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Size, Seasonality, and Stock Market Overreaction

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Abstract

Recent research finds that the prior period's worst stock return performers (losers) outperform the prior period's best return performers (winners) in the subsequent period. This potential violation of the efficient markets hypothesis is labeled the "overreaction" phenomenon. This paper shows that the tendency for losers to outperform winners is not due to investor overreaction, but to the tendency for losers to be smaller-sized firms than winners. When losers are compared to winners of equal size, there is little evidence of any return discrepancy, and in periods when winners are smaller than losers, winners outperform losers.

I. Introduction

For the past generation, the efficient markets hypothesis has been one of the most dominant themes in financial research. While the efficiency of the stock market was once virtually taken for granted,[1] it is now being seriously questioned again, primarily due to the recent evidence on the return reversal behavior of stock prices; i.e., the prior period's worst stock return performers (losers) outperform the prior period's best return performers (winners) in the subsequent period. This potential violation of the efficient markets hypothesis is labeled the "overreaction phenomenon," because it suggests that the market has overreacted in the initial period, and that it subsequently corrects itself.[2]

Perhaps the most influential papers on the overreaction hypothesis are those by DeBondt and Thaler (1985), (1987) who find evidence of price reversals in 3-year returns.[3] The research presented here reexamines DeBondt and Thaler's evi-

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[1] For example, Jensen (1978) states, "I believe that there is no other proposition in economics which has more solid empirical evidence supporting it than the Efficient Markets Hypothesis."

[2] See Camerer (1989) and DeBondt (1989) for reviews of recent literature on mean reversion and overreaction in stock prices.

[3] Their primary results are based on 3-year returns. They use return intervals as long as 5 years, but their results are insensitive to the length of the return interval beyond 3 years. Additionally, Rosenberg and Rudd (1982), Rosenberg et al. (1985), Lehmann (1989), and Bremer and Sweeny

dence on stock market overreaction, in the light of recent findings relating the overreaction phenomenon to the well-documented size phenomenon. Although DeBondt and Thaler ((1987), p. 579) claim that "The winner-loser effect is not primarily a size effect," there is evidence suggesting that the relation between the size and the overreaction phenomenon demands further investigation. This evidence comes from their own, as well as related, research.

DeBondt and Thaler ((1987), Table 5, Panel A) show that the extreme loser quintile and the extreme winner quintile (ranked by cumulative average residuals over the prior 3 years) have average market values of equity of 304 million and 582 million, respectively, at the time of portfolio formation. Thus, winners are almost twice as large as losers, on average, but DeBondt and Thaler perform no statistical tests for the equality of size between the two groups.

Zarowin (1989) examines the subsequent stock return performances of firms that have experienced extreme earnings years and finds that while the poorest earners outperform the best earners by a statistically significant amount over the subsequent 36 months, the poorest earners also are significantly smaller than the best earners at the time of portfolio formation. When the poorest earners are matched with the best earners of equal size, there is virtually no evidence of differential stock return performance, indicating that the market does not overreact to extreme earnings news, and suggesting that size discrepancies between winners and losers may be responsible for the apparent overreaction phenomenon.

Motivated by these findings, we reexamine DeBondt and Thaler's evidence on stock market overreaction, controlling for size differences between winners and losers.[4] We find that losers are (usually) smaller than winners.[5] We then perform two sets of tests to examine the role of firm size in the overreaction phenomenon. First, by matching subgroups of winners and losers of equal size, we find that all return discrepancies, except those in January, are eliminated. This suggests that an effect other than overreaction, such as the tax loss selling phenomenon, may be at work.[6] Second, we perform separate analyses on periods when losers are smaller than winners, and on periods when winners are smaller than losers. When losers are smaller, they outperform winners; when winners are smaller, they outperform losers. The tendency for losers to be smaller than winners, therefore, appears to be responsible for the overreaction phenomenon.

(1987) find evidence of overreaction in short-term price movements (one day in Bremer & Sweeny, one week in Lehmann, and one month in Rosenberg and Rudd and Rosenberg et al.). However, the short-term and long-term reversals may not reflect the same phenomenon.

[4] Fama and French (1986) and Jegadeesh (1987) also deal with the effects of size and prior period performance on returns. Fama and French use methods similar to ours except that their rankings on size and prior period returns are sequential, not independent, with firms first being sorted into size deciles, and then into losers and winners within deciles. Jegadeesh runs monthly cross-sectional regressions of returns against lagged returns and conducts hypotheses tests on coefficients using the methodology of Fama and MacBeth (1973). Both we and Fama and French treat our samples as series of nonoverlapping 3-year periods, whereas Jegadeesh treats his as a series of one-month periods. While this allows Jegadeesh to have more independent observations, he does not address the question of whether a *multimonth* buy-and-hold strategy (based on past returns) earns abnormal returns.

[5] As explained in Section III, we find that losers are, on average, smaller than winners in 13 of the 17 nonoverlapping 3-year sample periods studied here.

[6] Chan (1986) and Jones (1987) find evidence that tax loss selling behavior affects returns in January.

Thus, the results presented here show that differential size, and not investor overreaction, is driving the winner versus loser phenomenon, and that a widely regarded efficient markets anomaly is subsumed by the size and seasonal phenomena.

The paper is organized as follows. Section II replicates the DeBondt and Thaler (1985) results and examines the ability of risk differences and seasonality to explain the winner versus loser phenomenon. We find that neither risk nor seasonality alone can account for their results; i.e., losers outperform winners on a risk-adjusted basis over all months. Section III examines size differences between winners and losers and compares the subsequent returns of prior period loser and winner portfolios of comparable size. When size is controlled for, losers outperform winners only in January. Since we find that losers outperform winners by a large amount in the first January of the test period, this result may be due to the well-documented January effect, or to investor overreaction in the initial month of the test period. In Section IV, we distinguish between these competing hypotheses by forming portfolios based on a June 30th, rather than a December 31st, ranking cycle. The January effect remains, but we find no July effect. Section V examines subperiods when losers are smaller than winners and subperiods when winners are smaller than losers. In the former, losers outperform winners; in the latter, winners outperform losers. Section VI concludes the paper with a summary of the findings and their implications, and suggestions for future research.

II. The Overreaction Hypothesis: Preliminary Evidence

A. Subsequent Return Differences between Extreme Prior Period Performers

Beginning December 31, 1932, and continuing for each successive nonoverlapping 3-year period through December 31, 1977, DeBondt and Thaler (1985) formed separate portfolios of the top and bottom 35 (or 50) stock return performers over the prior 36-month period. They used as their stock return performance metric the firm's cumulative market-adjusted excess return over that prior 36-month period.[7] They then observed the return behavior of the two portfolios over the subsequent 36 months. They found that, on average, the 35 losers outperformed the 35 winners by a statistically significant 24.6 percent over this period. Furthermore, 20.7 percent of the cumulative return discrepancy (i.e., 84 percent) came in the 3 Januaries of the test period.

Panel A of Table 1 reports the results of a similar analysis, based on seventeen nonoverlapping 3-year test periods, beginning in January 1930. The 3-year ranking periods begin in January 1927. We define winners and losers as the top and bottom quintiles of firms ranked by cumulative market-adjusted returns over the 36-month rank period. We use quintiles (rather than the 35 or 50 most extreme firms) to ensure that in the next stage of the analysis, when firms are ranked by size, there are extreme winners and losers of all size ranges.

[7] They used the CRSP equal weighted index as the market index. We do the same for all tests reported in this paper. We also follow their procedure of dropping a firm from the test sample as soon as it shows a missing return.

The results in Table 1, Panel A, confirm DeBondt and Thaler's original findings. Losers outperform winners by a statistically significant amount over the test period.[8] Since we include less extreme firms than DeBondt and Thaler, it is not surprising that our cumulative return difference of 17.4 percent is less than theirs.[9]

Like DeBondt and Thaler, we find a strong January effect; 15.2 percent of the cumulative return discrepency (i.e., 87 percent) comes in the 3 Januaries of the test period, and all 3 Januaries show a statistically significant return difference between winners and losers.

B. Can Differences in Risk Explain This Result?

Differences in risk (beta) between winners and losers are a possible explanation for the superior performance of losers over winners shown in Panel A of Table 1, since the returns shown in Table 1 are market-adjusted, but not risk-adjusted returns. To control for risk differences, we follow DeBondt and Thaler's (1987) procedure of regressing the return on an arbitrage portfolio against the market risk premium, i.e.,

$$R_{At} = \alpha_A + \beta_A\left(R_{mt} - R_{Ft}\right) + \epsilon_{At} , \tag{1}$$

where $R_{At} = R_{Lt} - R_{wt}$ and R_{Ft} = the risk-free (one-month Treasury Bill) rate set at the beginning of the month t; and R_{Lt} and R_{wt} are the returns on the loser and winner portfolios, respectively. The intercept, α_A, from this regression, is the Jensen performance index; and the slope coefficient, β_A, is an estimate of the difference in CAPM-betas between the two portfolios over the test period.

The results of Equation (1) are presented in Panel B of Table 1, which shows that, while losers are significantly riskier than winners, differences in risk cannot account for the return discrepancy. Even controlling for risk, losers outperform winners. Furthermore, this result is not due to January returns, as losers significantly outperform winners in February–December.

Chan (1988) suggests that, due to potential time-varying risk of the arbitrage strategy, running Equation (1) over the full sample period may produce a biased estimate of the strategy's abnormal performance. When we follow Chan's procedure of running a separate regression for each 3-year period (each time the portfolios are updated), our results are virtually unchanged.[10]

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[8] Following DeBondt and Thaler (1985), (1987), we compute test statistics for the difference between loser (L) and winner (W) excess returns and cumulative excess returns by regressing the 34 loser and winner excess returns and cumulative excess returns for each month against a zero-one dummy variable

$$R_{jmt} = \tau_{0t} + \tau_{1t}D + \epsilon_{jmt}, \; j = L,W, \; m = 1,17, \; t = 1,36 ,$$

where R_{jmt} = loser or winner excess return or cumulative excess return in month t, and D = 0,1 dummy variable; D = 0 for winners and 1 for losers.

[9] When we use compounded returns as Fama and French (1986) do, the cumulative return differences are (t-statistics in parentheses):

Months 1–12	0.021	(0.55)
Months 1–24	0.111	(1.83)
Months 1–36	0.195	(2.48)

[10] Our results with Chan's technique are: $\overline{\alpha}$ = 0.025 and u = 8.7, where $\overline{\alpha}$ is the average Jensen

TABLE 1

Tests of the Overreaction Hypothesis

Panel A. Regressions of Portfolio Excess Returns against a Loser-Winner Dummy Variable

$$R_{jmt} = \tau_{0t} + \tau_{1t}D + \epsilon_{jmt}$$

	Excess Returns		Cumulative Excess Returns		
	τ_1	$t(\tau_1)$		τ_1	$t(\tau_1)$
January yr. 1	0.075**	4.31	Months 1–12	0.020	0.54
January yr 2	0.036**	2.98	Months 1–24	0.055	1.86
January yr. 3	0.041**	3.12	Months 1–36	0.174*	2.51

Panel B. Jensen Performance Tests for Arbitrage Portfolios

$$R_{At} = \alpha_A + \beta_A(R_{Mt} - R_{Ft}) + \epsilon_{At}$$

	$\hat{\alpha}$	$\hat{\beta}$	$\bar{R}^2$	NOBS
All Months	0.026** (5.76)	0.150** (2.80)	0.011	612
January Only	0.031 (1.59)	0.532** (2.64)	0.106	51
February–December	0.024** (5.16)	0.102 (1.83)	0.004	561

Notes:

R_{jmt} = market-adjusted return on loser or winner portfolio for month t.

Losers and winners are the bottom and top quintiles of firms ranked by cumulative market adjusted returns over the prior 36 months.

D = zero for prior period winners, one for losers dummy variable.

** = coefficient is significantly greater than zero at the $\alpha = 0.01$ level.

* = coefficient is significantly greater than zero at the $\alpha = 0.05$ level.

R_{At} = the return on an arbitrage portfolio for month t, i.e., $R_{At} = R_{Lt} - R_{Wt}$.

$R_{Mt} - R_{Ft}$ = the market risk premium—the return on the CRSP equally weighted index minus the risk-free (1-month Treasury bill) rate at the beginning of month t.

t-statistics are in parentheses.

NOBS = number of observations used to estimate regression model.

Thus, the results in Table 1 show that prior period losers significantly outperform winners over the subsequent 36 months, and that neither differences in risk nor in January returns can completely account for this return discrepancy.

performance measure and u is its average t-statistic. According to Chan, u approaches a standard normal distribution as the number of test periods gets large. Furthermore, when we follow Chan's (1987) procedure of allowing the beta of the arbitrage portfolio to vary with lagged growth in the industrial production index between months $t-j$ and $t-j-11$ (IP_{t-j}), our results are (t-statistics are in parentheses):

$$R_{At} = \alpha + \beta R_{mt} + \Sigma W_j(IP_{t-j}R_{mt}) + \epsilon_t \quad (j = 1, 13, 25)$$

α	β	W_1	W_{13}	W_{25}	$\bar{R}^2$
0.018 (3 13)	0.678 (3.34)	−0 045 (−1.59)	−0 063 (−2.12)	−0.063 (−1.67)	0.023

This regression was conducted on 372 monthly observations beginning in January 1950. Our industrial production index, taken from the Citibase Database, begins in January 1947, and 3 years of lagged indices are necessary to construct the regressors.

III. The Role of Size in the Winner vs. Loser Phenomenon

A. Examining Size Differences between Winners and Losers

Losers are likely to be smaller-sized firms than winners since losers, by definition, have lost market value relative to winners. Table 2 reports the results of an analysis of size differences between the winner and loser quintiles for each nonoverlapping 3-year period of this study. Size is defined as the market value of the firm's equity at the end of the 3-year ranking period (i.e., beginning of the portfolio formation period).

In 13 of the 17 periods, the mean size of losers is smaller than the mean size of winners. Furthermore, the averages of the quintile ranks for losers and winners show that losers tend to be among the smaller firms, while winners tend to be among the larger ones. This, of course, is not surprising since size is measured at the end of the extreme performance period.

DeBondt and Thaler (1987) dismiss the size effect as an explanation for the overreaction phenomenon because losers (winners) tend to be larger (smaller) than firms in the smallest (largest) size-ranked quintiles. This is exactly what we find, as evidenced by the average size ranks in Table 2. However, since losers *are* smaller than winners, it may be a mistake to dismiss the size effect as an explanation for stock market overreaction.

The crucial point is that such a size discrepancy indicates the need to control for size when comparing the return performances of winners vs. losers, because it is well known that smaller firms outperform larger firms.[11] Without such a control, we cannot know whether differential size or investor overreaction (or perhaps some other phenomenon) is responsible for the tendency for prior period losers to outperform prior period winners in the subsequent period.

B. Excess Return Comparisons, Controlling for Size

In order to control for size while comparing the test period returns of winners and losers, we proceed as follows: at the beginning of each test period, all firms in the sample are given a 1 to 5 ranking based on size. Ranking 1 indicates the smallest firms, ranking 5 the largest. For example, if there are 1,000 firms in the sample, the 200 smallest are coded 1 and the 200 largest are coded 5. Each firm is indexed by i, j where the i index refers to prior period return performance and the j index refers to size; $i = 1$ refers to the losers, $i = 5$ refers to the winners. Likewise, $j = 1$ refers to the smallest firms, $j = 2$ to the next smallest, up to $j = 5$, which are the largest firms. For example, 11 refers to the smallest losers, 12 refers to the next smallest losers, and 15 refers to the largest losers; 51 are the smallest winners, 52 are the next smallest winners, and 55 are the largest winners.

The key feature of our ranking procedure is that for each nonoverlapping 3-year period, the firms in the sample are ranked *independently* by size and by prior period return. This ensures that firms in the smallest (largest) size quintile are truly small (large) with respect to all firms in the sample, not just with respect to

[11] See Schwert (1983) for a discussion of size and related phenomena in finance.

TABLE 2
Size Differences between Winner and Loser Portfolios

3-Year Test Period	ML	Size Rank Losers	MW	Size Rank Winners
1	8.19	1.58	10.91	3.65
2	8.07	2.33	8.24	2.55
3*	10.17	3.53	8.29	2.14
4	8.30	2.19	9.51	2.92
5	8.08	2.39	8.70	2.82
6*	10.68	3.75	8.83	2.09
7	9.60	2.51	10.11	3.09
8	9.75	2.46	10.39	3.17
9	9.04	1.91	10.91	3.56
10	10.34	2.51	11.31	3.35
11	10.86	2.63	11.36	3.03
12	10.56	2.28	11.92	3.56
13	11.50	2.75	11.71	2.94
14*	12.82	3.58	11.95	2.58
15	10.88	1.91	13.03	3.91
16	9.85	1.81	12.36	3.85
17*	12.57	3.49	11.32	2.30

Notes:

ML = mean natural log-size of losers at the beginning of the portfolio formation period.

MW = mean natural log-size of winners at the beginning of the portfolio formation period.

Size Rank = average of the quintile ranks; 1 is smallest, 5 is largest.

* = ML is greater than MW.

firms in their return quintile.[12] We then conduct the Jensen performance tests on 5 groups of losers and winners that are matched by size. The groups are 11 vs. 51, 12 vs. 52, 13 vs. 53, 14 vs. 54, and 15 vs. 55.

Panel A of Table 3 reports the results of the Jensen performance tests, for the 5 size-matched regressions. The 5 regressions are jointly estimated, using Zellner's (1962) seeingly unrelated regression model, SURM.[13] Column 1 of Panel A reports the results of this test where Jensen's α is constrained to be equal across the 5 equations. Columns 2 through 6 report the results of the multivariate regression where the α is allowed to vary across the 5 equations.

The results in Panel A of Table 3 show that when size is controlled for, losers outperform winners only in January; outside of January, there is no differential performance between losers and winners. Interestingly, the α's and their t-statistics for the "all months" row are virtually monotonic across the size-matched groups; the smallest group appears to be driving the significantly positive α in the constrained regression.[14]

As a test of the robustness of the results in Panel A of Table 3, we compared the effects of size and overreaction on returns using Jegadeesh's (1987) cross-sectional regression methodology. The test assumes that returns are linear in the

[12] Note that our sorting method is different from the sequential sorting method used by Fama and French (1986). See footnote 4.

[13] Since the regressors in the 5 equations are identical, this is a multivariate, and not a seemingly unrelated, regression.

[14] When the portfolio returns are weighted by their beginning of test period market values, the results are virtually identical to those reported in Table 3, Panel A.

TABLE 3

Size-Controlled Tests of the Overreaction Hypothesis

Panel A. Jensen Performance Tests for Five Size-Matched Groups[a]

	Jensen's Alpha Estimates[b] (t-statistics)					
		Group[d]				
	Constrained[c]	1	2	3	4	5
All Months	0.0027*	0.0052*	0.0025	0.0026	0.0025	0.0010
	(2.03)	(2.15)	(1.47)	(1.40)	(1.19)	(0.56)
January Only	0.017*	0.023*	0.018*	0.018	0.011	0.021*
	(2.33)	(2.10)	(2.12)	(1.87)	(1.28)	(2.37)
February–December	−0.0001	0.0020	−0.0007	0.0004	0.0010	−0.0018
	(−0.09)	(0.84)	(−0.44)	(0.21)	(0.43)	(−1.03)

Panel B. Results of Cross-Sectional Regressions of Test Period Cumulative Excess Returns against (Log) Size and Rank Period Cumulative Excess Returns[e-g]

$$\text{CXS}_j = \tau_0 + \tau_1 \text{Size}_j + \tau_2 \text{RANKCXS}_j + \epsilon_j$$

	τ_0	τ_1	τ_2
January	0.650**	−0.062**	−0.068**
	(7.39)	(−6.6)	(−5.11)
February–December	0.099	−0.011	0.004
	(0.44)	(−0.50)	(0.143)
Full 36 Months	0.749**	−0.073**	−0.064
	(2.77)	(−2.70)	(−1.94)

Notes:

[a] The 5 size-matched groups are: 11 vs. 51, 12 vs. 52, 13 vs. 53, 14 vs. 54, and 15 vs. 55. 11 and 51 are the smallest losers and winners, 12 and 52 are the next smallest losers and winners, etc., 15 and 55 are the largest losers and winners.

[b] Jensen's alpha is the intercept estimated from the regression model $R_{At} = \alpha_A + \beta_A(R_{Mt} - R_{Ft}) - \epsilon_{At}$. See notes to Table 1 for the description of this regression model.

[c] The 5 size-matched regressions are jointly estimated using the SAS procedure SYSLIN, and the α_A coefficients are constrained to be equal across the 5 equations using the SRESTRICT option.

[d] The 5 size-matched regressions are jointly estimated using the SAS procedure SYSLIN, and the α_A coefficients are allowed to vary across the 5 equations.

[e] CXS = 36-month test period cumulative excess return,
Size = log of market value of equity at beginning of test period, and
RANKCXS = 36-month rank period cumulative excess return.

[f] t-statistics are in parentheses.

[g] Coefficients and t-statistics are computed using the methodology of Fama and MacBeth (1973).

** = coefficient is significantly different from zero at the $\alpha = 0.01$ level.

* = coefficient is significantly different from zero at the $\alpha = 0.05$ level.

explanatory variables and uses the Fama-MacBeth (1973) methodology to compute t-statistics. We performed this test by regressing, for each of the 17 periods, the test period cumulative excess returns of the 10 size- and performance-based portfolios against their mean rank period cumulative excess returns and (log) sizes at the date of portfolio formation. The results are reported in Panel B of Table 3, and they confirm the results in Panel A of Table 3; losers' superior performance over winners is confined to January. Thus, the size-controlled results in Table 3 are consistent with the size and January phenomena, but not with the overreaction phenomenon.

IV. Are the January Returns Due to Investor Overreaction in the Initial Month?

The results in Table 1 show that the first January of the test period yields a large positive return to the overreaction investment strategy. While the well-known January phenomenon may be responsible for this result, we cannot completely rule out investor overreaction as an explanation, because January is the initial month of the trading strategy, when overreaction is, perhaps, most likely to occur.

Thus, to know whether the superior performance of losers over winners in the first January is due to investor overreaction or to the January effect, we repeat our original analysis beginning each 6-year period (i.e., 3-year ranking period followed by 3-year test period) 6 months later. Thus, each ranking period now ends and each test period now begins at $6/30/t$ and $7/1/t$, respectively. In our original tests, the ranking period ends at $12/31/t-1$ and the test period begins at $1/1/t$.

If our original results are due to the January effect, we still expect losers to outperform winners in January, with the new portfolio formations.[15] If our previous results are due to initial month overreaction, we now expect to see a ''July'' effect.

The results of this analysis are shown in Tables 4 and 5. There is a strong January effect in these results, but no July effect. In Table 4, 2 of the 3 Januaries of the test period show significantly positive returns, and 8.2 percent of the 13.7 percent cumulative return to the strategy is earned in January. By contrast, the cumulative return in the 3 July's is only 1.6 percent, and no July shows a significantly positive return.

The Jensen performance measures in Table 5 confirm the presence of a January effect and the absence of a July effect. Thus, the results in Tables 4 and 5 indicate that the January returns observed in our earlier tests are likely not the result of an initial month overreaction effect.

V. Subperiod Analysis

The size-matched portfolio results in Table 3, when compared with the unmatched results in Table 1, suggest that size/January effects, and not investor overreaction, are responsible for the tendency for prior period losers to outperform prior period winners in the subsequent period. We perform an additional test to distinguish between the two competing hypotheses.[16]

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[15] We would not expect as strong a January effect as found in Tables 1 and 3 (with the December 31st ranking cycle) because the firms that are the most extreme winners and losers as of June 30th may not be the most extreme as of December 31st, due to their price movements in July–December.

[16] The results in Section V are based on our original (December 31st) ranking cycle.

TABLE 4

Regressions of Portfolio Excess Returns against a Loser-Winner Dummy Variable for Portfolios Formed on a June 30th Ranking Cycle

$$R_{jmt} = \tau_{0t} + \tau_{1t} D + \epsilon_{jmt}$$

	Excess Returns			Cumulative Excess Returns	
	τ_1	$t(\tau_1)$		τ_1	$t(\tau_1)$
July yr. 1	−0.000	−0.030	Months 1–6	−0.014	−0.78
January yr. 1	0.017	1.40	Months 1–12	0.010	0.38
July yr. 2	0.006	0.97	Months 1–18	0.021	0.82
January yr. 2	0.038**	3.88	Months 1–24	0.079*	2.55
July yr. 3	0.010	0.91	Months 1–30	0.062	1.86
January yr. 3	0.027*	2.18	Months 1–36	0.137*	2.41

Notes: See Notes to Table 1.

TABLE 5

Jensen Performance Tests for Arbitrage Portfolios Formed on a June 30th Ranking Cycle

$$R_{At} = \alpha_A + \beta_A (R_{Mt} - R_{Ft}) + \epsilon_{At}$$

	α	β	$\overline{R}^2$	NOBS
All Months	0.003 (1.59)	0.104** (5.17)	0.04	612
January Only	0.026* (2.55)	0.024 (0.21)	−0.02	51
February–December	0.0009 (0.55)	0.099** (5.04)	0.04	561
July Only	0.006 (1.24)	−0.027 (−0.49)	−0.02	51
August–June	0.002 (1.43)	0.117** (5.47)	0.05	561

Notes: See Notes to Table 1.

The evidence in Table 2 showed that while losers are usually smaller than winners, winners are occasionally smaller than losers. If investor overreaction causes losers to outperform winners, then we expect no difference in returns to the overreaction investment strategy in periods when losers are smaller than in periods when winners are smaller. If differential size is responsible for the observed return behavior of losers vs. winners, then losers should outperform winners when losers are smaller, and winners should outperform losers when winners are smaller. Thus, we conduct separate analyses of periods when losers are smaller vs. periods when winners are smaller to test whether the size effect or the overreaction effect is driving the winner vs. the loser phenomenon.

The results of this analysis are shown in Tables 6 and 7. Panel A of Table 6 shows that when losers are smaller, they outperform winners by a highly significant 26.7 percent over the 36-month test period. All 3 Januaries show significantly positive returns to the overreaction strategy, and 21.4 percent of the cumulative return difference (i.e., 80 percent) comes in January, again highlighting a strong January effect.

Panel B of Table 6 shows that when winners are smaller, they outperform losers! This is consistent with the size phenomenon, but it is inconsistent with the

TABLE 6
Regressions of Portfolio Excess Returns against a Loser-Winner Dummy Variable
$$R_{jmt} = \tau_{0t} + \tau_{1t} D + \epsilon_{jmt}$$

	Excess Returns		Cumulative Excess Returns		
	τ_1	$t(\tau_1)$		τ_1	$t(\tau_1)$
Panel A. For the 13 Periods when Losers Are Smaller Than Winners					
January yr. 1	0.097**	4.74	Months 1–12	0.076	1.97
January yr. 2	0.055**	4.36	Months 1–24	0.144*	2.25
January yr. 3	0.062**	4.29	Months 1–36	0.267**	3.53
Panel B. For the 4 Periods when Winners Are Smaller Than Losers					
January yr. 1	0.002	0.13	Months 1–12	−0.162*	−2.39
January yr. 2	−0.028	−1.65	Months 1–24	−0.041	−0.50
January yr. 3	−0.028*	−2.62	Months 1–36	−0.130	−1.23

Notes: See Notes to Table 1.

overreaction phenomenon. The first year's return difference of −16.2 percent is statistically significant ($t = -2.4$) and losers regain only about 3 percent over the next 2 years. Although the full 36-month difference is not statistically significant, this is not surprising given the small sample size (4 observations). Nevertheless, the magnitude and direction of the results in Table 6, Panel B, when compared with those in Table 6, Panel A, strongly suggest that differential size, and not investor overreaction, is responsible for the winner vs. loser phenomenon.

The Jensen performance measures and test period beta differences for the two subperiods are shown in Table 7. Panel A shows that when losers are smaller, they experience a significantly superior performance that is consistent across all months. Panel B shows that when winners are smaller, they experience a significantly superior performance that is almost identical in magnitude to the losers' superior performance when losers are smaller!

Only in January do we not find strong evidence that smaller winners outperform larger losers (Table 7, Panel B), although the negative point estimate for $\hat{\alpha}_A$ does favor the size effect over the overreaction effect. The inconclusiveness of the January results in Panel B of Table 7 may be due to the small sample size used for this regression (12 observations). Alternatively, it may be due to the potentially offsetting effects of size vs. tax loss selling; i.e., the size effect favors the smaller winners, but the tax loss selling effect favors the larger losers.[17] Nevertheless, the results in Tables 6 and 7 again indicate that the winner vs. loser phenomenon is another manifestation of the size phenomenon in finance. Losers outperform winners only because, on average, losers are smaller-sized firms than winners. When winners are smaller than losers, however, winners outperform losers.

[17] Interestingly, the slope coefficients for all 6 regressions in Table 7 show that smaller firms have higher test period betas than larger firms, regardless of prior period performance.

TABLE 7

Jensen Performance Tests for Arbitrage Portfolios

$$R_{At} = \alpha_A + \beta_A(R_{Mt} - R_{Ft}) + \epsilon_{At}$$

	α	β	$\overline{R}^2$	NOBS
Panel A. For the 13 Periods when Losers Are Smaller Than Winners				
All Months	0.048** (10.20)	0.273** (4.99)	0.049	468
January Only	0.054** (3.05)	0.666** (3.79)	0.258	39
February–December	0.045** (9.39)	0.219** (3.79)	0.030	429
Panel B. For the 4 Periods when Winners Are Smaller Than Losers				
All Months	−0.046** (−5.79)	−0.405** (−3.89)	0.090	144
January Only	−0.016 (−0.47)	−0.683 (−1.50)	0.102	12
February–December	−0.048** (−5.72)	−0.402** (−3.69)	0.088	132

Notes: See Notes to Table 1.

VI. Conclusions

This paper has reexamined DeBondt and Thaler's evidence on stock market overreaction, i.e., the tendency for losers over the prior 3-year period to outperform winners during that period in the subsequent 3-year period. The research presented here has shown that losers' superior performance over winners during the 3-year test period is due, not to investor overreaction, but to size discrepancies between winners and losers since losers tend to be smaller than winners. Without controlling for size, losers significantly outperform winners, and neither differences in risk (beta) nor in January returns can account for this result. When losers and winners of comparable size are matched, there is evidence of differential performance only in January. When 3-year losers are smaller than winners, losers outperform winners; when 3-year winners are smaller than losers, winners outperform losers. Thus, the winner vs. loser phenomenon found by DeBondt and Thaler appears to be another manifestation of the size phenomenon in finance.

Interesting questions emerge from our results. While the size phenomenon appears to subsume the 3-year return reversals documented by DeBondt and Thaler, the anomaly of short-term (i.e., one-day through one-month) overreaction remains. Are these apparent trading rule profits also subsumed by a larger effect? Since losers outperform comparably sized winners in January, this may be due to tax loss selling. An interesting avenue of future research would be to compare the overreaction ranking variable with the tax loss selling measures of Reinganum (1983) and Roll (1983). Whether the size phenomenon is itself a manifestation of market inefficiency or a misspecification of the capital asset pricing model, is an ongoing, important topic of financial research. Nevertheless, the evidence presented here shows that the market is not characterized by the overreaction phenomenon hypothesized by DeBondt and Thaler.

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