Delayed Reaction in Stocks with the Characteristics of Past Winners: Implications for Momentum, Value, and Institutional Following

Steven L. Jones
Indiana University - Kelley School of Business

Drew B. Winters*
University of Central Florida

The common characteristics of extreme past winners form a unique synthesis of the return-momentum, earnings-momentum, and value strategies. We find that stocks that satisfy these characteristics produce significant positive abnormal returns for up to one year in a NYSE/Amex sample and for up to two years in a NASDAQ sample. The more prolonged accumulation of abnormal returns in the NASDAQ stocks relative to the NYSE and Amex stocks and the lack of any observable return reversal support delayed reaction as an explanation for the abnormal returns. In addition, we find the institutional response is quicker in the NYSE/Amex sample than in the NASDAQ sample. We interpret this evidence as consistent with institutions contributing to the gradual correction of underreaction in these stocks. The magnitude of the abnormal returns and their association with institutional following also implies that the returns to momentum and value strategies reported in the recent literature are at least in part due to delayed reaction.

Introduction

The efficient market hypothesis (EMH) has been questioned in numerous papers that isolate one particular firm characteristic and then detect associated abnormal returns. For example, abnormal returns have been observed in stocks selected on the basis of momentum, value, institutional following, contrarian returns, and firm size.

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Although that work casts doubt on the efficient market hypothesis, risk misspecification has not been rejected as an alternative explanation. In addition, it is not clear that the apparent opportunities are large enough to survive transaction costs.[1] But if the objective is to determine whether material market inefficiencies exist and, if so, the conditions under which they arise, then a shortcoming of these papers is that they presuppose where one should look. It is possible that some other characteristics, or a particular combination, could earn even higher returns.

Reinganum (1988) uses a unique approach to address this shortcoming. Instead of a priori isolating characteristics, he selects winning stocks that at least doubled in price within a calendar year and identifies their leading characteristics. He finds these winners had nine characteristics in common prior to their price appreciation. His test of their predictive power reveals that stocks that satisfy these characteristics earn a mean return that accumulates over two years to a dramatic 50.7 percent (in excess of the contemporaneous return on the S&P 500). While Reinganum's findings are widely cited in textbooks, little consideration has been given to why the strategy earns such high returns.[2]

In this paper, we replicate the strategy and document that it earns significant and material long-horizon returns that survive risk-adjustment. Given this finding, we are interested in why the strategy appears to work, as well as the implications for the market efficiency literature. In particular, is the return pattern due to overreaction or delayed reaction, and do institutions contribute to, or reduce, the inefficiencies implied in the pattern? Studying the behavior of institutions in these stocks adds to our understanding of why the return pattern exists, as well as the opportunities it may present to investors.

Why does the strategy produce high returns? Clues come from three observations regarding the original winners:

- Eight of the nine common characteristics are consistent with momentum in either past returns or earnings;

[1]See, for example, Jegadeesh and Titman (1993) on return momentum; Bernard and Thomas (1989) on earnings momentum; Lakonishok, Shleifer, and Vishny (1994) on value strategies; Grinblatt, Titman, and Wermers (1995) and Arbel, Carvell, and Strebel (1983) on institutional following; Chopra, Ritter, and Lakonishok (1993) and Jones (1993) on contrarian return strategies; and Reinganum (1981) on firm size. Fama and French (1996) argue that with the exception of short-term return momentum, these anomalies can be explained by a multifactor asset pricing model that is consistent with a rational ICAPM or APT. Chan, Jegadeesh, and Lakonishok (1996) indicate that the returns to short-term earnings and return-momentum strategies may not be large enough to be exploitable.

[2]Reinganum's (1988) findings are discussed in Haugen, *Modern Investment Theory* (1997, p. 710); Bodie, Kane, and Marcus, *Essentials of Investments* (1998, p. 244), and Levy, *Introduction to Investments* (1999, pp. 434, 704-706). Levy's Chapter 19, on common stock selection, devotes an entire section to Reinganum's strategy. No consideration, however, is given to the source of the strategy's success.

- The other characteristic is the well-known value indicator of Benjamin Graham (1973), market-to-book ratio of less than one; and
- The number of institutional investors in these winners did not increase prior to the price appreciation but more than doubled during the subsequent appreciation.

The relevance of these observations is more evident today, in light of newer findings. Specifically, Jegadeesh and Titman (1993) document that winning NYSE and Amex stocks, that experienced return-momentum over the prior two quarters, earned a mean abnormal return of 9.5 percent in the subsequent year. They attribute the abnormal returns to delayed reaction (i.e., the correction of underreaction) to firm-specific information. Similarly, Bernard and Thomas (1989) find that stock prices underreact to news about future earnings contained in current earnings announcements. This is the so-called *post-earnings announcement drift* in which stocks with favorable (unfavorable) earnings surprises earn positive (negative) abnormal returns for two to three quarters after the announcement. In regards to the value indicator, Lakonishok, Shleifer, and Vishny (1994) show that low market-to-book stocks outperformed high market-to-book stocks by 10 to 11 percent per year, on average. Moreover, La Porta, Lakonishok, Shleifer, and Vishny (1997) show that much of this superior performance is due to earnings surprises that are systematically more favorable in value stocks.

Given the momentum and value characteristics of the strategy, these recent findings suggest the high returns represent the market's gradual correction of underreaction. Jegadeesh and Titman, however, also report that almost one-half of the 9.5 percent return is reversed in the second year. They interpret this reversal as consistent with DeLong, Shleifer, Summers, and Waldmann's (1990) claim that extreme price movements reflect overreaction if part of the initial movement is due to positive feedback trading (i.e., buying past winners in an attempt to benefit from return momentum). Grinblatt, Titman, and Wermer (1995) document positive feedback trading prevalent among institutional investors. Thus, the dramatic increase in institutional following observed in the original winners suggests the strategy may be identifying stocks that are initially undervalued but eventually become overvalued due to positive feedback trading by institutions.

In DeLong, Shleifer, Summers, and Waldmann, however, overreaction stems from positive feedback trading because it originates from *noise traders*, who practice a range of strategies that ignore fundamentals and thus create systematic pricing errors called *noise*. Uncertainty about the future level of systematic noise is known as *noise-trader risk*. Arbitrageurs price this risk. It follows that positive feedback trading by institutions will result in overreaction only if the institutions act as noise traders. If institutions instead act as informed traders, who consider fundamentals, their positive feedback trading may result in the gradual recognition of value. In this case, the increases in institutional following observed in the original winners would be consistent with delayed reaction but not with overreaction.

We can see from the recent literature that, on the face of it, the strategy's returns and the increased institutional following in the winners can be reconciled with either overreaction or delayed reaction. In this paper, we differentiate these explanations by replicating Reinganum's strategy with holdout samples and then analyzing the pattern of quarterly abnormal returns over two-year holding periods. The abnormal returns accumulate gradually for up to one year in a NYSE/Amex sample and for up to two years in a sample of NASDAQ firms, but we fail to detect a reversal pattern that would support overreaction. An implication of our finding is that a particular combination of momentum and value characteristics identifies stocks that experience material underreaction and dramatic corrections. This implies that the returns to momentum and value strategies in the aforementioned literature are at least partially due to market inefficiency. We also find a pattern of significant increases in institutional following in the stocks of our replication and show that it is due to positive feedback trading. The positive feedback trading in these stocks, however, appears to contribute to increased pricing efficiency and lower risk premiums.

The Common Characteristics of Past Winners

Identifying the Common Characteristics of Past Winners

Reinganum obtained his sample of past winners from the William O'Neil & Co. publication, *The Greatest Stock Market Winners: 1970-83*. Each of these stocks more than doubled in price during at least one year of the 1970 to 1983 period. The *Datagraph* books, provided by O'Neil & Co., then were used to identify any financial characteristics or trends in characteristics that prevailed in the winners during the eight quarters prior to their appreciation. The possible characteristics from the *Datagraph* books are from five categories:

(1) *Smart money*, which includes the trading of institutional investors and corporate insiders;
(2) Valuation measures, such as market-to-book and price-to-earnings ratios;
(3) Technical indicators, such as relative strength;
(4) Earnings measures, such as changes in quarterly earnings; and
(5) Miscellaneous variables, such as the ratio of the price on the buy date to the maximum price during the previous two years.

From these categories, Reinganum identified the following nine characteristics as having the tendency to predict the winners' appreciation.

(1) Market-to-book ratio is less than 1.0;
(2) Average quarterly earnings growth rate over the past five years is positive;
(3) Quarterly earnings are accelerating (i.e., there is a positive change in the change in quarterly earnings);
(4) Pretax profit margins are positive;
(5) Fewer than 20 million shares of common stock shares are outstanding;

(6) Relative-strength rank is at least 70;[3]
(7) Relative-strength rank of the stock in the current quarter is greater than the rank in the previous quarter;
(8) O'Neil *Datagraph* rating is at least the 70th percentile; and
(9) The stock is within 15 percent of its maximum price from the prior two years.

Reinganum's strategy is to screen stocks based on these characteristics and generate a buy signal for any stock that survives all nine. This is effectively a test of the predictive power of the characteristics outside the sample of 222 winners. His test identifies 453 NYSE and Amex stocks that survive the nine screens over the 1970-1983 period. A position in a survivor is taken at the end of the quarter subsequent to the quarter in which the buy signal was generated. The one-quarter delay is intended to insure that the earnings reports were publicly available. He reports that the survivors' mean buy-and-hold return exceeds that of the S&P 500 by 50.7 percent.

The Significance of Reinganum's Strategy

The strategy's connection with the recent literature is evident from the characteristics. The value of characteristic 1 (market-to-book ratio of less than one) recently has been affirmed by Lakonishok, Shleifer, and Vishny (1994) who show that between 1968 and 1990 low market-to-book stocks earned mean returns 10 to 11 percent greater than high market-to-book stocks. Characteristic 2 (positive average quarterly earnings growth rate over past five years), characteristic 3 (accelerating quarterly earnings), and characteristic 4 (positive pretax margins), together capture earnings momentum; thus, stocks satisfying these screens are more likely to experience the post-earnings-announcement drift of Bernard and Thomas (1989).

Reinganum notes that the stocks of many of the original 222 winners split during their dramatic price run-ups. He therefore suggests that characteristic 5 (fewer than 20 million shares of stock outstanding), along with the return momentum characteristics, identifies stocks that are about to split. The logic is that stocks that have already split are likely to have more than 20 million shares outstanding. Characteristic 9 (a stock must be selling within 15 percent of its maximum price from the previous two years) tends to support this stock split interpretation. The significance of these potential splits was not clear, however, until Ikenberry, Rankine, and Stice's (1996) finding that stocks that split two for one earned abnormal returns that accumulate to 15 percent, on average, over three post-split years. Their explanation is that managers split their stock to move the price from the high to the low end of a preferred trading range and that the decision to split is conditioned on inside information about future performance. Thus, a split signals favorable inside information, and the market is slow to react.

[3]Reinganum defines the relative strength of a stock as the weighted average of the percentage price changes of the stock over the previous 12 months. The price change in the most recent quarter receives a weight of 40 percent, while the other three quarters are weighted 20 percent each.

Characteristic 6 (relative strength rank of at least the 70th percentile) and characteristic 7 (relative strength rank of the stock in the current quarter is greater than the rank in the previous quarter) together reflect the return momentum that Jegadeesh and Titman (1993) find predicts future returns. Finally, characteristic 8 (an O'Neil *Datagraph* rating of at least 70) combines earnings and return momentum. (The O'Neil rating is a proprietary formula that assigns weights to relative strength, earnings momentum, and other factors.)

The commonality of characteristic 1 (market-to-book ratio less than one) with the return momentum characteristics (5, 6, 7, 8, 9) and the earnings-momentum characteristics (2, 3, 4, 8) implies that big winners may perform well prior to their price run-up. This momentum, however, is conditional on valuation measures, such as market to book, remaining at attractive levels. Reinganum points out that if stocks are screened only on characteristics 2 through 9, then the strategy's two-year holding period return declines almost 40 percent. He shows that the critical characteristics, in terms of generating high test period returns, are characteristics 1, 3, 5, and 7. (To reiterate, characteristics 1, 3, 5, and 7 are market-to-book less than one, quarterly earnings are accelerating, fewer than 20 million common shares outstanding, and relative strength rank of the stock in the current quarter is greater than in the prior quarter, respectively.) Thus, Reinganum's strategy is a synthesis of the results from Lakonishok, Shleifer and Vishny, Jegadeesh and Titman, Bernard and Thomas, and Ikenberry, Rankine, and Stice.

Data and Test Methodology

To implement Reinganum's strategy, we use the Compustat tapes to calculate seven of the nine characteristics. We are unable to duplicate characteristic 2, the five-year growth rate based on quarterly earnings, because the Compustat quarterly tapes do not go back far enough given that we wish to start testing the strategy in 1975. Also, we cannot replicate the proprietary *Datagraph* rating, characteristic 8. The omission of these two characteristics should not materially impact our ability to detect any abnormal returns because, as mentioned, Reinganum reports that the critical characteristics are numbers 1, 3, 5, and 7.

Table 1 shows the number of firms on the Compustat tapes that have a record of the financial variables necessary to calculate the seven characteristics. We begin with 1975 because this is the first year in which the tapes contain enough observations to conduct a meaningful test. (Beginning the test in 1975 necessitates data availability in 1973.) 1985 is the last year in which we identify stocks because this keeps the total length of our replication (1973-1986) the same as Reinganum's test (1970-1983). It is our intention to replicate Reinganum's test, not to test his strategy out of time period. In addition, this period covers most of the years from the test periods in Lakonishok, Shleifer, and Vishny (1968-1990), Jegadeesh and Titman (1965-1989), and Bernard and Thomas (1974-1986).

Table 1-Number of Stocks on the Compustat Tapes with a Record of the Necessary Financial Variables

Year	Total Number of Stocks	Number of NASDAQ Stocks	Number of NYSE/AMEX Stocks
1970	1490	206	1284
1971	1624	250	1374
1972	1747	319	1428
1973	1848	359	1489
1974	1931	414	1517
1975	1970	439	1531
1976	2033	478	1555
1977	2102	519	1583
1978	2231	607	1624
1979	2455	785	1670
1980	2639	917	1722
1981	2990	1202	1788
1982	3150	1319	1831
1983	3623	1694	1929
1984	3981	1972	2009
1985	4436	2337	2099
1986	5187	2918	2269
1987	5873	3455	2418

For each surviving stock, we use the CRSP daily returns file with dividends to compute geometrically compounded buy-and-hold returns. We retain the two-year holding period of Reinganum to facilitate direct comparisons and because this interval should be long enough to detect return reversals. In Jegadeesh and Titman reversals began in event month 13. Reinganum did not adjust for risk as a part of his test of the strategy; he did, however, report that the average beta of the original 222 winners was not unusually high. Here, our calculation of abnormal returns accounts for risk more precisely by subtracting the buy-and-hold return on a size-matched control group from the buy-and-hold return of the respective survivor. Each size-matched control group is an initially equally weighted portfolio of the five stocks with market values closest to that of the respective survivor.[4] Thus, a group's mean buy-and-hold return is the mean of individual control firms' buy-and-hold returns. If a matched firm is delisted, the group's subsequent buy-and-hold return is the mean of the remaining firms in the

[4]Our size-matched control group method is similar to the size-matched control firm method of Barber and Lyon (1997). Their method matches only one firm, whereas we match a group of five firms. The advantage of matching with a single firm is that it mitigates the so-called skewness bias in long-run abnormal returns. This bias overstates the standard error of the abnormal return and thus understates the t-statistic and biases against rejecting a null of zero abnormal because skewness biases us against rejecting the null of zero abnormal returns. The disadvantage of matching with a single firm is that the sample size must be large to prevent one or a few outlier control firms from driving a result. To avoid this possibility, we use control groups of five firms. This does introduce the possibility of skewness bias into our t-statistics, but we are not overly concerned because skewness biases us against rejecting the null of zero. Thus, our t-statistics are conservative.

control group. The firms of a control group also are matched to the respective survivor by exchange listing (i.e., NYSE/Amex or NASDAQ).

Data on the number of institutional investors in a stock, as well the percent of each stock's outstanding shares held by institutions, are collected from the *Standard & Poor's Stock Guides*. The original sources of the S&P data are the quarterly 13(f) reports that institutions with more than $100 million in equities under management must file with the Securities and Exchange Commission within 45 days of the end of the next quarter. Because of this reporting delay, we collect end-of-quarter data from the *S&P Stock Guide* six months later (e.g., the data for the end of December are from the following June's issue).

Because the results are similar from both measures (the number of institutional investors in a stock and the percent held by institutions), the upcoming analysis of institutional following only reports the results from the use of the former. We prefer the number of institutions in a stock as a measure because it reflects new entrants and, thus, the possibility of additional analysis. Although our proxy for institutional following does not directly measure analyst coverage, Arbel, Carvell, and Strebel (1983) indicate that the number of institutional investors in a stock and the number of analysts covering a stock are highly correlated. This is logical because sell-side analysts follow stocks as a service to institutional clients. Hence, although our use of the term *institutional following* refers specifically to the number of institutional investors in a stock, the term captures breadth of ownership and analyst coverage as well. We wish to capture all of these.

Testing the Strategy with NYSE and Amex Stocks

Replication with Compustat

Our replication finds that 316 NYSE and Amex stocks survive the seven screens (calculated with Compustat data rather than *Datagraph*). 214 are NYSE stocks and 102 are Amex stocks. We calculate the strategy's return net of the return on the S&P 500 Index, as did Reinganum, to check the accuracy of our replication. We find the two-year buy-and-hold returns for our surviving stocks, net of the contemporaneous returns on the S&P 500, have a pooled mean of 57.8 percent. Given that Reinganum reported a return of 50.7 percent for the same measure, this confirms that our replication captures the underlying phenomena.

Two-Year Buy-and-Hold Abnormal Returns Using Size-Matched Control Groups

Table 2 reports the distribution of two-year buy-and-hold returns for the survivors, net of the returns for the respective size-matched control groups. Individual years of the test are listed in the left column. The number of survivors, N, in a year is listed in the third column. The p-value, in the second column, is from a nonparametric sign test of the median return for the respective year's survivors. Only 10 stocks are selected in

Table 2-Two-Year Buy-and-Hold Abnormal Returns of the NYSE/Amex Survivors, Net of Returns on Size-Matched Control Groups (in percent)

Year	P-Value[a]	N	MEAN	MIN	Q1	MEDIAN	Q3	MAX
1975	.40	33	7.8	-192.2	-34.9	1.0	42.7	278.1
1976	.50	55	14.3	-125.6	-25.6	9.7	55.8	193.8
1977	.98	53	-10.4	-107.3	-62.9	-21.2	22.1	235.4
1978	.50	10	30.9	-44.8	-23.2	11.4	92.6	119.3
1979	.10	26	23.0	-82.1	-39.7	21.7	66.4	258.8
1980	.50	20	12.7	-146.6	-44.0	-6.0	67.2	240.6
1981	.40	58	23.1	-189.4	-28.4	0.7	54.5	413.4
1982	.04	25	38.8	-62.2	-16.2	36.3	83.5	151.1
1983	.18	9	33.0	-28.7	-11.8	40.2	66.2	93.7
1984	.01	16	33.5	-80.0	11.5	37.9	71.7	81.4
1985	.92	11	-5.4	-62.4	-21.3	-12.5	17.5	50.3
Pooled	.26	316	15.0	-192.2	-31.0	4.5	55.4	413.4

[a]Refers to sign test of the median for individual years and t-test for the pooled mean

1978 because the bear market of 1976-1977 prevents most stocks from satisfying the momentum characteristics. This same problem arises in 1983 due to the bear market of 1981-1982. Median buy-and-hold abnormal returns are significantly positive in only three of the 11 years.[5] The lack of a discernable return pattern suggests the underlying phenomenon is unaffected by the passage of time.

The pooled-mean of the two-year buy-and-hold returns is 15.0 percent, but the p-value is not significantly different than zero based on a t-test.[6] These results appear to

[5]The p-values of the test-statistics for the individual years of Table 2 assume cross-sectional independence. Although there is event-time clustering, this assumption of independence is probably reasonable because the pairing of stocks with size-matched control firm portfolios eliminates most systematic sources of return.

[6]Computing the T-statistic for this pooled mean involves treating each quarter as an independent portfolio and converting each quarter's mean holding period return from lognormal to normal. The variance of the pooled mean is estimated as follows:

$$\sigma^2_{pooled} = \sum_{t=1}^{T} w_t^2 \sigma^2 + 2 \sum_{t=1}^{T} \sum_{j=1}^{J} w_t w_{t+j} \sigma_{t,t+j}, \; t \neq j$$

where:

T = The number of pooled quarters;
J = The number of overlapping quarters;
w_t = The number of survivors in quarter t divided by the total number of survivors in the pooled sample;
N_t = The number of survivors in quarter t;

$$\sigma^2 = \sum_{t=1}^{T} w_t (\bar{r}_t - \bar{r}_p)^2$$

$$\sigma_{t,t+j} = \sum_{j=1}^{J} \sum_{t=1}^{T} w_t (\bar{r}_t - \bar{r}_p)(\bar{r}_{t+j} - \bar{r}_p)$$

$$\bar{r}_t = \ln \left| \sum_{i=1}^{N_t} (1+r_{it})/N_t \right|, r_p = \sum_{t=1}^{T} \bar{r}_t \cdot w_t, \text{ and}$$

conflict with Reinganum's assertion that his high returns do not result from the size effect. We do find, as did Reinganum, that few of the survivors are from the smaller size deciles. The pooled mean return, in excess of the S&P 500 Index, of 57.8 percent is related to the size effect because it results from using a value-weighted index (the S&P 500) to measure the performance of an equally weighted portfolio of survivors.

Buy-and-Hold Abnormal Returns and Institutional Following, by Quarter

The above findings suggest that the survivors' abnormal returns are insignificant. The two-year holding period, however, may subsume a shorter period of significant abnormal returns. Jegadeesh and Titman's momentum strategy earned its return over the first four quarters and then lost about one-half of these gains over the subsequent four quarters. Therefore, Table 3 reports the pooled mean buy-and-hold abnormal returns by quarter. Table 3 also allows us to determine whether the abnormal returns accumulate gradually over time. To check if these survivors draw new institutional following (as did the original winners), Table 3 presents the mean number of institutional investors per stock at the beginning of the first quarter and the end of the fourth and eighth quarters.

Over the first four quarters, the survivors' buy-and-hold abnormal returns accumulate to a statistically significant mean of 14.2 percent. This result is strikingly similar to that of Jegadeesh and Titman. Their returns erode in the second year, however, whereas our abnormal return is approximately zero in the second year. After two years our mean buy-and-hold abnormal return becomes insignificant due to the increased variability of the two-year abnormal returns. Per Barber and Lyon (1997), this suggests that skewness in abnormal returns is biasing our result against rejecting the null. Thus, the return pattern is consistent with the correction of underreaction over about a one-year period, rather than overreaction (which would require a reversal pattern).

The mean number of institutional investors per stock is initially 16.4 and gradually increases over two years to 26.4. In addition, over 90 percent of the stocks from our sample experienced an increase in institutional following. For the 222 original winners, Reinganum reports that the mean number of institutional investors per stock begins at 9.3 and increases to 20.9 by the end of the price run-ups. He also reports that over one-half of the winners had no institutional investors on the buy-date. Even after the price run-ups, slightly more than a quarter still lacked a single institutional investor. In our

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r_{it} = The holding period plus the return on survivor i, from quarter t, less the holding period return on the associated benchmark portfolio.

This procedure mitigates potential cross-sectional dependence within quarters. Positive time-series autocorrelation is a potential problem because of the overlapping observations. Consequently, as per Miller (1986, p. 36), we estimate the lagged autocovariances; even though they are small, they are included in the calculation of the standard error.

Table 3–Cumulative Buy-and-Hold Abnormal Returns of the NYSE/Amex Survivors, Net of Returns on Size-Matched Control Groups, by Quarter Relative to Buy Signal (in percent) and the Mean Number of Institutional Investors

Quarter t, Relative to Buy Signal at t = 0	Cumulative Abnormal Returns	Change from Prior Quarter	Mean Number of Institutions, Per Stock
Buy			
t = 0			16.4
t = 1	3.6		
t = 2	7.9	4.3	
t = 3	11.7	3.8	
t = 4	14.2**	2.5	22.4
t = 5	12.3	-1.9	
t = 6	8.3	-4.0	
t = 7	11.0	2.7	
t = 8	15.0	4.0	26.4

Note: Tests of statistical significance are conducted only after the fourth and eighth quarters. These statistics are calculated with the procedure described in footnote 6 to consider the positive time-series autocorrelation from the overlapping observations

** Significantly greater than zero at the 5 percent level

sample, institutions are absent in 16 percent of the stocks on the buy-date and in only 6 percent two years later.

The initial lack of institutional following in the original winners suggests that the neglected firm effect of Arbel, Carvell, and Strebel (1983) may be at work in Reinganum's results (although he did not recognize it as a characteristic). Institutional neglect is consistent with delayed reaction as an explanation for the dramatic price run-ups in the winners. Delayed reaction is also consistent with the return pattern in our survivors. The more modest returns to our survivors may reflect the additional institutional following they received beyond that of the original winners. In an attempt to either corroborate or deny this explanation for the strategy's returns, we turn our attention to the NASDAQ where the typical stock receives less institutional following; thus, delayed reaction may be more prevalent.

Testing the Strategy with NASDAQ Stocks

There are at least two reasons why the typical NASDAQ stock could be expected to react more slowly. First, the process of assimilating new information about neglected stocks that are not widely followed by institutions may be more difficult or costly.[7] For example, institutional analysts use the most recent earnings report to update their

[7] Blume and Friend show that, as of 1985, institutional investors held a larger proportion of the shares of high market value firms, regardless of the market. For example, on both the NYSE and NASDAQ, institutions held about 50 percent of the shares of firms with a market value of $500 million or more. In the same markets, institutions held about 10 percent of the shares of firms with a market value of $10 million or less. It follows, given the preponderance of small firms in the NASDAQ, that institutions play a much larger role in the NYSE relative to the NASDAQ. About 60 percent of NYSE firms have 30 percent or more of their shares held by institutions, while the same can be said for less than 20 percent of NASDAQ firms.

estimate of future earnings growth (or the long-term dividend stream). If an analyst does not follow a stock at the beginning, there is no context in which to interpret the news. In addition, for many neglected stocks, a considerable upfront investment may be required by an analyst to assimilate all the background necessary to interpret new information. A second reason follows from DeLong, Shleifer, Summers, and Waldmann's (1990) model of noise trader risk. They argue that the heavy presence of noise traders in a stock exposes informed traders of the stock to greater risk. Thus, if noise traders are more influential in the absence of institutions, then institutions will react more slowly and deliberately in neglected stocks.

Table 4 reports the mean buy-and-hold abnormal returns in excess of NASDAQ size-matched control groups by quarter. There are only 101 NASDAQ survivors (as opposed to 316 in the NYSE/Amex sample) because for most of the 1973-1985 period fewer NASDAQ firms have the necessary record of financial variables (Table1). The results indicate that buy-and-hold abnormal returns continue to accumulate over two years to a mean of 40.9 percent. The abnormal returns are approximately the same in the second year (22.4 percent) as in the first (18.5 percent). Although not provided in the table, the two-year buy-and-hold abnormal returns for the first quartile, the median, and the third quartile are -20.4, 25.4, and 65.7 percent, respectively.

The mean number of institutional investors per stock increases from 4.7 to 6.1 after the first year and to 7.8 within two years. About 75 percent of the stocks experienced an increase in the number of institutional investors over the two years. But even after two years of significant abnormal returns, the NASDAQ survivors have fewer institutional investors, on average, than did the survivors of the NYSE/Amex sample at the beginning. In addition, the percent of NASDAQ firms without institutional following is slightly higher than in the NYSE/Amex sample. Twenty-two percent of the NASDAQ survivors lacked a single institutional investor on the buy date, and 8 percent were without an institutional investor after two years.

These findings indicate that the strategy identifies mean returns in NASDAQ stocks that accumulate over two years (without reversal) at much higher levels than in the sample of NYSE and Amex stocks. This finding corroborates delayed reaction as an explanation for the strategy's success, given that these NASDAQ stocks receive less institutional following, on average. If the strategy's success is related to institutional following, however, the association should be detectable in the cross section.

The Cross-Sectional Relation between Abnormal Returns and Institutional Following

The previous two sections report evidence of significant buy-and-hold abnormal returns to Reinganum's strategy. Here, we are interested in whether the abnormal returns are larger and more persistent in the stocks with less institutional following. In addition, we consider the cause and effect of the observed increases in institutional

Table 4—Cumulative Buy-and-Hold Abnormal Returns of the NASDAQ Survivors, Net of Returns on Size-Matched Control Groups, by Quarter Relative to Buy Signal (in percent) and the Mean Number of Institutional Investors

Quarter t, Relative to Buy Signal at t = 0	Cumulative Abnormal Returns	Change from Prior Quarter	Mean Number of Institutions, Per Stock
Buy			
t = 0			4.7
t = 1	4.8		
t = 2	11.9	7.1	
t = 3	16.5	4.6	
t = 4	18.5*	2.0	6.1
t = 5	20.7	2.2	
t = 6	33.0	12.3	
t = 7	38.3	5.3	
t = 8	40.9**	2.6	7.8

Note: Tests of statistical significance are conducted only after the fourth and eighth quarters. These statistics are calculated with the procedure described in footnote 6 to consider the positive time-series autocorrelation from the overlapping observations

* Significantly greater than zero at the 10 percent level

** Significantly greater than zero at the 5 percent level

following. Later, we discuss the implications of the results for the market efficiency literature.

Cross-Sectional Analysis

We estimate the regression models in Panels A through D of Table 5 for the pooled NYSE/Amex sample and the pooled NASDAQ sample, separately. The dependent variables in Panels A, C, and D are individual survivor's buy-and-hold abnormal returns from the first year, $R_i(10)$, the second year, $R_i(21)$, and the full two years of the holding period, $R_i(20)$, respectively. These dependent variables are regressed on measures of the respective survivor's institutional following and prior period returns.[8] The independent (explanatory) variables include the number of institutional investors in a survivor at the start of the holding period, $IN_i(0)$; the change in the number of institutional investors in a survivor during the first year, $\Delta IN_i(10)$; a variable that interacts the previous two, $INT_i(10)$; the change in the number of institutional investors in a survivor during the second year, $\Delta IN_i(21)$, and a second interaction variable, $INT_i(21)$. The model in Panel B uses $\Delta IN_i(21)$ as a dependent variable. In Table 5 the coefficients and subscripts are associated with the same independent variables across all four panels to facilitate comparisons across panels.

[8] Positive time-series autocorrelation is a potential problem because of the overlapping observations. We do not have overlapping observations on individual survivors. Therefore, only the overlapping systematic returns of the survivors could be the source of such a problem. As mentioned in footnote 5, the pairing of stocks with size-matched benchmarks is a reasonable attempt to eliminate systematic effects in the cross-section. Consequently, autocorrelation should not be a problem in these regressions. This is confirmed by the estimated Durbin-Watson statistics for first-order autocorrelation.

Table 5–Cross-Sectional Relations Between Size-Matched Abnormal Returns and Institutional Following (t-statistics in parentheses)[a]

Model Coefficients (and t-statistics) for NYSE/Amex and NASDAQ Samples								F-stat	R^2
Panel A									
$R(10) =$	$\alpha_0 +$	$\alpha_1 IN(0) +$	$\alpha_2 \Delta IN(10) +$	$\alpha_3 INT(10)$					
NYSE/Amex	.150	-.003	.008	.001				4.73***	.032
	(4.50)	(-2.08)	(2.85)	(0.05)					
NASDAQ	.207	-.008	-.002	.000				.62	.016
	(2.68)	(-1.06)	(-.08)	(0.01)					
Panel B									
$\Delta IN(21) =$	$\alpha_0 +$	$\alpha_1 IN(0) +$	$\alpha_2 \Delta IN(10) +$	$\alpha_3 INT(10) +$			$\alpha_6 R(10)$		
NYSE/Amex	.446	.114	.174				4.543	27.77***	.223
	(.66)	(4.14)	(3.03)				(3.67)		
NASDAQ	.961	.134	-.160				2.105	4.55***	.156
	(1.80)	(2.71)	(-1.14)				(2.76)		
Panel C									
$R(21) =$	$\alpha_0 +$	$\alpha_1 IN(0) +$	$\alpha_2 \Delta IN(10) +$	$\alpha_3 INT(10) +$	$\alpha_4 \Delta INT(21) +$	$\alpha_5 INT(21) +$	$\alpha_6 R(10)$		
NYSE/Amex	-.017	.001	-.003	-.044	.003	.116	.039	2.37**	.032
	(-.34)	(.04)	(-.81)	(-1.31)	(.80)	(2.96)	(.48)		
NASDAQ	.261	-.012	-.010	-.012	.034	.223	-.441	2.18*	.107
	(2.30)	(-1.10)	(-.28)	(-0.41)	(1.40)	(1.90)	(-2.66)		
Panel D									
$R(80) =$	$\alpha_0 +$	$\alpha_1 IN(0) +$	$\alpha_2 \Delta IN(10) +$	$\alpha_3 INT(10) +$	$\alpha_4 \Delta INT(21) +$	$\alpha_5 INT(21)$			
NYSE/Amex	.118	-.004	.003	-.044	.012	.140		6.80***	.066
	(1.97)	(-1.67)	(.65)	(-1.07)	(2.29)	(2.81)			
NASDAQ	.342	-.019	-.018	-.011	.058	.256		2.83**	.103
	(2.89)	(-1.70)	(-.58)	(-.035)	(2.39)	(2.10)			

[a] $R_i(jk)$ is the return on survivor i net of its size-matched portfolio from quarter j through k, where 0 represents the start of the first quarter and 8 corresponds to the end of the final quarter of the two year holding period; $IN_i(0)$ represents the number of institutions holding stock in the survivor at the start of the holding period; $\Delta IN_i(40)$ is the change in the number of institutions holding stock in the survivor from the beginning to the end of the first year of the holding period; similarly, $\Delta IN_i(84)$ represents the number of institutions holding stock in the survivor at the end of the two-year holding period less the number holding stock in that survivor after the first year of the period

* $p < .10$ for F-test of joint significance

** $p < .05$ for F-test of joint significance

*** $p < .01$ for F-test of joint significance

Panel A of Table 5 presents the results from regressing the survivors' first year abnormal returns, R(10), on the measures of institutional following. The α_1 coefficients on IN(0) are negative in both samples but significant only in the NYSE/Amex sample, implying that an initial lack of institutional following is associated with delayed reaction and subsequent corrections in the first year of the NYSE/Amex sample. The insignificant α_1 coefficient for the NASDAQ sample may indicate that the correction of underreaction has yet to occur in these stocks. The significantly positive α_2 coefficient, on $\Delta IN(10)$, in the NYSE/Amex sample indicates that stocks with larger returns experience greater increases in institutional following. The interaction variable, INT(10), which is constructed to take on a positive coefficient if the effect of $\Delta IN(10)$

is greater for lower levels of IN(0), is insignificant in both samples.[9] From these regressions, we cannot determine whether the changes in institutional following are in response to, or the cause of, the survivors' returns. The former would represent positive feedback trading, but we cannot dismiss the possibility that institutions initiate the returns.

Panel B reports the results from regressing the change in the number institutional investors in the second year, $\Delta IN(21)$, on past returns and institutional following. IN(0) is intended to capture the tendency of stocks to incur larger absolute changes in institutional following if they initially have more. This tendency is supported by the significant α_1 coefficients on IN(0) in both samples. The significantly positive α_2 coefficient on $\Delta IN(10)$ in the NYSE/Amex sample implies cascading, but this is not apparent in the NASDAQ sample. (*Cascading* refers to institutional buying that motivates subsequent institutional buying, without regard to returns.) The α_6 coefficients on R(10) are significantly positive in both samples and indicate that institutions are positive feedback trading. The detection of positive feedback trading in the NASDAQ in Panel B suggests the lack of a significant α_2 coefficient for the NASDAQ in Panel A results from institutional investors reacting more slowly in NASDAQ than in NYSE/Amex stocks.

Panel C provides the results from regressing the abnormal returns from the second year, R(21), on past returns and institutional following. In neither sample are the coefficients on IN(0), $\Delta IN(10)$, or INT(10) related to the second year returns. The α_4 coefficients on the change in institutional following in the second year, $\Delta IN(21)$, are also insignificant in both samples. The coefficients on the interaction variable, INT(21), are significantly positive, however, and indicate that the effect of $\Delta IN(21)$ is more positive at low levels of IN(1), the number of institutional investors in a survivor at the end of the first year. This finding is consistent with delayed reaction as an explanation for the returns. That is, large increases in institutional following are likely to be associated with the correction of underreaction if the stocks had relatively little institutional following at the start of the year (over which the returns are measured). Although we still cannot ascertain if the changes in institutional following are in response to, or the cause of, the returns, the insignificant α_2 coefficients on $\Delta IN(10)$ do indicate that institutions were not in front on these stocks.

The α_6 coefficients on R(10) indicate that there is no relation between the first and second year returns of the NYSE/Amex sample, but there is a significant negative

[9] Our interaction variable is calculated as $[\Delta IN_i(10)/(1+ IN_i(0))]$. The exact formulation of this interaction variable is arbitrary. Given its rough approximation to the percentage increase in institutional holdings, it should serve the purpose in the cross-section. We could not directly incorporate the percentage increase in institutional holdings in these regression models because so many of the survivors had no shares held by institutions at the start of the two-year holding period. In Panels C and D of Table 5 we introduce a second interaction variable calculated as $[\Delta IN_i(21)/(1+IN_i(1))]$.

relation in the NASDAQ sample. This observation may suggest overreaction in the NASDAQ sample, but it would not appear to be the result of positive feedback trading (from the first year) because the α_2 coefficient on $\Delta IN(10)$ is insignificant. In addition, closer examination indicates that those NASDAQ stocks that earn small positive abnormal returns in the first year, tend to earn large positive abnormal returns in the second year and vice versa. It follows that the initial reaction to information may be slower in the NASDAQ than in the NYSE/Amex. Once the correction has begun, however, it plays out more quickly than was suggested in Table 4.

Panel D of Table 5 shows the results of regressing the two-year buy-and-hold abnormal returns, R(20),on institutional following. In both samples R(20) has an inverse relation with initial holdings, IN(0). One additional institutional investor at the start of a holding period predicts a 0.40 percent lower two-year return in the sample of NYSE and Amex stocks and a 1.9 percent lower return in NASDAQ stocks, all else equal. Apparently, IN(0) is significant in the NASDAQ sample in Panel B but not in Panel A because the two-year holding period is long enough to capture the correction of underreaction in the NASDAQ stocks. The insignificant coefficients on $\Delta IN(10)$ and INT(10) again suggest that in both samples changes in institutional following do not lead returns.

The significantly positive α_4 coefficients on $\Delta IN(21)$ indicate that one additional institutional investor predicts a 1.2 percent higher two-year return in the NYSE/Amex sample and a 5.8 percent higher return in the NASDAQ, all else equal. Moreover, the significant coefficients on the interaction variable INT(21) imply that in both samples the effect of $\Delta IN(21)$ is greater for lower levels of IN(1). Thus, changes in institutional following are lagging or contemporaneous with returns. The ability of the $\Delta IN(10)$ variable to partially explain the abnormal returns from the first year of the NYSE/Amex sample in Panel A has been swamped by institutions chasing the first year returns in the second year.[10]

Discussion

The results of Table 5 indicate that changes in institutional following are contemporaneous with and/or lag abnormal returns. To ascertain whether the annual interval of the data obscures the prediction of returns by institutions, we use quarterly data to estimate regressions similar to those in Table 5. Although not shown here, these results also fail to reveal any evidence that changes in institutional following predict

[10] These results raise the question of whether the abnormal returns are a manifestation of the neglected firm effect of Arbel, Carvell, and Strebel (1983). To address this question, we generate a random sample of stocks matched on size with the original survivors but with initially zero or one institutional investor. We then compare the two-year buy-and-hold returns of these neglected stocks with those of the size-matched groups. The pooled mean of the resulting abnormal returns is negative for the NYSE/Amex sample and approximately zero for the sample of NASDAQ firms.

future abnormal returns. Thus, the changes in institutional following appear to be due mainly to positive feedback trading, although we cannot dismiss the possibility that the contemporaneous returns are partly initiated by institutions. There is no evidence, however, to suggest that this positive feedback trading leads to overreaction. In addition, the results indicate the relation between changes in institutional following and abnormal returns is stronger when the initial level of institutional following is relatively low. This implies the changes in institutional following are associated with the correction of underreaction.

Why are institutions slow to respond to these opportunities, and what are they contributing when they do increase their following in a stock? Although we cannot definitively answer these questions, the results presented here, together with the related literature, provide considerable insight.

Institutional investors, in general, were slow to respond in the stocks of our sample, which suggests that their reluctance is attributable to some perceived risk that they initially avoid. This risk may take the form of obscurity and/or noise traders [as in DeLong, Shleifer, Summers, and Waldmann (1990)]. Our finding that institutional response is not as slow in the NYSE/Amex as in the NASDAQ sample supports this view. Noise trader risk also may be the rational basis for the so-called prudent man rules that constrain or dissuade institutions from taking positions in obscure stocks. (Lakonishok, Shleifer, and Vishny (1994) also recognize these prudent man rules as a possible explanation for the underpricing of out-of-favor value stocks.) The rapid price appreciation of our survivors may provide an appropriate track record such that the prudent man rules no longer apply in these stocks; thus, institutions buy in.

The price run-ups also could increase the survivors' visibility and make them more acceptable to institutions that are unconstrained by the prudent man rules. Peter Lynch (1989) refers to the aversion of institutional investors to adding obscure stocks as *street lag*, and he suggests favorable past performance makes it easier for institutions to defend a buy decision should the stock falter later. Lynch's observation captures the essence of Scharfstein and Stein's (1990) more formal argument that managers will tend to move in herds because the cost of a mistake is less when almost everyone else has made the same error. Another reason why institutions may initially hesitate to buy new stocks comes from Foster and Viswanathan (1996). They show that differentially informed traders each have the incentive to make smaller trades, while hoping that other informed traders will reveal their private information through larger trades. This results in a standoff called the *waiting game*. Aggressive, competitive trading occurs only after the private information is revealed. In this case, the rapid price appreciation of our survivors may have ended the waiting game and trigger a buying spree among institutional investors.

The literature provides several reasons why rapid price appreciation would cause institutional investors to look beyond the risks associated with obscurity (such as noise trader risk). Once institutions begin to buy in, their increasing presence should

gradually reduce these risks as long as the institutions behave as informed traders rather than as noise traders. This, in turn, would attract additional institutions and lead to greater efficiency as in Brennan, Jegadeesh, and Swaminathan (1993), who find that more informed traders in a stock result in quicker price adjustments to new information. Thus, on the basis of this literature and given the lack of a reversal pattern in the strategy's returns, we interpret the positive feedback trading by institutions as a contribution to the gradual correction of underreaction in our survivors. Such an interpretation is similar to that of Hong, Lim, and Stein (1999), who find that momentum strategies are most profitable in stocks with low analyst coverage and interpret this as consistent with a gradual-information diffusion-model.

Summary and Conclusions

Reinganum (1988) finds that a sample of extreme past winners has nine common characteristics. These characteristics exhibit a unique synthesis of the return-momentum, earnings-momentum, and value strategies. Our replication of Reinganum's strategy finds that stocks that satisfy the characteristics produce significant and material positive abnormal returns for up to one year in a NYSE/Amex sample and for up to two years in a NASDAQ sample. The more prolonged accumulation of abnormal returns in the NASDAQ stocks, as well as the lack of any observable return reversal, supports delayed reaction as an explanation for the abnormal returns.

Institutions were slow to respond in these apparently underpriced stocks, suggesting that their reluctance is attributable to perceived risk. Our finding of an inverse relation between initial institutional following and subsequent abnormal returns corroborates this view. That is, perceived risk appears to result from the obscurity of the stocks and/or to the presence of noise traders. In addition, we find the institutional response is quicker in the NYSE/Amex sample than in the NASDAQ sample. We interpret this evidence as consistent with institutions contributing to the gradual correction of underreaction in these stock prices.

It is remarkable that the common characteristics of Reinganum's strategy (identified in 1988) were the subject of considerable attention in the asset pricing/market efficiency literature of the 1990s. But the characteristics of this strategy and its success are more than just independent verification of significant returns to momentum and value strategies. The dramatic magnitude of the strategy's returns and their association with institutional following also implies that the returns reported in Lakonishok, Shleifer and Vishny (1994), Jegadeesh and Titman (1993), Bernard and Thomas (1990), and Ikenberry, Rankine, and Stice (1996) are in part due to pricing inefficiency or delayed reaction. This delayed reaction associated with institutional neglect recently has been independently verified in Hong, Lim, and Stein (1999).

References

1. Arbel, A., S. Carvell, and P. Strebel, "Giraffes, Institutions, and Neglected Firms," *Financial Analysts Journal*, 39 (1983), pp. 57-63.

2. Barber, B.M., and J.D. Lyon, "Detecting Long-Run Abnormal Stock Returns: The Empirical Power and Specification of Test Statistics," *Journal of Financial Economics*, 43 (1997), pp. 341-372.

3. Bernard, V.L., and J.K. Thomas, "Post-Earnings Announcement Drift: Delayed Price Response or Risk Premium?" *Journal of Accounting Research*, 27 (1989), pp. 1-36.

4. .Blume, M.E., and I. Friend, "Institutional Investors: A Rapidly Growing Presence in NASDAQ," in D.F. Parrillo, E.R. Hobbing, and M.V. Porter (eds.), *The NASDAQ Handbook: The Stock Market of Tomorrow-Today* (Chicago, IL: Probus, 1987).

5. Bodie, Z., A. Kane, and A.J. Marcus, *Essential of Investments* (New York: Irwin/McGraw-Hill, 1998).

6. Brennan, M.J., N. Jegadeesh, and B. Swaminathan, "Investment Analysis and the Adjustment of Stock Prices to Common Information," *Review of Financial Studies*, 6 (1993), pp. 799-824.

7. Chan, L.K.C., N. Jeegadeesh, and J. Lakonishok, "Momentum Strategies," *Journal of Finance*, 51 (1996), pp. 1681-1713.

8. .Chopra, N., J. Lakonishok, and J.R. Ritter, "Measuring Abnormal Return Performance: Do Stocks Overreact?" *Journal of Financial Economics*, 31 (1993), pp. 235-268.

9. DeLong, J.B., A. Shleifer, L.H. Summers, and R.J. Waldmann, "Positive Feedback Investment Strategies and Destabilizing Rational Speculation," *Journal of Finance*, 45 (1990), pp. 379-396.

10. Fama, E.F., and K.R. French, "Multifactor Explanations of Asset Pricing Anomalies," *Journal of Finance*, 51 (1996), pp. 55-84.

11. Foster, D.F., and S. Viswananathan, "Strategic Trading When Agents Forecast the Forecasts of Others," *Journal of Finance*, 51 (1996), pp. 1437-1478.

12. Graham, Benjamin. *The Intelligent Investor* (New York: Harper and Row, 1973).

13. Grinblatt, M., S. Titman, and R. Wermers, "Momentum Investment Strategies, Portfolio Performance, and Herding: A Study of Mutual Fund Behavior," *American Economic Review*, 85 (1995), pp. 1088-1105.

14. Haugen, R.A., *Modern Investment Theory*, 4th ed. (New Jersey: Prentice-Hall, 1997).

15. Hong, H., T. Lim, and J.C. Stein, "Bad News Travels Slowly: Size, Analyst Coverage, and Profitability of Momentum Strategies," forthcoming in the *Journal of Finance*.

16. Ikenberry, D.L., G. Rankine, and E.K. Stice, "What Do Stock Splits Really Signal," *Journal of Financial and Quantitative Analysis*, 31 (1996), pp. 357-376.

17. Jegadeesh, N., and S. Titman, "Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency," *Journal of Finance*, 48 (1993), pp. 65-91.

18. Jones, S.L., "Another Look at Time-Varying Risk and Returns in a Long-Horizon Contrarian Strategy," *Journal of Financial Economics*, 33 (1993), pp. 119-144.

19. Lakonishok, J., A. Shleifer, and R.W. Vishny, "Contrarian Investment, Extrapolation, and Risk," *Journal of Finance*, 49 (1994), pp. 1541-1578.

20. La Porta, R., J. Lakonishok, A. Shleifer, and R.W. Vishny, "Good News for Value Stocks: Further Evidence on Market Efficiency," *Journal of Finance*, 52 (1997), pp. 859-874.

21. Levy, H., *Introduction to Investments*, 2nd ed. (Cincinnati: South-Western, 1999).

22. Lynch, Peter, *One Up On Wall Street* (New York: Simon and Schuster, 1989).

23. Miller, Rupert, *Beyond ANOVA, Basics of Applied Statistics* (New York: Wiley, 1986).

24. O'Neil, W. *The Greatest Stock Market Winners: 1970-1983* (William O'Neil and Co.)

25. Reinganum, M.R., "The Anatomy of a Stock Market Winner," *Financial Analysts Journal*, 44 (1988), pp. 16-28.

26. Reinganum, M.R., "Misspecification of Capital Asset Pricing: Empirical Anomalies Based on Earnings Yields' and Market Values," *Journal of Financial Economics*, 9 (1981), pp. 19-46.

27. Scharfstein, D.S., and J.C. Stein, "Herd Behavior and Investment," *American Economic Review*, 80 (1990), pp. 465-479.