when discounts narrow than do high institutional ownership stocks. This evidence casts serious doubt on the assertion of CKM that the Lee *et al.* results are just a "chance sampling fluctuation."

CKM also attack our "critical Table IV." They claim that by switching around the dependent and the independent variable, one can see that "the smallest firms are no more strongly related to closed-end fund discounts than are firms in other size classes." Their Table II presents regressions of the return on the portfolio of closed-end funds on the return on the net asset value of these funds and the returns on decile portfolios taken one at a time. CKM interpret these regressions as showing that the marginal contribution of small firms to explaining returns on closed-end funds, given net asset values, is not larger than that of medium and even large cap firms. In this "more revealing form," they see no role for small firms at all.

An inspection of their Table II, however, reveals a problem with their specification. CKM allow the coefficient on the return to NAV to be determined by the regression, even though theoretically it should be restricted to 1, i.e., the market value of a closed-end fund should vary one for one with its net asset value. In fact, when they use the return on NAV as the only regressor in Table II, the coefficient is 0.95. But when decile returns, which are of course correlated with the return on NAV, are included in the regression, the coefficient on RNAV drops to 0.6 or 0.7. A theoretically more satisfactory way to run their "more revealing" regression is to restrict the coefficient on RNAV to 1, so that in fact fund prices are constrained to vary one-for-one with changes in net asset values, and decile returns are indeed explaining changes in the prices of funds beyond changes in net asset values. These results are presented in Panel A of our Table III. The results show that in terms of R-squared, in terms of the coefficient, and in terms of its t-statistic, the strongest correlation is between the return on the portfolio of closed-end funds and the return on small stocks. These results are consistent with those in Table IV of Lee *et al.*, and contradict the interpretations made by CKM.

There remains a question of whether small stock returns explain "a lot" of the variation in closed-end fund discounts. The R-squared in the first regression of Panel A of Table III is only 3.5 percent, suggesting the small stock returns explain only a small fraction of variation in discounts. This R-squared is misleading, however, since the dependent variable in the regression is

Table III

Monthly Time Series Relations between Returns on Closed-End Fund Share Prices Minus Returns on Net Asset Value, Returns on Size-Decile Portfolios and Excess Returns on Size-Decile Portfolios (1965/8 to 1985/12)

This table presents the regression of monthly value-weighted returns (with dividends) of share prices of a portfolio of closed-end funds (RSP) minus monthly value-weighted returns (with dividends) of net asset value of the corresponding closed-end funds (RNAV) on different equally weighted size-decile portfolios of the NYSE (DEC_i). In Panel A, all variables are presented without market adjustment. In Panel B, the variables are first regressed against monthly value weighted NYSE market returns.

$$\text{Panel A: } (RSP_t - RNAV_t) = b_0 + b_1 DEC_i + e_t$$
$$\text{Panel B: } (RSP_t - RNAV_t)' = b_0 + b_1 (DEC_i)' + e_t$$

where $(RSP_t - RNAV_t)'$ and $(DEC_i)'$ are the residuals from the regression of $(RSP_t - RNAV_t)$ and DEC_i, respectively, on the monthly value-weighted NYSE market return. In the last row, DEC_i is replaced by $(DEC_1 - DEC_{10})$ for Panel A, and $(DEC_i)'$ by $(DEC_1 - DEC_{10})'$ for Panel B.

Portfolio	Panel A				Panel B			
(i)	Intercept	DEC_i	t-Statistic	Adj. R^2	Intercept	$(DEC_i)'$	t-Statistic	Adj. R^2
(smallest)								
1	0.0004	0.066	3.15	0.035	0.000	0.152	5.03	0.090
2	0.0007	0.060	2.53	0.022	0.000	0.197	4.85	0.085
3	0.0009	0.050	2.00	0.012	0.000	0.193	4.17	0.063
4	0.0008	0.056	2.08	0.013	0.000	0.268	4.90	0.086
5	0.0010	0.042	1.52	0.005	0.000	0.240	3.89	0.055
6	0.0010	0.045	1.55	0.006	0.000	0.305	4.37	0.069
7	0.0013	0.022	0.74	−0.002	0.000	0.244	2.76	0.026
8	0.0013	0.026	0.82	−0.001	0.000	0.347	3.36	0.041
9	0.0014	0.015	0.45	−0.003	0.000	0.378	2.69	0.025
10	0.0018	−0.034	−0.90	−0.001	0.000	−0.580	−3.44	0.043
(largest)								
1 minus 10								
(small-large)	0.0004	0.122	4.73	0.080	0.000	0.131	4.93	0.087

effectively a change in the discount, which is purged of the market return, while the independent variable, namely DEC1, contains the market return. As the last row of Panel A shows, if the independent variable is the difference between DEC1 and DEC10 returns, which is a measure of the small firm premium, then the R-squared of the regression is 8 percent. Variation in the small firm *premium* explains 8 percent of the variation in discounts, and, of course, vice versa. As Table X of our original paper shows, the value-weighted discount compares favorably with conventional "fundamental" factors in explaining small firm premium.

Panel B of Table III presents a more systematic analysis of the explanatory power of decile returns purged of the market return. To produce this panel, we regressed both the dependent and the independent variables used in

Panel A on the monthly value-weighted NYSE market return, took the residuals, and then regressed the residuals from the dependent variable on the residuals from the independent variable. The R-squares in Panel B show how much of the component of the change in discounts orthogonal to the market is explained by the component of decile returns orthogonal to the market. The results of the regression show that DEC1 residuals have the highest explanatory power of 9 percent, and that the R-squares fall approximately monotonically. These results confirm that small firm returns (net of the market) explain more of the change in discounts (net of the market) than medium or large firm returns.

CKM also object to the Lee *et al.* regression with one fund, TriContinental (TriCon). They present regressions that show that TriCon returns are correlated with both decile 10 and decile 8 stock returns, and not with decile 1 returns. Lee *et al.* showed TriCon's holdings to be mainly in large firms, so the correlation with deciles 8 and 10 is not surprising. Since CKM do not look at discounts or control for changes in net asset value, we are not quite sure what to conclude from their regressions. However, a simple regression of monthly changes in the TriCon discount on the small firm premium (DEC1 − DEC10) over the original Lee *et al.* sample period (1965 to 1985) produces a slope coefficient of −8.26 with a t-statistic of −2.24. A regression similar to that in Panel B of Table III, in which monthly changes in the TriCon discount and DEC1 returns are first regressed on the market, and then residuals are regressed on each other, yields a slope of −11.78, and a t-statistic of −2.74. Thus the "more revealing" specification suggested by CKM confirms that small firms move together with discounts of TriCon, as well as of the portfolio of closed-end funds.

In summary, none of the stones CKM throw seem to have hit. There is nothing embarrassing for Lee *et al.* in the fact that utility stocks rise when fund discounts narrow. In fact utilities with lower institutional ownership rise more when discounts narrow than higher institutional ownership utilities. There is nothing alarming about the fact that small stocks move together with discounts even for "high" institutional ownership small stocks, since virtually all small stocks are predominantly individually owned. In fact, using much better data, we have shown that *within* nine out of ten size deciles, lower institutional ownership stocks do better when discounts narrow than high institutional ownership stocks. This new evidence strongly supports the arguments made in Lee *et al.* Finally, our original results do not change from reshuffling the variables. In fact, using a correct restriction of coefficients in the preferred specification of CKM confirms the statistical significance of our results, and shows that discount changes explain 8 or 9 percent of the small firm premium. The regressions run here support the hypotheses in Lee *et al.*: small firms, and particularly low institutional ownership firms, move together with closed-end fund discounts.

It is also important to note that CKM have obviously selected the evidence from Lee *et al.*—both that Lee *et al.* produced themselves and that they reported from other studies—that CKM find the weakest. There is consider-

able evidence consistent with the investor sentiment hypothesis that they simply ignore. This includes evidence on new issues of closed-end funds when seasoned funds sell at a premium or low discount, on the January effect in discounts as well as in small firms, on the correlation between the discounts and redemptions on open end funds, on correlation in changes in discounts across funds, etc. Moreover, as stressed in Lee *et al.*, other explanations of the puzzle do not seriously address the evidence. This is not to say that the investor sentiment hypothesis is an obviously correct or a complete solution to the puzzles. As CKM say, the right place to go is back to the drawing board, and to continue the investigation of the evidence. But the drawing board is not "old." We should consider investor sentiment and other new hypotheses, and not go back to the "stone" age of finance.

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