Low Price Stocks and the January Effect*

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Abstract

This study explores the role of per share price in identifying stocks particularly likely to outperform the market in January. It is found that low price stocks that exhibited poor December performance were likely to rebound in January. This tendency was observed annually for the 1971-1983 sample, as well as for the 1984 holdout sample. Similar results were obtained with or without risk adjustment.

Introduction

The stock market's seasonality (often referred to as the *January effect*) has been examined by a number of researchers (Dyl [18], Rozeff and Kinney [37], McEnally [30], Branch [7], Branch and Ryan [10], Reinganum [31], Roll [33], Givoly and Ovadia [21], Branch and Chang [11], Rozeff [35, 36], and several others). These studies find that stocks that were depressed by year-end (tax?) selling pressure tend to yield abnormal (positive) returns during the following January.

According to Keim [25], Roll [33], Reinganum [31], Blume and Stambaugh [6], and Lakonishok and Smidt [28], small firm stock returns tend to exceed those of larger firms, particularly in January. Several of these researchers also find that most of the abnormal January returns occur in the first few days of the month.

Other researchers examine the return behavior of low price stocks and, in some cases, relate it to the January effect. Blume and Husic [5] document an inverse relation between per share price and subsequent return. Stoll and Whaley [40] find that most of the inverse relation occurs in January and that much of the effect appears to be offset by transaction costs. Chang [15] finds that each month's losers tend to outperform the market in the following month. Only in January, however, are the differential returns significantly positive. Moreover, the effect is most pronounced for poorly performing, low price stocks. Clark and Peavy [16] find an especially positive after market performance for initial

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public offerings priced below $1.00 per share. Blume and Stambaugh [6], Kross [27], and Elgers, Callahan, and Strock [19] find the price effect to be much more powerful than either size or earnings yield effects. Tseng [42] also finds a powerful low price effect in a multifactor model. In the most recent research in the area, Jaffe, Keim, and Westerfield [24] examine the PE, size, and low price effects. Their tests were applied to three different time frames: all months; January only; February-December only. Powerful and distinct size and low price effects are found for the January period, but not for other months. The PE effect is subsumed by the size and low price effects in January, but not in other months. Schwert [39] and Keim [25] have written excellent reviews of this body of literature.

Many researchers ascribe the January effect to the end of the tax year. Year-end sellers of depressed stocks realize tax losses that may be used (with some limitations) to offset other gains or income. If concentrated year-end selling is not offset by an equivalent increase in buying interest (willingness to absorb additional shares without a substantial price reduction), a temporary price decline is required to clear the market. To test for such a price pattern, researchers need a screen that identifies issues that are depressed at year-end and likely to rebound in January.

Selecting An Appropriate Screen

Tax-selling may or may not affect the market at year-end. If it does, however, the effect is almost certainly concentrated in a relatively small number of issues.[2] Past researchers use a variety of screens to identify stocks that are most likely to be subject to the January effect: annual lows at year-end (Branch [7]), poor performers over the prior January-November (McEnally [29]), poor performers over the prior July-November (Reinganum [31], Rozeff [36]), and poor performers over the prior December (Chang [15]). Each of these screens tends to yield a relatively low percentage of stocks that rebound in January and thus are (or at least may be) depressed by year-end tax-selling. This paper attempts to devise a screen whose selections contain a relatively large percentage of stocks that are depressed at year-end but rebound in January.[3] This study focuses on the combined effect of a poor December performance and a low per

[2]That is, little or no tendency has been observed for the market as a whole to decline in December and rise in January.

[3]Identifying stocks that rebound strongly in January is like searching for needles in a haystack. The screen is designed to remove straw while leaving the needles in the stack. The more effective the screen, the greater the ratio of needles to hay in the final stack.

share price level. By using two separate and carefully selected factors in the screen, it is hoped that yield will increase. That is, the stocks that meet both criteria may be more likely to be depressed by year-end tax-selling and more likely to rebound in January than the much larger numbers that are selected by either of the two screens separately. Having a more effective screen should facilitate both a better test of the relevant hypotheses and the construction of more effective trading strategies.

A Per Share Price Screen

A possible association between tax-selling and December performance is easy to envision. If tax-selling has an effect, that impact is most likely to be revealed by the the affected stocks' December performances. A stock's per share price, however, is a relatively arbitrary number. It equals the company's residual market value, V (its total market value less the value of its debt and preferred), divided by the number of shares outstanding, N: P - V/N. Notwithstanding this mechanical relationship, the absolute level of a stock's price may contain some interesting and potentially useful information. Both the number of shares outstanding and the dividend/retention ratio are decision variables. How the firm manages these decisions may prove revealing. According to conventional (if undocumented) Wall Street wisdom, a firm's stock price level varies with a number of other factors, including its size, maturity, financial health, and stature. More specifically, large, mature, and established firms tend to achieve and maintain above average stock prices. Lower stock prices, in contrast, are associated with smaller, younger, and, not infrequently, more troubled firms. These associations tend to be maintained by a number of mechanisms: the setting of the original issue price, the length of time since the firm went public, and the firm's decisions regarding splits, reverse splits, stock dividends, cash dividends, and the issuance of additional shares. Established firms are generally reluctant to split their shares unless they expect the resulting price to remain safely above the desired minimum per share level. As long as such firms continue to be successful, their per share prices will remain above the desired minimum level.

Per share price and size (market valuation) are related, but distinct concepts. The market valuation of a company's stock is the product of its per share price and the number of shares outstanding. A company with a low (high) per share price can have large (small) market capitalization if the number of shares outstanding is sufficiently large (small). Jaffe *et al.* [24] find that the two factors (size and per share price) have distinct effects on January returns.

Two types of firms tend to have low per share stock prices. First, young, small, and less established firms' stock prices are influenced strongly by the

initial issue levels that often are set relatively low (presumably reflecting the advice of such firms' investment bankers). Heretofore established companies that encounter severe financial difficulty (e.g., Chrysler, International Harvester, and Continental Illinois Bank) constitute a second category of low price stocks.

Obviously not all start-up and troubled firms have low price stocks, and not all established firms have high priced shares. This line of reasoning, however, appears to contain enough substance to be employed in devising tests of stock market seasonality. If a firm's per share stock price provides a usable proxy for its degree of establishment, it may be useful in identifying stocks that are vulnerable to tax-selling pressure (orders to sell a large number of shares compared to normal trading volume).

Low per share price, PE, size, and analyst coverage screens all tend to identify similar firms. Other work such as that by Elgers, Callahan, and Strock [19], however, strongly suggests that price is the most effective of these screens. This study expands on that work. The focus of this research is the interplay of the low price and January effects in identifying stocks that experience abnormal returns.

Selling Pressure and Efficient Markets

When a temporary preponderance of selling threatens to depress an established firm's shares, an efficient market quickly (immediately) responds. Enough buyers surface to maintain a price that is consistent with the stock's fundamentals (a price close to its intrinsic value). A less well-established firm may lack a sufficient reservoir of potential investors and interested analysts to offset the impact of impatient sellers (assuming that the market in which it trades is not completely efficient). Thus, selling pressure could depress such a firm's shares below their intrinsic values more easily than when proportionately equivalent selling pressure is applied to the issues of more established firms. Ritter [34] finds that individual investors do a preponderance of the selling in December and a preponderance of the buying in January. Such investors tend to trade disproportionately in low capitalization (and therefore less established) firms.

Selling pressure can affect any stock's price at any time. Some stocks, particularly depressed issues, may be likely to experience such pressure at year-end. Earlier in the year such investors may be more inclined to wait for a rebound. At year-end, the certain benefit of the tax shelter provided by a realized loss may seem more attractive than the possibility that the stock will return to higher ground. Waiting until after the current tax year ends to sell stocks that were held at a loss defers the tax losses into the year of the sale. Accordingly, any extensive tax-motivated selling pressure is likely to stop at year-end and not

resume (if at all) until relatively close to the end of the following year. Thus, the prices of such stocks are free to return to their intrinsic value levels once year-end tax selling abates. Prior to year-end, however, a preponderance of sellers may depress the shares of poorly established firms substantially below their intrinsic values. The per share price level may be a useful statistic that, when combined with other factors, can help identify stocks subject to year-end selling pressure.

If the market is weak form efficient, a stock price level screen would not help identify misvalued securities. In all probability, most of the finance profession believes that the market is (at least approximately) weak form efficient. Thus, any hypothesis that conflicts with weak form efficiency is bound to raise questions.[4] Therefore, the hypothesized relation between per

[4]If tax-motivated selling pressure produces predictable price patterns, potential arbitrage opportunities thereby will arise. An efficient market, however, will not necessarily eliminate such predictable price patterns. Rational investors seeking to profit from these patterns will be constrained by several factors: first, transaction costs (commissions and bid ask spreads) will limit their abilities to exploit these patterns. An expected price change of 2 percent to 3 percent, for example, would be too small for most individual investors to cover trading costs and still earn a meaningful return. Institutional investors who can trade at lower costs may pass up such opportunities if they largely may occur in stock issues that have too low a capitalization to be attractive to such institutions. Second, identifying stocks under year-end selling pressure is an uncertain process. Moreover, the process of identifying such issues involves nontrivial search costs. A strategy seeking to exploit such price patterns is most likely to prove successful for those who have both the financial and information-processing resources to identify and assemble a sizeable portfolio of such issues. The odds that a particular tax-selling candidate will rebound in January are probably much lower than that for a diversified portfolio of such issues. Third, one who pursues such a strategy must take due account of the resultant tax liability. If successful, buying issues depressed in December and selling them when they rebound in January (for tax-paying investors) will produce a taxable gain. Such a gain for many would be investors is taxable at their highest marginal tax rate. Other investments, in contrast, may offer at least a modicum of tax shelter. For example, any long-term holding allows the investor to defer any tax payment on the gain until the asset is sold. The presence of differential tax rates will tend to limit the pool of investors best positioned to exploit any year-end price patterns. Accordingly, trading costs, uncertainty, search costs, minimum optimal scale, and differential tax rates will tend to limit the ability of the market to eliminate a predictable year-end price pattern. Those having the greatest financial and informational resources, the lowest trading costs, and the most attractive tax status (institutions) may find the issues most likely to exhibit this price pattern too small to be worth investment. Those investors more inclined to invest in such low capitalization issues may be limited by their typically higher costs of trading, tax bracket, etc. Nonetheless, a weak form efficient market should reduce the magnitude of such patterns to the point where no reliable after transaction cost abnormal returns remain to be exploited.

share price and year-end performance runs counter to established views. The remainder of this paper discusses the tests and results that bear on this issue.

Data

Primary data were obtained from the 1982 and 1983 versions of the Compustat price-dividend-earnings (PDE) tapes. All such stocks that had complete monthly price and dividend data in a given year were included in the sample. The number of qualifying stocks ranged from 1,887 in 1970 to 4,696 in 1983. An equally-weighted average of these stocks' returns were used to proxy the market return.[5] The 1984 Compustat PDE tape was used to form a secondary data set for a follow-up set of tests on 1983-1984 data.

Two potential problems with this data set (and with most of the data sets used to test these issues) need to be mentioned. Compustat only includes firms that reached some threshold end-of-period size. Thus, both large, troubled, but surviving firms and initially small firms that had grown substantially tend to be overrepresented. Similar firms that either did not survive or did not grow sufficiently are not on the list. The firms in this overrepresented component may tend both to have low initial per share prices and show abnormal returns. There seems to be no reason, however, why this selection bias should concentrate abnormal returns in January.

Using closing prices to compute returns introduces a second bias (Gottlieb and Kalay [23]). This research largely is concerned with the relationship between January and December returns. The December closing price generally is used as the end point for computing December returns and the beginning point for January returns. Most stocks will have month-end closing prices that are either

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[5]The table below illustrates the relationship of this index to some of the more popular market averages: Dow Jones Industrials, S&P 500, and NYSE composite index.

Pearson Correlation Coefficients of Selected Market Indices

	PDE	DJI	S&P 500	NYSE
PDE	1.0000			
DJI	.7483	1.0000		
S&P 500	.7480	.8594	1.0000	
NYSE	.8307	.9143	.8642	1.0000

These relatively high correlations imply that the results may not be particularly sensitive to the choice of index. An equally-weighted index of PDE stocks, however, does give more weight to small firm and low price stocks than do the more popular averages. Because this paper's interest centers on the behavior of such stocks, their performance should be compared with a representative index.

at their bid (highest current offer to buy) or at their ask (lowest current offer to sell). For a given bid and ask quote, a December close at the bid will lead to a lower December return report and a higher January return report than a December close at the ask. This relationship tends to produce negative autocorrelations in month-to-month reported returns.[6] The effect is likely to be greatest for low price stocks where bid-ask spreads tend to represent a higher percentage of the price. Both of these biases against the null hypothesis need to be borne in mind in interpreting the results.[7]

Related Prior Work

In a previous study, the present authors [11] partitioned their sample into ten portfolios of approximately equal numbers ranked by the magnitude of returns at the month t. The stocks with the lowest decile of returns for that month form the first portfolio (10th percentile) . . . And so on, with the tenth portfolio containing the stocks having the highest 10 percent of returns at month t. The following month's return behavior for these portfolios then was examined.

Table 1 taken from Branch and Chang [11] shows the market differential returns of these ten portfolios for the 1970-1983 period. The losers of one month (10th percentile) consistently outperformed the market in the following month, while the winners of one month (100th percentile) consistently are outperformed by the market in the following month. For example, the December losers (10 percent) outperformed the market in January by 15.6 percent (with a t ratio of 5.2). Similarly, the second worst December performers (20 percent) outperformed the market by 10.4 percent in January. On the other hand, the best (100 percent) and second best December performers (90 percent)

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[6]This negative autocorrelation of returns tendency is a result of computing returns from closing prices. Should returns be computed bid-to-bid, ask-to-ask, or some other similar way, the tendency would disappear. The data needed for such return computations generally are not available, however.

[7]A study by Amihud and Mendelson, AM [1] raises yet a third issue. They find that returns tend to increase at a decreasing rate with percentage bid-ask spreads. Amihud and Mendelson conclude that more costly to trade securities will be priced to yield expected gross returns that are sufficiently high to offset their higher trading costs. Low price stocks tend both to have higher spreads and incur higher commissions (Branch [8]). Thus, higher returns for low price issues would be consistent with the Amihud and Mendelson hypothesis. Their hypothesis, however, does not lead to an expectation of especially high returns in January. Moreover, their own results are consistent with the more general findings of Kross [27] and others--an inverse relation between returns and per share price.

underperformed the market by 5.1 percent and 1.9 percent, respectively. These results are consistent with the bid-ask induced autocorrelations of returns. This return reversal effect is, however, particularly pronounced for January. With this result as background, the role of the per share price level now is explored.

Price Composition of the Portfolios

The behavior of low price stocks could account for most or all of the observed December-January return reversal. Alternatively, the return reversal results could reflect a broader phenomenon. This research seeks to discriminate between these two possibilities. Accordingly, the percentages of stocks priced in the beginning of the month for less than $2 per share (the original, i.e., nonsplit-adjusted stock) in December portfolios were computed for the 1970-1982 period and are displayed in Table 2. The first entry in the 10 percent row (17.1) is interpreted as follows: In December 1970, about 17.1 percent of the 10 percent portfolio (the biggest losers) consists of stocks whose per share prices were less than $2. The other numbers are interpreted similarly. For each year studied, the 10 percent portfolio (December losers) contained a larger proportion of low price stocks than did virtually all of the other portfolios for that year (the single exception is 1982 when one other portfolio's percentage of low price stocks was slightly higher). The relation is not surprising. One important mechanism by which stocks become low priced is by falling from a higher price level. Low price stocks are more likely to have declined, and high price stocks more likely to have risen from past levels. This tendency of portfolios with lower *ex post* returns to overrepresent low price stocks encouraged closer examination of the issue.

If low price stocks generally outperform the high price stocks, the differential January performances (Table 1) might be due to the presence of a disproportionate number of low price stocks in the 10 percent portfolio. To examine this possibility, returns of low price (Table 3a) and higher price (Table 3b) stocks in each portfolio were computed separately for the following Januaries.

The upper left entry of Table 3a (.28 for 10 percent, 1971) is read as follows: the average January 1971 return for the low price stocks with the worst December performances exceeded the market average by 28 percent (t-value--3.70). The corresponding (10 percent, 1971) figure for higher price stocks (Table 3b) is a 10 percent differential return. The low price stocks outperformed the high price stocks for this cell. In all but six of the 103 cells (40 percent in 1973 and 1982, 70 percent in 1979 and 1983, 90 percent in 1982, and 100 percent in 1971, all with statistically insignificant differential returns), the portfolios of low price stocks outperformed those of the high price stocks. In

addition, low price stocks in the 10 percent portfolio almost always outperformed the other portfolios of low price stocks.

The average January return of low price stocks almost always exceeded that for high price stocks. Thus, a portfolio that overrepresents low price stocks may be expected to outperform one with proportionately fewer low price stocks. Table 2 revealed that the 10 percent portfolios contained an above average proportion of the low price stocks.

If what appears to be a January effect is a low price effect, the greatest market differential returns would be found for portfolios that contain the largest percentages of low price stocks. No clear relationship between the percentage of the low price stock and the size of the market differential returns was found, however.[8]

Results similar to those of Tables 2, 3a, and 3b were found when low price stocks were defined as those with per share prices of less than $3 or less than $5 (see Chang [15]). Thus, it is concluded that while the January effect is strongest for low price stocks, it is not restricted to such issues.

Regression Analysis

To explore the January low stock price relationships further, cross-section regressions were computed of the form:

$$Jan = a + b \times Dec^{+} + c \times Dec^{-} + d \times Ln(price)$$

where:

Jan = January return[9]

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[8]For example, in December 1974, low price stocks made up 67.8 percent of the 10 percent portfolio. The January 1975 market differential returns of these stocks was 49.5 percent which is not the highest among the 13 years stated. The highest market differential return of low price stocks in the 10 percent portfolio (99.6 percent) was achieved in January 1981 when the proportion of the low price stocks in that portfolio was only 19.5 percent. The correlation between the percentage of the low price stocks and the market differential returns was .168. This correlation was only barely statistically significant. Thus, little relationship between the percentage of depressed low price stocks in December and the market differential returns of the following January is found.

[9]More precisely, Jan = $(P_j - P_d + D_i)/P_d$. P_d is the closing price for the last trading day of December, P_j is the closing price for the last trading day of January, and D_j is the amount of any dividend payment over the January period. Dec^{+} and Dec^{-} are computed similarly. No adjustment is made for the impact of the market return, as separate regressions are estimated for each year.

Dec^+ = December return (if positive, zero otherwise)
Dec^- = December return (if negative, zero otherwise)
Ln(price) = Logarithm of the December per share stock price plus one.[10]

The intercept term (a) reflects the effect of the market in January,[11] while the slope terms (b and c) show the association between a stock's December and succeeding January returns. The slope term (d) for Ln(price) captures the association of a stock's December per share price level with its January return. Use of the logarithmic form for the price variable reflects the belief that a firm's degree of establishment tends to increase with its per share price level but at a decreasing rate. The slope coefficients for the December risers variable (bs) are

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Risk-adjustment is a more complex issue. Tinic and West raise serious questions about the appropriateness of the CAPM model and beta estimates derived from it. Brown and Warner [14] show that adjusting for market risk is not generally necessary in event studies such as this one. Estimating betas for this sample could introduce as much noise as it removes. Moreover, some observations would be lost because of the prior period data needed to estimate the betas. Thus, risk adjustment involves some important tradeoffs. Still, stocks that were depressed in December and/or had low per share prices could have high average betas. If so, they would tend to rise relative to the market in those months when the market rose. On the other hand, such a tendency would cause the returns of such issues to be below the market's when the market fell. Thus, the sample's relative performance in up and down markets should reveal whether risk adjustment is necessary. If the selection process identifies stocks that perform strongly in January when the general market rises but weakly when the general market declines, risk adjustment is indicated. If the relative performance of the selected stocks is similar in both up and down markets, however, risk adjustment is unnecessary.

[10]The closing price (not adjusted for splits) for the last trading day of December is used to compute Ln(price). One is added to the price to compute the Ln(price) variable. This adjustment allows the variable to increase monotonically from a price of zero Ln(1) = 0. Some may argue that the presence of the Ln(price) variable biases the result. That is, the per share price enters as the denominator of the January return (dependent) variable and the Ln(price) (independent) variable. Thus, a low beginning-of-period price should be associated with a greater than average change of a price rise, while a high beginning-of-period price would tend to be associated with a more likely price fall. Such an argument, however, runs directly counter to the weak form of the efficient market hypothesis. One cannot forecast returns accurately on the basis of price history (including the current price level) in a weak form efficient market. If a significant relationship between beginning price level and January return is found, that result conflicts with the finance profession's generally accepted theory of the return-generating process.

[11]Note, however, that the intercept, a, is not expected to equal the average January return. Such a relationship would occur only when the average values of the model's explanatory variables were zero. They were not.

expected to be random, while the slopes for the December losers and price variables (cs and ds) are expected to have negative values. First, however, consider the results with the Ln(price) term removed from the equation (Table 4 taken from Chang, [15]).

The coefficients for the December returns of the December decliners (cs) are all negative and, except for 1973, are all highly significant (although a 90 percent confidence test is used, most of the coefficients are also significant at a higher test level). The corresponding coefficients for the December returns of the December risers (bs) are, in contrast, about equally likely to be positive as negative. Four are positive; nine are negative, but only five of the 13 are significantly negative. Thus, the return reversal is much more evident for December decliners than December risers.

The results for the more complete equation (Table 5 which contains the Ln(price) term) show a similar pattern. Eleven of the December loser return coefficients (cs) are negative. Nine of the negative cs are significant, while the two positive cs are not. The results for the bs (December risers) are mixed. One is positively significant, seven are negatively significant, four are insignificantly positive, and one is insignificantly negative. The coefficients for the Ln(price) variable (ds) are all negative and significant, indicating that higher per share prices tend to be associated with lower January returns.

The magnitudes of the coefficients on the annual regressions vary substantially from year to year. The averages over the 13 year period, however, reveal an interesting and presumably more reliable pattern. First consider the simple regression (Table 4 which does not contain the Ln(price) variable). The average intercept is essentially zero (.04 percent). Similarly, the b coefficient's average value of .094 indicates little or no relationship between December risers and their January performance. On average, stock prices that rise in December rise about another 9 percent of their December rise in the following January. The c coefficients average value of -1.15, however, is revealing. It implies that, on average, December decliners make up all of the December decline in January (115 percent of their December decline). The relatively low average R^2 of .038 indicates a high random component, however. The average adjusted R^2 rises to .089 for Table 5. The addition of the Ln(price) term helps explain January returns.[12]

[12]These results also shed light on the possibility of a risk-induced bias. The overall market declined in January in 1973, 1974, 1978, and 1983. It rose in the other Januaries of the sample. The coefficients on the December decliners variable were significantly negative for three of the four down years. The corresponding coefficients were significantly negative in six of the nine up years. The coefficients on the Ln(price) terms were significantly negative for all down and all up years. Because the results show little or no systematic difference in up and down Januaries, there is no reason to believe that risk adjustment would

In this more complete model, the average c coefficient falls to .630 (compared to 1.15 in Table 4). In this more complete regression, December decliners tend to regain about two-thirds of their December loss in the following January. Moreover, stocks tend to decline in January about 8 percent of the logarithm of their price plus one. For low price stocks, this Ln(price) variable has little impact on the expected January return. Note that in this regression the intercept has an average value of .250 percent, compared with .045 percent in the regression that excludes the Ln(price) variable. Thus, the intercept is increased about .205 percent by the inclusion of the Ln(price) variable. According to the regression parameters, the Ln(price) variable tends to reduce the expected return 8.4 percent of Ln(price). 8.4 percent of Ln(price) = .205 percent for a stock price of 16.6. For prices less than 16.6, the Ln(price) variable subtracts less return than the increased intercept value adds. Only for relatively high price stocks (about $20 per share or more) does the Ln(price) variable begin to reduce the expected January return.

That the price level substantially increases the model's explanatory power suggests a further refinement. Adding interaction terms between Ln(price) and Dec^+ and Dec^- allows the December return slopes to vary with the per share price level. Thus, for example, it can be tested whether the January returns of December decliners tend to rise more if the stocks have low per share prices than if they have high per share prices. The results are displayed in Table 6.

Similar to the earlier results, 11 of the December decliner coefficients (cs) are significantly negative. The two positive c coefficients are insignificant. Thus, December decliners continue to exhibit a strong tendency to rebound in the following January. As before, the Ln(price) term's coefficients are all significantly negative. The December losers interacted with Ln(price) variables generally have positive and significant coefficients (nine of 13 f coefficients are significantly positive). These results are consistent with expectations. The higher the stock's price, the more this interaction term subtracts from the return estimate. Because (Ln(price) x Dec^-) is always negative, a positive coefficient implies that the higher the per share price, the lower the estimated January return. Thus, December losers tend to rise less in January the higher their per share price.

The coefficients (bs) for the December risers are mixed. Only six of the nine negative coefficients are significant. Moreover, three of the four positive coefficients are also significant. There is no more than a modest tendency for December risers to decline in the following January. The coefficients for the Ln(price) x Dec^+ interaction terms (es) are essentially random. Only five of the

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affect the findings appreciably. This conclusion is bolstered by the out-of-sample results reported at the end of this paper.

13 coefficients are significant, and only four of these are negative. This interaction term adds little explanatory power to the model. Taken together, the results for the Dec^+ term and interaction term Ln(price) x Dec^+ only modestly support the hypothesis that stocks that are strong in December (and particularly low price stocks that are strong in December) tend to decline in January. The addition of the two interaction terms increases the average adjusted R^2 from .089 to .114.[13]

These December-January return reversal results also help explain the imperfections of the returns data. As was previously discussed, groups of stocks with strong (weak) reported December performances will contain disproportionate numbers of stocks closing at or near their ask (bid). In January, however, these stocks (as with any preselected sample) are about equally likely to close at or near their bids as at or near their asks. Thus, some return-reversal tendency is expected when returns are computed from close-to-close prices. This tendency is likely to be strongest for low price stocks. Such stocks tend to have the highest bid-ask spreads as a percentage of their price. This bid-ask spread phenomena should have an approximately equal effect on reported returns for both December risers and December decliners. In fact, the decliners exhibit a much stronger reversal pattern than do the risers. This combined finding supports the notion that the results primarily reflect a real phenomenon (the end of tax-loss selling pressure) rather than a statistical artifact (negative autocorrelation of returns introduced by using close-to-close prices).

These results also shed some light on the selection bias problem. As a postselected sample, the Compustat data bases tend to overrepresent small and/or troubled firms that survive and/or grow. This tendency is, however, much greater for the early years of the sample than the later years. Thus, the greatest selection bias impact is expected for these early years.[14] Although far from

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[13]Adding these variables to the model clearly introduces a multicollinearity problem, as they are composed of other variables that already are contained in the equation. Accordingly, interpretation of the coefficients of this more complete model is suspect. Nonetheless, the fact that the explanatory power of the model rises appreciably with the addition of these variables supports the decision to add them. Taken together, the variables of this most complete model explain a substantial fraction of the January returns. The presence of multicollinearity may bias the individual coefficient activity, but does not bias the adjusted R^2. Thus, the most complete model is probably the best predictor, even though its individual coefficient estimators are unavoidable.

[14]That is, the early years are much more likely to contain small firms that only reached a large size near the end of the selection period. Firms that were large enough to be in the sample in 1983 were probably not much smaller in 1982 or 1981. Thus, this bias is unlikely to have much of an impact near the end of the sample period.

monotonic, the results of Table 6 (R^2s and t-values) tend to be strongest in the earlier years. Note, however, that the 1983 results (where little or no significant selection bias is expected) are strong and consistent with theory (R^2 = .14, very high t-values for coefficients c, d, and f). Moreover, the results for 1978-1982, although generally weaker than for 1983 and 1971-1977, are still statistically significant and consistent with expectations. Finally no mechanism can be seen that would concentrate the abnormal returns from such firms in the December-January period. Thus, the results do not appear to be explained by selection bias.

A Follow-Up Test

The initial tests utilized the 1982 and 1983 Compustat data. Data from the 1984 PDE tape were used for a follow-up study. The same types of tests as were reported in Tables 3, 4, 5, and 6 were applied to 1984 data. These additional tests explored the consistency of the relations found in the analysis of the principal sample. This second data set covers a different (larger) sample of firms. The results are reported in Table 7. Table 7a contains January returns stratified by December performance for low and higher price stocks. Table 7b contains regression results for the 1984 data base.

The stratified differential returns results (Table 7a) are similar to the principal findings. Low price stocks that declined by the greatest percentage (10th percentile) in December 1983 outperformed the market by 27.5 percent in the following January. The differential returns for other percentiles were much lower. Higher price stocks (above $2 per share) with poor December performance had random January performance.

The regression results of Table 7b are consistent with those from the principal sample. For 1984 the December decliners have significant negative coefficients (c) in all three equations. Similarly, the Ln(price) variables coefficient (d) is significantly negative for the two equations in which it appears. Finally the Ln(price) Dec^- coefficient has the expected positive sign in the full equation. These regression results are all in line with earlier results. December decliners with low per share prices are particularly likely to rise in January. The R^2 of .07 for the most complete model is also in line with other results.

The results reported in Table 7c influence the decision to use differential rather than abnormal returns. Table 7c contains three sets of regressions for each of the years 1982, 1983, and 1984. The top regression for each year corresponds to the regressions reported in Table 6 or 7b. That is, unadjusted returns are regressed on the full set of variables for the entire data set. The other two regressions utilize a smaller data set. Market model betas are estimated with 34

months of prior data.[15] The Vasicek adjustment is applied and abnormal returns computed. The number of observations is reduced because of the need for a complete monthly data set for two prior years. This same data set also was used to estimate regressions using differential returns as the independent variable. These results appear in the bottom two regressions of Table 7c. The two sets of results are virtually identical. At least for these time periods, risk adjustment makes almost no difference. Somewhat greater differences are observed between these results and those of the full data sets. The basic findings are similar. Low price stocks and December declines both tend to do well in January. The principal differences are the lower R^2s and t values for the restricted sample. Both the lower R^2s and lower t values probably are due to the change in the sample size. The stocks eliminated would tend to be of smaller companies whose sensitivity to buying/selling pressure is greater than the larger firms.[16]

Conclusions

There is a strong tendency for December decliners to outperform the market in the following January. The December decliners that are also low price stocks show especially high market differential returns in January. Thus, a large portion of the January effect seems to be related to the behavior of low price stocks. Accordingly, a screen based on both December performance and per share price appears to be more effective than one based on either variable alone.

The most complete January return model contains six separate explanatory terms constructed from two independent variables (December return and per share price). The intercept term, which is generally positive, reflects a tendency for the overall market to rise in January. The positive December performance term and its interaction with Ln(price) add modestly to the equation's explanatory power. Although these coefficients that are significant suggest that the December risers (especially the high price risers) tend to decline in January, the result may reflect a statistical artifact (computing returns with close-to-close prices). The more powerful inverse association between January and December returns of December decliners (especially low price December decliners) almost certainly reflects the year-end release of tax-selling pressure. Low price stocks

[15]For the December 1983-January 1984 regression, for example, January 1981-October 1983 returns are used to compute the betas. For the December 1982-January 1983 regression, the betas are estimated on January 1980-October 1982 data. For the December 1981-January 1982 regression, January 1979-October 1981 data are used.

[16]Thus risk adjustment would require the deletion of a large number of smaller firms and thereby reduce the power of the tests.

(that tend to be those of less established firms) are less likely to have a loyal following of investors and analysts to offset any selling pressure. The results hold throughout the sample period, suggesting that they cannot be explained by selection bias. That this model, on average, is able to explain over 10 percent of the variability of January returns is impressive for a cross-sectional model containing relatively few variables. A weak form efficient market should exhibit January returns that are random with respect to information available in December. These results seem inconsistent with that expectation.[17] The overall findings are bolstered by their consistency with similar tests applied to a second data set.

Further work can be directed toward expanding the list of usable variables for screening. For example, would a multifactor screening that utilized not only poor December performance and low per share price but also low market capitalization and low PE perform better than the two factor screen discussed herein?

[17]Any event study that seeks to test market efficiency is a joint test of market efficiency and the model chosen to represent an efficient price formulation process. Thus, the true model of efficient equilibrium expected returns for January could generate returns that are correlated with the explanatory variables. If so, the results may be consistent with market efficiency. Accordingly, an appropriately specified model of efficient expected returns generation may exhibit a tendency for low price stocks that declined in December to rise in January. Although such a tendency seems to differ sharply from the concept of market efficiency, the possibility can not be discounted. A form of market efficiency can be defined to be consistent with any particular set of apparent anomalies. Additionally, the current study reports results before transaction costs commissions and bid-ask spreads. Netting such costs from the gross return continually would reduce and possibly eliminate any abnormal returns reported herein.

References

1. Amihud, Y. and H. Mendelson, "Liquidity and Stock Returns," *Financial Analysts Journal* (May/June 1986), pp.43-48.

2. Asinof, L., "With 1983 Ending Soon, It's Time for Investors to Come Up with Ways to Slash Their Taxes," *Wall Street Journal* (December 5, 1983), p. 60.

3. Berg, A., J. McConnell, and G. Schlarbaum, "The Turn-of-the-Year in Canada," *Journal of Finance*, (March 1984), pp. 185-192.

4. Berg, W. and R. Wessels, "Why are Returns High in January? An Examination of the Tax Loss Selling Hypothesis," unpublished working paper, Rotterdam, Erasmus University, Centre for Research in Business Economics, October 1983.

5. Blume, M.E. and F. Husic, "Price, Beta, and Exchange Listing," *Journal of Finance* (March 1973), pp. 283-299.

6. Blume, M.E. and R. Stambaugh, "Bias in Computed Returns: An Application to the Size Effect," *Journal of Financial Economics* (November 1983), pp. 387-404.

7. Branch, B., "A Tax Loss Trading Rule," *Journal of Business* (April 1977), pp. 198-207.

8. _____, "Low Priced Stocks, Discrimination in the Brokerage Industry," *American Association of Individual Investors Journal* (July 1985), pp.9-11.

9. _____ and W. Freed, "Bid-Ask Spreads on the AMEX and the Big Board," *Journal of Finance* (March 1977), pp. 159-164.

10. _____, and J. Ryan, "Tax Loss Trading: An Inefficiency Too Large to Ignore," *Financial Review* (Winter 1980), pp. 20-29.

11. _____ and K. Chang, "Tax Loss Trading, Is the Game Over or Have the Rules Changed?" *Financial Review* (February 1985), pp. 55-69.

12. Brown, P., D.B. Keim, A.W. Kleidon, and T.A. Marsh, "Stock Return Seasonalities and the Tax Loss Selling Hypothesis," *Journal of Financial Economics* (June 1983), pp. 105-127.

13. _____, A.W. Kleidon, and T.A. Marsh, "New Evidence on the Nature of Size-Related Anomalies in Stock Process," *Journal of Financial Economics* (June 1983), pp. 33-56.

14. _____ and J. Warner, "Measuring Security Price Performance," *Journal of Financial Economics* (September 1980), pp. 205-258.

15. Chang, K., "A Study of the Stock Market Seasonality: What Causes the Abnormal January Return?" unpublished Ph.D. dissertation, University of Massachusetts, 1985.

16. Clark, A. and J. Peavy, "Initial Public Offering Types and the Price Effect," *Financial Analysts Journal* (September/October 1987), pp. 65-69.

17. Constantinides, G., "Optimal Stock Trading with Personal Taxes," *Journal of Financial Economics* (March 1984), pp. 65-89.

18. Dyl, E., "Capital Gains Taxation and Year-End Stock Market Behavior," *Journal of Finance* (March 1977), pp. 165-175.

19. Elgers, P., C. Callahan, and E. Strock, "The Effect of Earnings Yields Upon the Association Between Unexpected Earnings and Security Returns: A Re-examination," *Accounting Review* (forthcoming).

20. Fosback, N., "Tax Strategy," *Market Logic* (November 4, 1977), p. 3.

21. Givoly, D. and A. Ovadia, "Year-End Tax-Induced Sales and Stock Market Seasonality," *Journal of Finance* (March 1983), pp. 171-185.

22. Gultekin, M.N. and N.B. Gultekin, "Stock Market Seasonality: International Evidence," *Journal of Financial Economics* (December 1983), pp. 468-481.

23. Gottlieb, G. and A. Kalay, "Implications of the Discreteness of Observed Stock Prices," *Journal of Finance* (March 1985), pp. 135-153.

24. Jaffe, J., D. Keim, and R. Westerfield, "Earnings Yields, Market Values, and Stock Returns," *Journal of Finance* (March 1989), pp. 135-148.

25. Keim, D., "Size Related Anomalies and Stock Return Seasonality, Further Empirical Evidence," *Journal of Financial Economics* (June 1983), pp. 13-32.

26. _____, "The CAPM and Equity Return Regularities," *Financial Analysts Journal* (May/June 1986), pp. 19-34.

27. Kross, W., "The Size Effect is Primarily a Price Effect," *Journal of Financial Research*, Fall 1985, pp. 169-179.

28. Lakonishok, J. and S. Smidt, "Volume and the Turn-of-the-Year Behavior," *Journal of Financial Economics* (September 1984), pp. 434-455.

29. McEnally, R., "The Effects of Income Tax Consideration on Year-End Stock Price Changes," unpublished Ph.D. dissertation, University of South Carolina, 1968.

30. _____, "Stock Price Changes Induced by Tax Switching," *Review of Business and Economic Research* (Fall 1976), pp. 47-56.

31. Reinganum, M.R., "The Anomalous Stock Market Behavior of Small Firms in January, Empirical Tests for Year End Tax Effects," *Journal of Financial Economics* (June 1983), pp. 89-104.

32. Roll, R., "A Possible Explanation of the Small Firm Effect," *Journal of Finance*, Sept. 1981, pp. 888-897.

33. _____, "Vas Ist Das? The Turn-of-the-Year Effect and the Return Premia of Small Firms," *Journal of Portfolio Management* (Winter 1983).

34. Ritter, J., "The Buying and Selling Behavior of Individual Investors at the Turn of the Year," *Journal of Finance* (July 1988), pp. 701-719.

35. Rozeff, M., "The Tax Loss Selling Hypothesis: New Evidence from Short Shifts," working paper no. 85-16, College of Business Administration, University of Iowa, 1985.

36. _____, "The December Effect in Stock Returns and Tax-Loss Selling Hypothesis," working paper no. 85-18, College of Business Administration, University of Iowa, May 1985.

37. _____ and W.R. Kinney, "Capital Market Seasonality: The Case of Stock Returns" *Journal of Financial Economics* (October 1976), pp. 379-402.

38. _____ and T.J. Cook, "Size, Dividend Yield, and Coskewness Effects on Stock Returns: Some Empirical Tests," working paper series no. 82-20, University of Iowa, 1982.

39. Schwert, G., "Size and Stock Returns, and Other Empirical Regularities," *Journal of Financial Economics* (June 1983), pp. 3-12.

40. Stoll, H. and R. Whaley, "Transactions Costs and the Small Firm Effect," *Journal of Financial Economics* (June 1983), pp. 57-79.

41. Tinic, S. and R. West, "Risk, Return, and Equilibrium: A Revisit," *Journal of Political Economy*, (February 1986), pp. 126-147.

42. Tseng, K., "Low Price, Price-Earnings Ratio, Market Value, and Abnormal Stock Returns," *Financial Review* (August 1988), pp. 333-343.

Table 1
Monthly Differential Returns (February 1970-January 1983) Stratified by Prior Month Performance

Prior Performance Percentile	Month											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
10%	0.156*	0.002	0.036*	0.020*	0.016*	0.022*	0.029*	0.027*	0.022*	0.031*	0.022*	0.037*
	(5.20)	(0.67)	(12.00)	(6.67)	(5.33)	(7.33)	(7.25)	(6.75)	(7.33)	(5.17)	(5.50)	(9.25)
20%	0.104*	-0.012*	0.012*	0.002	0.003	0.006*	0.012*	-.001	0.004*	0.011*	0.001	0.003
	(2.33)	(-6.00)	(6.00)	(1.00)	(1.50)	(3.00)	(6.00)	(-.50)	(2.00)	(5.50)	(0.50)	(1.50)
30%	-.017*	-.008*	0.009*	0.002	0.000	0.003	0.005*	0.002	0.004*	0.005*	0.003	0.003
	(-4.25)	(-4.00)	(4.50)	(1.00)	(0.00)	(1.50)	(2.50)	(1.00)	(2.00)	(2.50)	(1.50)	(1.50)
40%	0.034	-.009*	0.000	0.001	-.002	0.001	0.004*	0.002	0.002	-.002	-.002	-.004*
	(1.26)	(-4.50)	(0.00)	(0.50)	(-.57)	(0.50)	(2.00)	(1.00)	(1.00)	(-1.00)	(-1.00)	(-2.00)
50%	-.028	-.009	0.005	0.000	-.001	-.001	-.003	-.003	-.001	0.003	0.002	0.009
	(-0.33)	(-.45)	(1.25)	(0.00)	(-.50)	(-.50)	(-1.50)	(-1.50)	(-.50)	(1.50)	(1.00)	(0.75)
60%	-.027*	-.009*	-.002	0.007	0.001	-.003	0.000	-.005*	-.001	0.000	-.006*	-.004*
	(-5.40)	(-4.50)	(-.50)	(1.40)	(0.50)	(-1.50)	(0.00)	(-2.50)	(-.50)	(0.00)	(-3.00)	(-2.00)
70%	-.017	-.004*	0.006	-.004*	-.002	-.001	-.003	-.002	-.001	-.004*	-.002	-.006*
	(-1.40)	(-2.00)	(0.80)	(-2.00)	(1.00)	(-.050)	(-1.50)	(1.00)	(-0.50)	(-2.00)	(-1.00)	(-3.00)
80%	-.045*	-.010*	-.005*	0.002	0.000	-.006*	-.008*	-.002	-.001	-.009*	-.004*	-.011*
	(-15.00)	(-5.00)	(-2.50)	(1.00)	(0.00)	(-3.00)	(-4.00)	(-1.00)	(-.50)	(-4.50)	(-2.00)	(-5.50)
90%	-.051*	-.008*	-.006*	-.005*	-.002	-.007*	-.010*	-.005*	-.002	-.013*	-.003	-.010*
	(-25.50)	(-2.67)	(-3.00)	(-2.50)	(-1.00)	(-3.50)	(-5.00)	(-2.50)	(-1.00)	(4.33)	(-1.50)	(-5.00)
100%	-.019	-.024	-.021*	-.018*	-.012*	-.012*	-.026*	-.016*	-.020*	-.023*	-.011*	-.019*
	(-1.90)	(-.800)	(-7.00)	-(6.00)	(-4.00)	(-3.00)	(-9.67)	(-5.33)	(-10.00)	(-7.67)	(-3.67)	(-6.33)
Avg. Return	0.102*	0.007*	0.014*	0.011*	-.002*	0.005*	0.013*	0.012*	-.003*	0.001	0.021*	0.014*
	(20.40)	(7.00)	(14.00)	(11.00)	(-2.00)	(5.00)	(13.00)	(12.00)	(-3.00)	(1.00)	(21.00)	(14.00)

Notes:
t-statistics in parenthesis below returns
* indicates that the monthly differential return is different from zero at the 5 percent level of significance

Table 2
Percentage of Low Price Stocks in December Portfolios

Prior Performance Percentile	Year 1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	Average All Years
10%	17.1	14.4	12.1	46.6	67.8	42.3	17.9	23.9	23.3	24.3	19.5	45.2	42.2	31.8
20%	8.0	5.7	6.9	27.9	43.5	16.9	17.4	7.3	11.1	4.8	7.6	14.4	11.1	13.7
30%	3.2	3.3	6.0	15.6	26.6	13.1	3.6	1.4	2.0	1.0	5.4	5.7	5.9	6.9
40%	2.6	3.8	1.7	9.9	26.3	5.9	3.6	2.2	13.1	24.3	5.1	4.5	0.4	6.9
50%	2.6	4.6	3.0	8.1	22.6	3.8	5.9	10.7	7.6	1.0	3.8	1.1	45.8	10.7
60%	4.1	1.9	4.6	5.1	15.8	17.2	6.5	5.7	13.3	1.2	1.1	12.4	25.5	9.7
70%	2.1	2.8	4.3	12.2	5.5	9.5	3.7	1.4	1.3	4.0	11.3	38.6	1.1	8.6
80%	3.7	2.3	3.4	7.0	26.6	6.0	6.6	2.5	1.7	5.6	4.4	3.9	6.6	6.1
90%	2.7	2.8	5.1	6.0	5.7	12.9	8.4	7.5	4.0	7.9	3.6	4.8	10.7	6.6
100%	7.5	5.3	5.1	15.3	28.4	26.4	20.5	13.6	7.7	13.0	7.6	31.4	21.9	16.6
Avg.	5.4	4.7	5.2	15.2	26.7	15.3	9.4	7.5	7.3	8.6	6.9	16.0	17.1	

Notes: Low price defined as shares with a market value less than $2

Table 3a

January Market Differential Return of the Low Price Stocks in December Portfolio Stratified by December Performance

December Performance Percentile	Year 1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	All Years Average
10%	.28*	.40*	-.01	.93	.50*	.16*	.26*	.07*	.17*	.52	1.00	.09*	.33*	.37*
	(3.70)[t]	(2.30)	(-.25)	(1.33)	(6.88)	(5.71)	(3.69)	(3.14)	(2.90)	(1.57)	(1.76)	(2.42)	(5.53)	(4.76)
20%	.07	.31	.02	.20*	.17*	.13*	.18*	.02	.13*	-.01	.74	-.03	.16*	.16*
	(1.24)	(1.54)	(.43)	(4.37)	(6.18)	(3.41)	(4.49)	(.42)	(3.31)	(-.12)	(.92)	(-1.46)	(3.08)	(3.61)
30%	2.17	.07	-.02	.16*	.14*	.09*	.10	.01	.07	.01	.22	.02	.16*	.16*
	(1.05)	(1.47)	(-.64)	(3.38)	(3.14)	(2.15)	(1.22)	(.267)	(.82)	(.05)	(1.04)	(.53)	(2.32)	(3.16)
40%	-.02	.10	-.11	.17	.12*	.06	.19	-.01	.22*	1.71	.01	-.04	.53*	.59
	(-.34)	(1.49)	(-1.54)	(1.48)	(2.63)	(.77)	(1.13)	(-.26)	(2.39)	(1.64)	(.10)	(-1.59)	(2.75)	(1.83)
50%	.02	.17	-.01	.18	.15*	.20*	.09*	.16*	.16	-.10	-.03	-.04	.08*	.10*
	(.22)	(1.92)	(-.16)	(1.63)	(2.81)	(2.19)	(2.23)	(2.04)	(1.38)	(-.94)	(-.46)	(-1.13)	(2.28)	(4.48)
60%	.13	.32*	.01	-.02	-.02	.09*	.14*	.04	.16	.00	.44	.01	.20*	.11*
	(1.54)	(3.32)	(.17)	(-.44)	(.54)	(2.07)	(2.96)	(.31)	(1.22)	(.03)	(.86)	(.37)	(2.53)	(3.65)
70%	.23	.12	.09*	.17*	.04	.08*	.19*	.02*	-.07	.09	2.39*	.01	-.06	.33*
	(.77)	(1.53)	(-2.40)	(2.04)	(.72)	(2.00)	(3.58)	(3.77)	(-1.67)	(.73)	(2.22)	(.52)	(-.54)	(2.41)
80%	.00	.13*	.01	-.06	.05	.15	.09*	-.02	.09	.16	.06	.04	.18*	.07*
	(.00)	(3.07)	(.18)	(1.38)	(.98)	(1.27)	(2.33)	(-.41)	(.91)	(1.53)	(.93)	(.67)	(2.20)	(3.22)
90%	.23	.17	-.05	.06	.14*	.02	.16*	-.06	.04	.10	-.09*	-.10	.15*	.06*
	(1.86)	(1.88)	(-1.63)	(.76)	(2.46)	(.52)	(2.23)	(-1.70)	(.70)	(1.09)	(-2.30)	(-1.96)	(2.81)	(3.05)
100%	-.03	.03	.06	.07	-.02	.10	.04	.39	-.02	1.24	-.09	-.05	.06	.12*
	(-.50)	(.79)	(.68)	(1.38)	(-.35)	(1.23)	(1.06)	(1.05)	(-.75)	(1.77)	(-1.76	(-1.73)	(.95)	(2.14)
Avg Raw Return	.26*	.23*	-.01	.37	.20*	.11*	.15*	.11	.13*	.83*	.76	.02	.17	
	(2.02)	(3.80)	(-.73)	(1.77)	(8.91)	(6.22)	(6.91)	(1.60)	(3.74)	(2.58)	(.298)	(1.07)	(7.21)	

Notes: t-statistics in parentheses below returns
Low price stocks defined as priced under $2 per share
Indicates that the market differential return is different from zero at the 5 percent level of significance

Table 3b

January Market Differential Return of the High-Priced Stocks in December Portfolio Stratified by December Performance

December Performance Percentile	Year 1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	Average All Years
10%	.10*	.04*	-.07*	.07*	.13*	.05*	.01	.00	.05*	-.08*	-.09*	-.03*	.04*	.00
	(5.39)	(3.39)	(-7.89)	(3.70)	(3.21)	(2.79)	(.73)	(.13)	(5.00)	(-5.64)	(-10.22)	(-2.46)	(3.08)	(.75)
20%	.03*	.01	-.07*	.04*	.04*	.01	-.01	-.05*	.05*	-.11*	-.07*	-.04*	-.02*	-.02*
	(2.36)	(.60)	(-9.25)	(2.40)	(2.00)	(.82)	(-.56)	(-8.17)	(3.06)	(-7.00)	(-5.14)	(-7.60)	(-2.25)	(-8.00)
30%	-.01	-.03*	-.08*	-.03*	-.01	-.00	-.02*	-.05*	.01	-.14*	-.09*	-.04*	-.02*	-.04*
	(-1.44)	(-3.06)	(-13.00)	(-2.55)	(-.53)	(-.04)	(-2.50)	(-9.60)	(1.63)	(-20.14)	(-12.14)	(-7.80)	-3.43)	(-21.00)
40%	-.02*	-.02*	-.07*	-.03*	-.04*	-.02*	-.01	-.05*	-.02*	-.13*	-.08*	-.03*	-.04*	-.04*
	(-2.56)	(-2.75)	(-10.00)	(-3.78)	(-2.57)	(-2.22)	(.83)	(-10.40)	(-3.00)	(-11.55)	(-13.83)	(-6.60)	(-6.50)	(-22.00)
50%	-.03*	-.03*	-.08*	-.06*	-.05*	-.04*	-.01	-.05*	-.02*	-.14*	-.10*	-.04*	-.04*	-.06*
	(-3.88)	(-4.13)	(-11.86)	(-7.11)	(-3.85)	(-4.63)	(-1.43)	(-9.00)	(-3.67)	(-17.13)	(-19.2	(-8.20)	(-3.73)	(-28.00)
60%	-.04*	-.03*	-.06*	-.09*	-.08*	-.04*	-.03*	-.07*	-.01	-.12*	-.10*	-.05*	-.06*	-.06*
	(-4.75)	(-3.11)	(-8.71)	(12.71)	(6.58)	(-4.30)	(-3.71)	(-17.00)	(-1.38)	(-11.90)	(-15.83)	(-12.50)	(-9.00)	(-31.00)
70%	-.04*	-.04*	-.08*	-.07*	-.12*	-.05*	-.02*	-.07*	-.04*	-.10*	-.05	-.03	-.06*	-.06*
	(4.75)	(-5.13)	(-13.67)	(-6.46)	(-12.00)	(-6.00)	(-3.17)	(-16.50)	(-8.80)	(-9.27)	(-1.34)	(-1.67)	(-9.83)	(-15.00)
80%	-.05*	-.01	-.09*	-.10*	-.12*	-.06*	-.03*	-.07*	-.03*	-.12*	-.10*	-.05*	-.05*	0.07*
	(-6.38)	(-1.00)	(-14.17)	(-14.57)	(-9.75)	(-7.25)	(-4.83)	(-13.20)	(-3.44)	(-8.93)	(-16.33)	(-9.40)	(-8.83)	(-35.00)
90%	-.05*	-.01	-.09*	-.14*	-.16*	-.05*	-.02*	-.07*	-.05*	-.11*	-.11*	-.05*	-.06*	.07*
	(-5.22)	(-.50)	(-14.17)	(-12.73)	(-15.70)	(-5.67)	(-2.75)	(-10.83)	(-8.00)	(13.25)	(-18.50)	(-8.00)	(-8.71)	(-37.00)
100%	-.02*	.01*	-.10*	-.14*	-.17*	-.03	-.03*	-.07*	-.05*	-.05*	-.12*	-.06*	-.03*	-.07*
	(-2.18)	(.92)	(-10.67)	(-42.00)	(-12.14)	(-1.59)	(-2.46)	(-9.71)	(-6.13)	(-2.25)	(-13.44)	(-8.00)	(-2.27)	(-16.50)
Avg Raw Return	-.02*	-.01	-.08*	-.06*	-.08*	-.03*	-.02*	-.05*	-.01*	-.11*	-.09*	-.04*	-.04*	
	(-5.33)	(-4.00)	(-39.00)	(-16.00)	(-15.00)	(-9.00)	(-8.00)	(-27.00)	(-4.33)	(-27.50)	(-22.50)	(-21.00)	(-18.50)	

Notes: High price stocks defined as priced above $2 per share

*Indicates that the market differential return is different from zero at the 5 percent level

Table 4
Regression Results For Equation Containing Only December Performance Variables

$$Jan = a + b(Dec^{+}) + c(Dec^{-})$$

Year	a	b	c	R^2	DF
1971	.142*	-.181*	-1.043*	.02	1884
	(12.189)	(-2.190)	(-4.664)		
1972	.072*	.091*	-2.455*	.09	2116
	(11.551)	(2.567)	(-14.320)		
1973	-.037*	-.081*	-.055	.00	2354
	(-10.940)	(-2.269)	(-1.197)		
1974	-.144*	.858*	-3.870*	.04	2573
	(-3.106)	(2.070)	(-10.406)		
1975	.175*	-.087	-1.386*	.15	2650
	(71.282)	(-.786)	(-20.394)		
1976	178*	-.010	-6.23*	.03	2671
	(32.141)	(-.197)	(-8.890)		
1977	.026*	-.047*	-.739*	.03	2739
	(6.093)	(-2.018)	(-7.583)		
1978	-.051*	.316*	-.609*	.01	2793
	(-6.752)	(4.348)	(-4.820)		
1979	.079*	-.140*	-.765*	.05	3003
	(16.388)	(-2.978)	(-10.770)		
1980	.106*	.486*	-1.459*	.00	3444
	(2.804)	(2.376)	(-2.085)		
1981	.010	-.065	-.778*	.00	3624
	(.380)	(-.306)	(-3.218)		
1982	-.031*	-.019*	-.278*	.02	4371
	(-9.293)	(-5.235)	(-8.383)		
1983	.066*	.102*	-.889*	.05	4693
	(11.864)	(4.040)	(-16.395)		
Mean of all Years	.045	.094	-1.150	.038	

Notes: Jan is differential returns in January
Dec^{+} is differential returns in December if positive, zero otherwise
Dec^{-} is differential return in December if negative, zero otherwise
* Indicates coefficient different from zero at the 5 percent level if significant

Table 5
Regression Results with Ln(Price) Variable

$$Jan = a + b(Dec^{+}) + c(Dec^{-}) + d\,(Ln(Price))$$

Estimated Coefficients (t-statistics in Parentheses Below Coefficients)

Year	a	b	c	+d	R^2	DF
1971	.359*	-.254*	-.347	-.086*	.08	1883
	(15.640)	(-3.150)	(-1.534)	(-10.863)		
1972	.248*	.031	-1.796*	-.067*	.19	2115
	(20.199)	(.918)	(-10.786)	(-16.322)		
1973	.026*	-.110*	.064	-.023*	.04	2353
	(3.579)	(-3.109)	(1.378)	(-9.783)		
1974	.047	.735	-3.400*	-.081*	.04	2572
	(.550)	(1.764)	(-8.260)	(-2.663)		
1975	.351*	-.302*	-.954*	-.090*	.21	2649
	(22.581)	(-2.789)	(-13.275)	(-14.526)		
1976	.308*	-.181*	-.291*	-.060*	.11	2670
	(31.184)	(-3.751)	(-4.131)	(-15.572)		
1977	.165*	-.162*	-.285*	-.058*	.15	2738
	(20.578)	(-7.172)	(-3.033)	(-19.938)		
1978	.049*	.196*	-.350*	-.041*	.03	2792
	(2.949)	(2.639)	(-2.669)	(-6.785)		
1979	.190*	-.209*	-.488*	-.046*	.09	3002
	(17.992)	(-4.530)	(-6.656)	(-11.761)		
1980	.798*	.028	.505	-.279*	.03	3443
	(10.095)	(.198)	(.712)	(-9.838)		
1981	.509*	-.332	-.051	-.186*	.03	3623
	(9.284)	(-1.444)	(-.205)	(-10.330)		
1982	.009*	-.021*	-.196*	-.018*	.04	4370
	(1.539)	(-5.658)	(-5.714)	(-8.530)		
1983	.191*	.037	-.604*	-.054*	.12	4692
	(21.868)	(1.504)	(-10.993)	(-18.104)		
Mean of all Years	.250	-.042	-.630	-.084	.089	

Notes: Jan is differential return in January
Dec+ is differential return in December if positive, zero otherwise
Dec- is differential return in December if negative, zero otherwise
*Indicates coefficient different from zero at the 5 % level of significance

Table 6
Regression Results for Most Complete Equation

$$Jan = a + b(Dec^{+}) + c(Dec^{-}) + d(Ln(price)) + e(Ln(Price) \times Dec^{+}) + f(Ln(price) \times Dec^{-})$$

Year	a	b	c	d	e	f	R^2	DF
1971	.414*	-.819*	.079	-.113*	.282*	-.225	.08	1881
	(14.526)	(-4.488)	(.199)	(-9.884)	(3.451)	(-1.056)		
1972	.235*	-.054	-4.206*	-.059*	.029	1.786*	.25	2113
	(14.930)	(-.595)	(-16.177)	(-9.798)	(.751)	(12.395)		
1973	.014	-.075	-.185*	-.018*	-.018	.125*	.05	2351
	(1.575)	(-.950)	(-1.998)	(-5.547)	(-.562)	(3.110)		
1974	-.663*	1.952*	-9.739*	.389*	-1.567*	6.081*	.20	2570
	(-7.654)	(3.807)	(-20.573)	(10.409)	(-6.055)	(22.213)		
1975	.311*	-.235	-1.209*	-.053*	-.105	.376*	.23	2647
	(18.503)	(-1.513)	(-15.002)	(-6.244)	-.978)	(6.873)		
1976	.309*	-.230*	-.312*	-.061*	.045	.020	.11	2668
	(28.117)	(-3.019)	(-3.375)	(-11.987)	(.840)	(.355)		
1977	.166*	-.203*	-.497*	-.059*	.030	.191*	.15	2736
	(18.848)	(-5.619)	(-4.179)	(-15.975)	(1.433)	(2.957)		
1978	-.022	1.440*	-.702*	-.005	-.743*	.202	.06	2790
	(-1.177)	(10.171)	(-3.381)	(-.600)	(-10.238)	(1.800)		
1979	.198*	-.379*	-.459*	-.050*	.094*	-.016	.09	3000
	(16.788)	(-4.347)	(-4.001)	(10.356)	(2.280)	(-.258)		
1980	.768*	.357	.543	-.260*	-.239	-.014	.03	3441
	(9.077)	(1.164)	(.606)	(-7.571)	(-1.387)	(-.290)		
1981	.432*	-.797	-1.011*	-.148*	.247	.591*	.04	3621
	(7.041)	(-1.773)	(-2.863)	(-6.300)	(1.055)	(3.675)		
1982	.002	-.028*	-.258*	-.011*	.003	.120*	.05	4368
	(.377)	(-2.228)	(-7.095)	(-4.606)	(.825)	(6.245)		
1983	.176*	.050	-.631*	-.038*	-.045*	.290*	.14	4690
	(20.079)	(1.858)	(-11.621)	(-11.078)	(-2.438)	(12.014)		

Notes: Jan is differential return in January
Dec^{+} is differential return in December if positive, zero otherwise
Dec^{-} is differential return in December if negative, zero otherwise
*Indicates coefficients different from zero at the 5 percent level of significance

Table 7a
January Market Differential Returns for Low and High Priced Stocks 1984

Prior Performance Percentile	Low Price Stocks		High Price Stocks	
	Mean Differential Return	t-statistic	Mean Differential Return	t-statistic
10%	.275*	18.33	.002	1.00
20%	.032*	(2.13)	-.010*	(-5.00)
30%	.043*	(3.20)	-.001	(-.50)
40%	.030*	(2.00)	-.009*	(-4.50)
50%	.013	(0.87)	-.011*	(-5.50)
60%	.017	(1.13)	-.014*	(-7.00)
70%	.054*	(3.60)	-.008*	(-4.00)
80%	.043*	(2.87)	.018*	(-9.00)
90%	.062*	(4.03)	-.020*	(-10.00)
100%	.051*	(3.40)	-.021*	(-10.50)

*Indicates differential return different from zero at the 5 percent level of significance

Table 7b
Out of Sample Tests: 1984 Regression Results for Full Sample

$$Jan = a = b\,Dec^{+} + c\,Dec^{-} + d\,Ln(price) + (e\,Ln(price) \times Dec^{+}) + (f\,Ln(price) \times Dec^{-})$$

Estimated Coefficients (t-statistics in Parentheses Below Coefficients)

Equivalent.Table	a	b	c	d	e	f	R^2	DF
4	-.020*	.010	-.431*				.03	5053
	(-5.995)	(.795)	(-11.825)					
5	.047*	.003	-.318*	-.026*			.04	5052
	(5.917)	(0.210)	(-8.319)	(-9.235)				
6	.017	.099	-.879*	-.011*	-.042	.395*	.07	5050
	(1.872)	(1.667)	(-13.817)	(-3.174)	(-1.736)	(11.080)		

Notes: Jan is differential return in January
Dec^{+} is differential return in December if positive, zero otherwise
Dec^{-} is differential return in December if negative, zero otherwise
*Indicates coefficients different from zero at the 5 percent level of significance

Table 7c
1982, 1983, and 1984 Regression Results

Estimated Coefficients (t-statistics in Parentheses Below Coefficients)

Equivalent.Table	a	b	c	d	e	f	R^2	DF
82 Raw Return	.0020	-.0280*	-.2580*	-.0110*	.0030	.1200*	.050	4368
(Full Sample)	(.377)	(-2.228)	(-7.095)	(-4.606)	(.825)	(6.245)		
Abnormal Return	.0522*	-.2389*	-.0822	-.0270*	.0402	.0424	.047	3091
(Restricted Sample)	(6.442)	(-4.595)	(-1.375)	(-8.381)	(1.426)	(1.348)		
Differential Return	.0681*	-.2389*	-.0824	-.0269*	.0402	.0426	.047	3091
(Restricted Sample)	(8.399)	(-4.595)	(-1.378)	(-1.426)	(1.354)			
83 Raw Return	.1760*	.0500	-.6310*	-.0380*	.0450*	.2900*	.140	4690
(Full Sample)	(20.079)	(1.858)	(-11.621)	(-11.078)	(-2.438)	(12.014)		
Abnormal Return	.1839*	.0984	-1.1636*	-.0702*	-.0622	.4369*	.133	3233
(Restricted Sample)	(12.282)	(1.580)	(-8.520)	(-12.113)	(-1.745)	(-12.113)		
Abnormal Return	.1839*	.0984	-1.1636*	-.0702*	-.0622	.4369*	.133	3233
(Restricted Sample)	(12.282)	(1.580)	(-8.520)	(-12.113)	(-1.745)	(-12.113)		
Differential Return	.1667*	.0975	-1.1613*	-.0710*	-.06073	.4351*	.134	3233
(Restricted Sample)	(11.134)	(1.566)	(-8.502)	(-12.247)	(-1.703)	(6.575)		
84 Raw Return	.0170	.0990	-.8790*	-.0110*	-.0420	.3950*	.070	5050
(Full Sample)	(1.872)	(1.667)	(-13.817)	(-3.174)	(-1.736)	(11.080)		
Abnormal Return	.0660*	.1172	-2.191*	-.0280*	.0456	.0711*	.046	3797
(Restricted Sample)	(8.092)	(-1.844)	(-4.631)	(-9.362)	(1.776)	(2.585)		
Differential Return	.0660*	-.1171	-.2194*	-.0281*	.0456	.0711*	.046	3797
(Restricted Sample)	(8.082)	(-1.843)	(-4.640)	(-9.397)	(1.776)	(2.585)		

Notes: Jan is differential returns in January
Dec+ is differential returns in December if positive, zero otherwise
Dec- is differential returns in December if negative, zero otherwise
*Indicates coefficient different from zero at the 5 percent level if significant