Return Seasonality in Stocks and Their Underlying Assets: Tax-Loss Selling versus Information Explanations

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Results of tests contrasting tax-loss selling with intertemporal information variation as explanations of the January seasonal in stock returns are reported. Closed-end fund shares display the typical size-related January seasonal while their net asset values do not. Interpreting the net asset value return as a proxy for information about underlying assets, this result indicates information variation is not a necessary condition for the January effect in stocks. The share returns at the turn of the year are negatively related to their mean preceding year returns and positively related to the standard deviations of their preceding year returns. These results are consistent with tax-loss selling.

Rozeff and Kinney (1976) were among the first to point out common stock rates of return in January are significantly larger than those in other months. Banz (1981) and Reinganum (1981) both provide reports

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of a significant negative relationship between stock returns and the size of the issuing firm as measured by the total market value of outstanding equity. Keim (1983) investigates the interaction of the seasonal and size effects and finds approximately half of the annual difference between the rates of return on small and large firms occurs in the month of January. Blume and Stambaugh (1983) apply a correction for the return measurement bias that results from using reported closing prices and shows virtually all of the size effect occurs in the month of January. While the size-related January pattern itself is well recognized, its cause is not. Efforts to explain the behavior of equity rates of return in January tend to take one of two approaches.

First, Branch (1977) and others investigated the link between tax-loss selling transactions and equity returns around the end of the year. To take tax advantage of accrued capital losses, an investor must realize those losses by the end of the year. This selling pressure late in December would depress prices and the prices would rebound in January when the selling pressure abates. The January price rebound is the supposed source of the abnormally large rates of return in January. Furthermore, because small firms' stock returns are more volatile than large firms' returns, small-firm stocks are more likely to have generated usable tax losses and therefore be candidates for tax-loss selling. Despite Constantinides's (1984) careful evaluation of rational tax trading, which concludes that the optimal strategy is not to delay loss realization until December, empirical evidence by Branch (1977), Reinganum (1983), Roll (1983), Chang and Pinegar (1986), and others appears to be at least partially consistent with the tax-loss-selling argument.

The second explanation for the abnormally large January equity rate of return relies upon seasonal differences in the information about underlying assets available to the market. Because the fiscal and calendar years coincide for a majority of firms, Rozeff and Kinney (1976) observed that January sees the release of an unusual amount of accounting information. They speculated that perhaps the return seasonal is associated with accounting news. An intertemporal information explanation for unusually large equity returns in January requires consistently positive price reactions to news in that month. An argument to this effect could follow Barry and Brown (1985), whose model shows relatively information-poor securities have more systematic risk than their information-rich counterparts. Suppose, in addition, small-capitalization stocks are information-poor while large-capitalization stocks are information-rich. The surfeit of news associated with year-end reporting would increase the information richness of small stocks by relatively much more than it would that of the already informationally affluent large stocks. Consequently, small stocks would react more strongly to the increased news of January by generating larger returns than large stocks. While Barry and Brown (1984) found the January effect cannot be explained entirely by the information surrogate they use, Penman (1987) documented a relationship between accounting information and an equity return seasonal in calendar quarters 2 through 4, Clarkson and Thompson (1988) presented evidence corroborating risk reductions in response to information increases, and Arbel and Strebel (1982) showed small-capitalization stocks tend not to be heavily researched by security analysts.

Empirical evaluations of the tax-loss-selling explanation require data only about the shares themselves. For example, Roll (1983) regressed stocks' returns at the turn of the year against their mean returns over the preceding year. Evaluating the information explanation, on the other hand, requires additional data on either the quantity of information or the effect of information on the underlying assets. This additional data should reflect information differences across firms as well as through time.

In this article, we exploit a unique data set to evaluate simultaneously the two explanations of the January seasonal. Closed-end investment funds provide contemporaneous, observable, market-based rates of return for both stocks and underlying asset portfolios. A closed-end fund is an investment company with a fixed number of shares of stock outstanding. As for any other widely held firm, the stock is bought and sold in a secondary market where the price of the shares is determined by their supply and demand. Unlike any other widely held firm, however, the company's assets are a portfolio dominated by very liquid securities. The market value of this portfolio is reported weekly as the net asset value of the fund. In a semistrong form-efficient market for the fund's assets, the rate of return calculated on the basis of the net asset value should quickly reflect any new information about the assets. Consequently, such returns can act as a proxy for measuring seasonal patterns in the information about the underlying asset portfolio. Tests of the tax-loss-selling explanation can also be performed. These tests require only data about the stock issued by the fund. Hence, both of the explanations for the January equity return seasonal can be evaluated simultaneously. No other firms exist for which *market-based* rates of return are available for both the firm's common stock and the assets against which the stock has a claim.[1]

[1] While this is the first investigation of the relationship between closed-end fund share returns and asset returns, several previous studies have linked share returns to other fund attributes. Anderson (1986); Brauer (1984, 1988); Brickley and Schallheim (1985); Leonard and Noble (1981); Richards, Fraser, and Groth (1980); Roenfeldt and Tuttle (1973); and Thompson (1978) tested various strategies for investing in closed-end shares using buy-and-hold rules, filter rules, rules based on "open-ending" information, and rules exploiting discount and expense data. Often the rules appear to generate abnormal returns. The contribution of mismeasured normal return benchmarks to such results is unclear, however.

The article is organized as follows. In Section 1, the overall and seasonal behaviors of closed-end fund stock and net asset rates of return are described. The rate of return patterns are compared to the original patterns reported by Rozeff and Kinney (1976) for common stocks in general. In Section 2, the information explanation of the January seasonal is investigated. The rate of return on the stock is regressed against seasonal dummy variables and the rate of return on net assets. In Section 3, the returns are examined for indications of tax-loss-selling activity. The methods used are the same as those employed by Roll (1983) and incorporate a variable suggested by Brickley, Manaster, and Schallheim (1988). In Section 4, the article is concluded with a discussion of the implications of the findings.

1. Description of Stock and Net Asset Rate of Return Data

The funds used in this study represent the intersection of three data sets. First, data about a fund's common stock returns had to be available from the Center for Research in Security Prices (CRSP) daily returns file. Second, contemporaneous data about a fund's end-of-week net asset values (i.e., the total market value of assets held less any liabilities all divided by the number of outstanding shares as of the close of trading on Fridays) had to be available from *Barron's* or the *Wall Street Journal.* Third, contemporaneous data about a fund's number of shares outstanding, share price, and dividends had to be available from *Standard & Poor's Stock Guide.* The Appendix lists the 68 closed-end funds that met these criteria. The period of study is January 1967 through December 1983. The number of funds for which data are available range from a minimum of 26 in 1970 to a maximum of 55 in 1974. The amount of data available for each fund ranged from 3 years of observations for Alleghany Corp. and Tonopah Mining Co.[2] to 17 years of observations for ASA Ltd.; Adams Express Co.; Castle Convertible Fund, Inc.; General American Investors, Inc.; Lehman Corp.; Madison Fund, Inc.; Niagara Share Corp.; Overseas Securities, Inc.; Petroleum and Resources Corp.; Tricontinental Corp.; and United States and Foreign Securities Corp.

Because closed-end fund net asset values are available only on a weekly basis, all of the analysis reported here uses either weekly or four-week proxies for monthly rates of return. Weekly net asset values and dividends paid were used to construct weekly rates of return for the portfolios held by the funds. The CRSP daily rates of return for

[2] Several companies that were at one time or another closed-end funds became increasingly specialized in certain types of investments and then deregistered under the Investment Company Act of 1940, as amended, to become operating or holding companies. All the companies listed in the Appendix were bona fide closed-end funds over the periods they were included in the data set.

the fund's stocks were converted to weekly rates of return. Three of the years after 1967 comprised 53 weeks with week 1 being defined as ending with the first Friday of trading for the calendar year.[3] Rates of return for the 27th week of these three years were deleted so that all years contained 52 weeks. "Months" were then defined as consecutive, nonoverlapping four-week periods, thereby generating 13 "months" in each year. The first and 13th "months" are analogous to the conventional January and December by this construction.

Because Keim (1983) and others have found firms in the two smallest-size deciles consistently show the strongest January rate of return seasonal, all of the analysis reported here was done separately for large and small market capitalization funds. If the total market value of outstanding equity for a fund at the beginning of a year would have placed it in the smallest 20 percent of all NYSE firms for the preceding year, that fund was classified as a small fund for that year. All other funds were classified as large funds.

Table 1 shows descriptive statistics for net asset and share rates of return for equally weighted portfolios of large and small funds. The weekly rates of return have been compounded over the nonoverlapping four-week periods both for ease of comparison with other studies that use calendar months and for later use in this study. Four attributes of the table merit comment. First, according to these overall (i.e., nonseasonal) statistics, the share portfolios' rates of return mirror their counterparts for the underlying net asset packages. The larger funds have larger mean rates of return and smaller standard deviations of rates of return. Second, the larger mean net asset rate of return for the large funds is consistent with observations frequently made in the popular financial press.[4] While conventional wisdom seems to hold that a small fund possesses more flexibility in allocating its assets than a large fund, the fact that larger funds frequently outperform their smaller brethren indicates that flexibility need not lead to higher returns. Third, the standard deviation of a share portfolio's rates of return is only slightly larger than that of its matching portfolio of net assets. Although the portfolios for which the net asset returns are calculated implicitly have many more securities than the portfolios for which the share returns are calculated (because net asset value is itself a portfolio value), the share portfolios are large enough that their smaller sizes provide only minimally greater total risks than are provided by the net asset portfolios. Fourth, the autocorrelation coefficient estimates reveal the pattern of large first-order values and gen-

[3] The years were 1970, 1976, and 1981.

[4] See, for example, "When It Comes to Mutual Funds, Bigger Might Be Better, After All," *Wall Street Journal*, June 5, 1986, p. 29 and "Wide Range of Stock Funds Post Gains for 2nd Quarter, But Biggest Do Best," *Wall Street Journal*, July 8, 1988, p. 15.

Table 1
Descriptive statistics for continuously compounded four-week rates of return on portfolios of large and small closed-end fund net assets and shares using all available data (for 68 funds) from January 1967 through December 1983

Portfolio	Mean rate of return, %	Standard deviation of rates of return, %	Autocorrelation coefficients*				
			$\hat{\rho}_1$	$\hat{\rho}_2$	$\hat{\rho}_3$	$\hat{\rho}_6$	$\hat{\rho}_{13}$
			Panel A: Net assets				
Large	.60	3.16	.17	−.09	−.05	.14	.07
Small	.33	5.48	.10	−.04	−.09	.09	.09
			Panel B: Shares				
Large	.64	3.91	.11	−.07	−.03	.10	.21
Small	.38	5.60	.22	.05	−.08	.09	.29

Funds are listed in the Appendix.

* Under the null hypothesis that the autocorrelation coefficients are zero, the standard error of the autocorrelation coefficient estimates is .07.

erally smaller absolute values for higher orders typical of monthly equity rates of return.[5] The exceptions are the one-year (i.e., 13-month) autocorrelation estimates for the share portfolios, which suggest a seasonal factor for some month. Most germane, of course, are the behaviors of the rates of return in the month of "January" versus the rest of the year.

Table 2 shows estimates of the expected rates of return to equally weighted portfolios of large- and small-fund net assets and shares in the month of January (i.e., the first four weeks of the year) compared to the rest of the year. The table also shows the results of *t*-tests for the expected rates of return differing from 0 and for the January expected rates of return differing from those for the rest of the year. The table shows important differences between the expected rates of return on net assets and the expected rates of return on shares. With respect to net assets, only those held by large funds in the last 48 weeks of the year provide a statistically significant positive expected rate of return. In sharp contrast, the shares of both sizes of closed-end funds provide statistically significant positive expected rates of return in the first four weeks of the year but not thereafter. The rightmost column of the table shows that the net assets of the funds have expected rates of return that are not greater in January than in the rest of the year, whereas the shares do have expected rates of return that are greater in January than in the rest of the year. That is,

[5] See, for example, table 1 (p. 121) in Fama and Schwert (1977). Note especially their second common stock return index, which is equally weighted, as are the portfolios in this article's Table 1. For the CRSP equally weighted monthly returns index from January 1967 through December 1983 the autocorrelations were, respectively, .14, −.05, −.01, −.03, and .13 for orders 1, 2, 3, 6, and 12. The standard errors of these estimates are .07 under the null hypothesis that the autocorrelations are zero.

Table 2
Estimates of differences in expected four-week rates of return on portfolios of large and small closed-end fund net assets and shares for the first four weeks of the year from those in the rest of the year from January 1967 through December 1983

Portfolio	Statistic	Time of the year: Weeks 1–4	Time of the year: Weeks 5–52	Difference between weeks 1–4 and weeks 5–52
		Panel A: Net assets		
Large	Mean (%)	1.28	0.54	0.74
	t-statistic*	1.82	2.43†	1.00
	Observations	17	204	
Small	Mean (%)	2.60	0.14	2.46
	t-statistic*	1.85	0.38	1.69
	Observations	17	204	
		Panel B: Shares		
Large	Mean (%)	3.79	0.38	3.41
	t-statistic*	3.11†	1.47	2.73†
	Observations	17	204	
Small	Mean (%)	6.54	−0.13	6.67
	t-statistic*	3.37†	−1.06	3.38†
	Observations	17	204	

* The t-statistics test the hypotheses that the expected four-week rates of return for weeks 1 through 4, for weeks 5 through 52, and for the difference between the expected rates for weeks 1 through 4 and weeks 5 through 52 are significantly greater than zero.

† Statistically significant at the 1 percent level or beyond.

the shares show January rate of return seasonals even though the underlying assets do not.

Investment companies and their shareholders are subject to a unique tax treatment that might appear to cause some part of the results reported in Panel B of Table 2. According to Subchapter M of the Internal Revenue Code, closed-end funds are not subject to taxation if they distribute substantially all their investment company taxable income—that is, dividend and interest receipts—and realized capital gains. Investors pay taxes on their receipts from the funds at rates that depend upon the source of the distribution: earned income rates on distributions from investment company taxable income and capital gains rates on distributions from fund-realized capital gains. While this tax treatment will never induce a seasonal in net asset rates of return, it could lead to a January seasonal in share rates of return (depending upon the marginal investor's capital gains tax rate), but only if most funds distribute large realized capital gains in January. The necessary conditions for such a tax-induced seasonal are very unlikely to have existed to the extent necessary to account for even a small fraction of the January return difference for small funds documented in Table 2.[6]

[6] So long as a fund's distributions render it tax-free, dividend payments have no effect on the net asset rate of return because, according to the AICPA (1979), the reporting practice is to reduce net asset value by the amount of the declared dividend when the stock goes ex-dividend, not when

The values reported in Table 2 can be aggregated over size and compared to the rates of return originally reported by Rozeff and Kinney (1976) in their table 1, which also used equally weighted portfolios, although of all available equities and for the period 1904 through 1974. Large- and small-fund portfolio rates of return were combined by forming aggregate portfolios of 38 percent small-fund returns and 62 percent large-fund returns because, on average, 38 percent of the funds fell into the two smallest NYSE size deciles. Annualizing Rozeff and Kinney's daily rates of return gives a January mean of 50.76 percent compared to a non-January mean of 5.16 percent. For aggregate closed-end fund net assets, the annualized January expected rate of return is 25.78 percent versus a non-January annualized expected return of 5.19 percent. In other words, the non-January closed-end fund net asset performance is expected to be virtually identical to that documented by Rozeff and Kinney for all equities over a longer period while the January expected rate of return is smaller. This observation is consistent with the funds holding larger than average securities so the net asset rate of return shows a smaller than average January value. Outside of January, where firm size is of minimal importance, the rates of return are the same. For aggregate closed-end fund shares, the annualized January expected rate of return is 84.86 percent versus a non-January annualized expected rate of return of 2.50 percent. Compared to Rozeff and Kinney's rates of return, the share rates of return are consistent with the funds themselves being on average smaller than other firms and, ergo, their shares showing a more pronounced January rate of return seasonal than equities in general. These comparisons are intended to provide a sense of the relative magnitudes of closed-end fund rate of return

the cash is disbursed. The effect of dividends on share returns is more involved, however, because three different cash flows can affect the marginal investor. First, the shareholder receives the investment company income distribution and pays personal earned income tax on that distribution. Second, the investor receives the capital gains payment and pays personal capital gains tax on that payment. Third, the shareholder incurs the capital loss created by the cum-to-ex share price drop. This loss also generates a tax benefit if the investor sells the stock. In a transaction costly world, the round-trip costs of selling the stock and purchasing a substitute security reduces, and may even eliminate, the tax benefit. The second flow is unique to closed-end fund shares, while the remaining two arise with any stock. Therefore, the traditional no dividend arbitrage condition must be modified for closed-end funds in a way that depends upon the marginal investor's capital gains tax rate. The modification will lead to a January share rate of return seasonal if, and only if, most funds distribute realized capital gains in January. Internal Revenue Service publication 4982 requires investment companies to distribute realized capital gains for a year by the first day of February of the following year. However, this requirement became effective with February 1, 1988 [see Siconolfi (1988)]—well after the period covered by this study. Casual inspection of the dividend patterns of the 68 funds revealed a weak pattern of capital gains distributions in January for only the equity funds in the sample. Moreover, in direct discussions, fund managers indicated most funds had no capital gains realization and distribution policies prior to 1988. The tax treatment of investment company dividends is, therefore, very unlikely to have contributed in any significant way to the January effects. A more detailed examination of the maximal impact of closed-end fund dividends and taxes on rates of return is available from the authors.

seasonalities and to show that closed-end fund rates of return are not pathological.

The observation of a size-related January seasonal in the returns to stocks but not their underlying assets is important. Because these firms on average used very little debt financing, this observation cannot be due to leverage. Rather, this is a new observation about the way in which the pricing of derivative securities relates to the pricing of underlying assets. The next two sections will investigate the extent to which closed-end fund returns are consistent with either the information variation or the tax-loss-selling explanations of the January equity rate of return seasonal.

2. Evidence on the Information Variation Explanation of the January Seasonal

A substantial body of research has concluded capital market prices tend to react quickly to new public information. Given that closed-end funds hold portfolios of widely traded securities,[7] and apparently large ones at that, the net asset values of the funds should react quickly to any new information about the assets underlying the funds' common stocks. Consequently, the rate of return on any fund's net assets should be a reliable barometer of the market-value effect of new information about that fund's underlying assets. An absence of a seasonal pattern in net asset returns would indicate a lack of a seasonal pattern in the information flow to the market.[8] This section uses seasonal dummy variable regressions to investigate the presence or absence of monthly patterns in share returns and net asset returns and relates any of the former to the latter.

Table 3 shows the results of estimating the following regression:

$$R_{pt} = \hat{a}_{p1} + \sum_{i=2}^{13} \hat{a}_{pi} D_{it} + \epsilon_{pt} \qquad (1)$$

where R_{pt} is the rate of return on portfolio p in week t, D_{it} is a dummy variable of the ith four-week period of the year in which week t falls (e.g., D_{2t} equals 1 if week t is in the fifth through eighth weeks of

[7] Brickley, Manaster, and Schallheim (1988) report for their sample of funds that "nearly 80 percent of the funds' assets, on average, consisted of actively traded equities with reliable market prices (AMEX or NYSE closing prices)."

[8] An information seasonal is not the only possible reason for a seasonal pattern in net asset returns. For example, a seasonal pattern in the market risk premium would also lead to a pattern in net asset returns. However, the absence of a seasonal pattern in net asset returns would be inconsistent with both a seasonal pattern in the market risk premium and a new information seasonal. Note further the potential information basis for other equity pricing "anomalies" such as Basu's (1977) earnings-price ratio effect or French's (1980) weekend effect could be evaluated in a similar fashion given adequate data availability.

Table 3
Estimates of variation in four-week-by-four-week expected rates of return on portfolios of large and small closed-end fund net assets and shares from January 1967 through December 1983 (t-values in parentheses)

$$R_{pt} = \hat{a}_{p1} + \sum_{i=2}^{13} \hat{a}_{pi} D_{it} + \epsilon_{pt} \qquad p = 1, \ldots, 4$$

Portfolio	Regression coefficient estimates: Weeks 1–4	Weeks 5–8	Weeks 9–12	Weeks 13–16	Weeks 17–20	Weeks 21–24	Weeks 25–28	Weeks 29–32	Weeks 33–36	Weeks 37–40	Weeks 41–44	Weeks 45–48	Weeks 49–52	R^2	DW	F-stat.*
Panel A: Net assets																
Large	1.28	−1.40	−0.53	0.11	−0.36	−0.64	−1.36	−1.34	−0.30	−0.57	−1.65	−0.28	−0.58	.03	1.65	0.54
	(1.65)	(−1.27)	(−0.48)	(0.10)	(−0.32)	(−0.58)	(−1.23)	(−1.22)	(−0.27)	(−0.51)	(−1.50)	(−0.25)	(−0.53)			
Small	2.60	−2.87	−1.18	−3.05	−2.29	−3.11	−2.78	−2.74	−2.28	−0.41	−3.24	−2.10	−3.36	.04	1.75	0.65
	(1.93)	(−1.51)	(−0.62)	(−1.60)	(−1.20)	(−1.64)	(−1.46)	(−1.44)	(−1.20)	(−0.22)	(−1.71)	(−1.11)	(−1.77)			
Panel B: Shares																
Large	3.79	−4.43	−4.22	−1.86	−4.33	−3.60	−3.36	−4.55	−2.58	−1.78	−4.45	−2.42	−3.37	.11	1.66	2.20†
	(4.12)	(−3.40)	(−3.24)	(−1.43)	(−3.32)	(−2.76)	(−2.58)	(−3.49)	(−1.98)	(−1.34)	(−3.41)	(−1.86)	(−2.58)			
Small	6.54	−4.92	−6.54	−5.87	−7.30	−6.08	−7.40	−7.13	−6.77	−6.08	−8.54	−5.86	−7.60	.13	1.48	2.51†
	(5.00)	(−2.66)	(−3.54)	(−3.17)	(−3.94)	(−3.28)	(−4.00)	(−3.85)	(−3.66)	(−3.29)	(−4.61)	(−3.17)	(−4.11)			

For each portfolio p, the intercept coefficient $\hat{a}_{p1}$ is an estimate of that portfolio's expected rate of return during the first four weeks of the year. The t-statistic for $\hat{a}_{p1}$ is for the test of whether the first four weeks' expected rate of return is significantly different from zero. The coefficients $\hat{a}_{p2}, \hat{a}_{p3}, \ldots, \hat{a}_{p13}$ are estimates of the differences in expected rates of return during the second four weeks of the year ($D_{2t} = 1$), the third four weeks of the year ($D_{3t} = 1$), . . . , the last four weeks of the year ($D_{13t} = 1$) from that during the first four weeks of the year. The t-statistics for $\hat{a}_{p2}, \hat{a}_{p3}, \ldots, \hat{a}_{p13}$ are for tests of whether the second four weeks of the year, the third four weeks of the year, . . . , the last four weeks of the year-expected rates of return are significantly different from that during the first four weeks of the year.

* The F-statistic tests the hypothesis that a_{p2} through a_{p13} are jointly equal to zero for each $p = 1, \ldots, 4$. The statistic has 12 and 208 degrees of freedom.

† Statistically significant at the 1 percent level or beyond.

the year and 0 otherwise), $\hat{a}_{p1}$ is the intercept coefficient estimate for portfolio p, $\hat{a}_{pi}$ is the coefficient estimate for dummy varible i for portfolio p, and ϵ_{pt} is a well-behaved error term. The regression was estimated for each of four portfolios: large-fund net assets, small-fund net assets, large-fund shares, and small-fund shares. The coefficients were estimated using ordinary least squares. This seasonal dummy variable methodology is the same as used by Chang and Pinegar (1986) and others.

The intercept coefficients estimate the expected rates of return on the portfolios for the month of January and are shown under the heading "Weeks 1–4." These coefficients are insignificantly different from zero at conventional levels for the net asset portfolios. The coefficients are significantly positive beyond the 1 percent level for the two share portfolios, however. The dummy variable coefficients estimate the expected differences between the rates of return in the ith month and the rates of return in January and are shown under the headings "Weeks 5–8" through "Weeks 49–52." None of these coefficients are significantly different from zero at conventional levels for the net asset portfolios. Turning to the share portfolios, however, only 4 of the 24 non-January coefficients for the two portfolios fail to reject the null hypothesis that they are zero in favor of the alternative that they are negative at the 1 percent level (i.e., have t-scores greater than -2.33), and all four are for the large-fund portfolio. The F-statistic in the rightmost column of the table tests the hypothesis that the coefficients for the monthly dummies are jointly equal to zero—that is, the expected rates of return in the months other than January are different than those in January. This hypothesis cannot be rejected for either net asset portfolio. In other words, by this test, the net asset rates of return provide no evidence of seasonality and hence no evidence of a seasonal pattern in the information about the underlying assets flowing to the market, regardless of fund size. The F-test rejects its jointly zero non-January coefficients hypothesis for both share portfolios, however, and does so at a higher confidence level for small funds than for large funds. Despite the lack of evidence of information variation over time about the underlying assets, the shares demonstrate typical size-related January rate of return seasonals.[9]

The failure of the F-tests for the net asset portfolios in Table 3 indicates a lack of asset information variation in January versus the rest of the year. Moreover, none of the non-January dummy variable

[9] Table 3 shows two additional statistics. The R^2 values for the regressions are provided for general information purposes. The Durbin–Watson statistics for first-order autocorrelation in the errors are reported since the monthly returns were found to be positively first-order autocorrelated to some degree in Table 1. The Durbin–Watson values do not allow rejection at conventional significance levels of the null hypothesis of no first-order autocorrelation in favor of the alternative of positive first-order autocorrelation, however.

coefficient estimates were individually significantly different from zero, also indicating a lack of month-by-month asset information variation. However, all test results that fail to reject a null hypothesis are potentially subject to Type II error. Perhaps the weak (i.e., not statistically significant) variations in the net asset portfolios' rates of return are nonetheless strong enough to give rise to the significant seasonal variations in the share portfolios' rates of return. That is, perhaps when the effects of net asset rate of return variation are removed from the share rates of return, the shares will no longer demonstrate the January equity rate of return seasonal pattern.

Table 4 shows estimates of the following regression:

$$\mathrm{RS}_{pt} = \hat{b}_{p1} + \sum_{i=2}^{13} \hat{b}_{pi} D_{it} + \sum_{j=1}^{13} \hat{c}_{pj} D_{jt} \mathrm{RN}_{pt} + \zeta_{pt} \tag{2}$$

where RS_{pt} is the rate of return on share portfolio p in week t, RN_{pt} is the rate of return on the matching net asset portfolio p in week t, D_{kt} ($k = i$ or j) is a dummy variable of the kth four-week period of the year in which week t falls, $\hat{b}_{p1}$ is the intercept coefficient estimate for portfolio p, $\hat{b}_{pi}$ is the coefficient for dummy variable i for portfolio p, $\hat{c}_{pj}$ is the coefficient estimate for the product of dummy variable j and net asset rate of return in week t for portfolio p, and ζ_{pt} is a well-behaved error term. The regression was estimated for both large- and small-share portfolios. Each regression was estimated twice using ordinary least squares. In the first set of regressions the coefficient estimates for the products of the independent variables were constrained to be equal (i.e., $\hat{c}_{p1} = \hat{c}_{p2} = \cdots = \hat{c}_{p13}$). In the second set of regressions the coefficient estimates for the products of the independent variables were allowed to vary over the months.

The intercept coefficients estimate the expected values of the rates of return on the share portfolios in January that cannot be explained by the matching rates of return on the net asset portfolios and are shown under the heading "Weeks 1–4."[10] These coefficients are sig-

[10] The net asset rate of return that "matches" a share rate of return is the net asset return for the same four-week period. The four-week periods run from one Friday close to the fourth following Friday close. (Recall the periods do not overlap.) This definition of matching returns, therefore, implicitly assumes investors know both the share prices and net asset values of the funds at the close of business on Friday, even though net asset values are published on the following Mondays for most funds for most of the time under study. That is, investors are assumed to have access to net asset values virtually continuously and share markets are assumed very efficient at impounding that information. An alternative matching procedure would be to pair the Friday-close-to-fourth-following-Friday-close net asset return with the lagged Monday-open-to-fourth-following-Monday-open share return. This alternative was not used for three reasons. First, the returns are being calculated over 28 days so any nonsynchronicity if the assumed conditions do not hold would likely be negligible. Second, the R^2 values reported in Table 4 already are large for regressions of monthly equity rates of return against other variables [cf. Fama and Schwert (1977, tables 5 and 8)]. Third, Monday-open share prices are not readily available for most funds for most of the time under study.

nificantly positive beyond the 1 percent level for both size portfolios for either treatment of the coefficients for the products of the independent variables. The dummy variable coefficients estimate the expected values of the differences between the share portfolios' rates of return in the *i*th month and the share portfolios' rates of return in January that cannot be explained by the rates of return on the matching net asset portfolios and are shown under the headings "Weeks 5–8" through "Weeks 49–52." When all of the interaction coefficient estimates are forced to be the same, only one of the seasonal dummy variable coefficients is not significantly negative at the 1 percent level or beyond, and it is for the large funds. When the interaction coefficient estimates are allowed to vary over the months, six of the seasonal dummy variable coefficients are not significantly negative, three each for the large and small funds. An *F*-statistic is shown at the far right of the table under the heading "Weeks." This statistic tests the hypothesis that the coefficients for the monthly dummies are jointly equal to zero. This hypothesis is rejected for either treatment of the coefficients for the products of the independent variables. In other words, the share rates of return still exhibit significant January seasonals even after controlling for net asset returns. This is direct evidence the January seasonal in the share rates of return is not induced by any seasonality (significant or otherwise) in the rates of return on the underlying assets that, in turn, may have been caused by seasonal variations in the flow of information about the assets to the market.[11]

The lack of a relationship between asset information variation and the January equity rate of return seasonal for closed-end funds is important. The process by which information about closed-end fund assets comes to the market is uniform.[12] Because of this uniformity, the only way an information explanation of the January rate of return seasonal could hold would be if the asset information itself showed a seasonal. Given closed-end funds hold portfolios of securities traded

[11] Table 4 also shows *t*-tests of the coefficients for the net asset rates of return. All but two of these coefficients are significantly positive at or beyond the 1 percent level, as one would expect, although they are sometimes quite different from unity, as one might not expect. The table also shows an *F*-test for the equality of the interaction term coefficients over the 13 months under the heading "Net asset return." At the 1 percent significance level, the null hypothesis of no variation cannot be rejected for large funds but can be rejected for small funds, suggesting the first line of the table shows an adequate treatment for large funds but the fourth line is the better treatment for small funds. The R^2 values for the regressions are again provided for general information. The Durbin–Watson statistics are also reported and do not allow rejection at conventional significance levels of the null hypothesis of no first-order autocorrelation in the errors in favor of the alternative of positive first-order autocorrelation. The key result remains any variation in net asset returns does not account for the variation in share returns.

[12] Regardless of the size of the fund or the time of the year, net asset values are reported weekly. Portfolio composition reporting is also uniform. Changes in the composition of a closed-end fund's asset portfolio are reported to the Securities and Exchange Commission quarterly via form N1-Q. This reporting requirement is identical for all registered funds, regardless of their size or the time of the year.

Table 4
Estimates of variation in four-week-by-four-week expected rates of return on portfolios of large and small closed-end fund shares not explained by variation in the matching four-week-by-four-week expected rates of return on the portfolios of assets held by the funds from January 1967 through December 1983 (t-values in parentheses)

$$RS_{pt} = \hat{b}_{p1} + \sum_{i=2}^{13} \hat{b}_{pi}D_{it} + \sum_{j=1}^{13} \hat{c}_{pj}D_{jt}RN_{pt} + \zeta_{pt} \qquad p = 1, 2$$

	Regression coefficient estimates													
Portfolio	Weeks 1–4	Weeks 5–8	Weeks 9–12	Weeks 13–16	Weeks 17–20	Weeks 21–24	Weeks 25–28	Weeks 29–32	Weeks 33–36	Weeks 37–40	Weeks 41–44	Weeks 45–48	Weeks 49–52	Net asset return 1–52
Large	2.69	−3.22	−3.77	−1.95	−4.02	−3.05	−2.19	−3.39	−2.32	−1.30	−3.02	−2.18	−2.86	0.86
	(4.22)	(−3.59)	(−4.21)	(−2.18)	(−4.49)	(−3.40)	(−2.44)	(−3.77)	(−2.60)	(−1.45)	(−3.36)	(−2.44)	(−3.20)	(15.32)
Small	4.77	−2.97	−5.74	−3.79	−5.73	−3.95	−5.50	−5.26	−5.21	−5.80	−6.32	−4.42	−5.30	0.68
	(5.06)	(−2.23)	(−4.34)	(−2.85)	(−4.32)	(−2.97)	(−4.14)	(−3.96)	(−3.93)	(−4.39)	(−4.75)	(−3.34)	(−3.98)	(14.19)
Large	2.46	−3.03	−3.26	−1.51	−4.03	−2.95	−1.97	−3.18	−2.33	−0.84	−2.73	−2.28	−2.50	
	(3.60)	(−3.28)	(−3.48)	(−1.52)	(−4.30)	(−3.14)	(−2.12)	(−3.43)	(−2.48)	(−0.89)	(−2.94)	(−2.39)	(−2.67)	
Small	3.31	−1.57	−4.22	−2.29	−4.35	−2.60	−3.98	−3.79	−3.73	−3.21	−4.81	−3.10	−3.68	
	(3.50)	(−1.22)	(−3.19)	(−1.79)	(−3.40)	(−2.03)	(−3.12)	(−2.97)	(−2.92)	(−2.47)	(−3.75)	(−2.42)	(−2.87)	

Table 4
Continued

	Regression coefficient estimates																
																F-statistics*	
Portfolio	Net asset return 1–4	Net asset return 5–8	Net asset return 9–12	Net asset return 13–16	Net asset return 17–20	Net asset return 21–24	Net asset return 25–28	Net asset return 29–32	Net asset return 33–36	Net asset return 37–40	Net asset return 41–44	Net asset return 45–48	Net asset return 49–52	R^2	DW	Weeks	Net asset return
Large														.58	2.38	2.93†	
Small														.56	2.01	3.24†	
Large	1.06	0.61	0.49	0.70	1.11	1.05	0.83	0.61	1.10	0.54	1.05	1.19	0.67	.62	2.34	2.68†	1.54
	(4.69)	(3.03)	(2.43)	(2.72)	(6.71)	(4.41)	(3.87)	(3.63)	(6.35)	(2.49)	(6.20)	(5.22)	(3.34)				
Small	1.25	0.44	0.64	0.76	0.95	0.46	0.97	0.69	0.64	0.17	0.76	0.96	0.90	.65	2.05	2.09†	4.16†
	(8.16)	(2.16)	(2.66)	(4.99)	(5.51)	(2.93)	(3.65)	(3.80)	(4.58)	(1.58)	(4.48)	(5.43)	(6.73)				

For each portfolio p, the coefficient $\hat{b}_{p1}$ is an estimate of the portfolio's expected value of the share rate of return in the first four weeks of the year that cannot be explained by the matching net asset rate of return. The coefficients $\hat{b}_{pi}$, $i = 2, \ldots, 13$, are estimates of the portfolio's expected differences between rates of return during the second four weeks of the year ($D_{2t} = 1$), third four weeks of the year ($D_{3t} = 1$), . . . , 13th four weeks of the year ($D_{13t} = 1$) from that during the first four weeks of the year that cannot be explained by the matched net asset rate of return. The coefficients $\hat{c}_{pj}$ are estimates of the expected sensitivites of the portfolio's share rate of return to a unit change in the rates of return in the matched net assets in the jth four weeks of the year. The $\hat{b}_{pi}$ estimates are made twice—once with all the $\hat{c}_{pj}$ constrained to be equal (reported under "Net asset return 1–52") and once with no such constraint (reported under "Net asset return 1–4" through "Net asset return 49–52"). All t-statistics are tests for whether the coefficient estimates are significantly different from zero.

* The F-statistics reported under "Weeks" test the hypothesis that b_{p2} through b_{p13} are jointly equal to zero for each $p = 1$ and 2. The statistics have 12 and 207 degrees of freedom in the first pair of regressions and 12 and 195 degrees of freedom in the second pair of regressions. The F-statistics reported under "Net asset return" test the hypothesis that c_{p1} through c_{p13} are jointly equal for each $p = 1$ and 2. The statistics have 12 and 195 degrees of freedom.

† Statistically significant at the 1 percent level or beyond.

in an efficient market, patterns in asset information would be revealed by patterns in the rates of returns to the funds' net assets. No seasonal pattern was found in net asset rates of return. The fact closed-end fund shares nonetheless exhibited the typical size-related January rate of return seasonal pattern indicates the pattern's source could not be related to information about the underlying assets. That is, firm size and time of year are not proxying for some other attributes of the assets to which the common stock has a claim. If information about underlying assets cannot explain the equity rate of return seasonal pattern, its source must lie with some aspect of the way in which the stock itself is traded in secondary markets. The next section uses closed-end fund returns to investigate the major secondary-market–based explanation of the size-related January rate of return seasonal: tax-loss selling.

3. Evidence on the Tax-Loss-Selling Explanation of the January Seasonal

The tax-loss-selling explanation of the January seasonal holds that at the end of the year investors sell stocks that have experienced losses over the preceding year in order to use those losses to reduce their taxable incomes and hence reduce their tax bills. This selling pressure is relieved early in January causing the stocks' prices to quickly rebound, thereby generating large returns soon after the first of the year. Brickley, Manaster, and Schallheim (1988) argue, following Constantinides (1984), that stocks with larger return variability are more likely to have experienced losses and therefore be candidates for tax-loss selling, ceteris paribus. The losses over the year will have reduced the market values of tax-loss-selling candidate stocks so the market value of outstanding equity should be negatively related to tax-loss-selling pressure also. This section presents some summary statistics for the variables frequently associated with tax-loss selling and relates share returns and net asset returns to those variables.

Table 5 shows summary statistics for the tax-loss-selling associated variables of turn of the year return, preceding year return, and standard deviation of preceding year returns for closed-end fund net assets and shares grouped by fund size.[13] The summary statistics are based

[13] Mean preceding year return is only one of several possible tax-loss-selling incentive measures. Branch (1977) looks at stocks reaching a new low during the last week of the year. Reinganum (1983) and Chang and Pinegar (1986) use the year-end price divided by, respectively, the maximum day-end and the maximum month-end price over the period the Internal Revenue Service would define as short term for tax purposes. Roll (1983) uses mean preceding year return. Ideally, one would like to use a measure suggested by a model of optimal tax-loss selling. However, Constantinides's (1984) model of optimal tax trading finds loss selling only at the end of the year is not rational. Absent a theoretical basis for the selection, the tax-loss-selling incentive measure used here—mean preceding year return—was chosen for two pragmatic reasons. First, since Roll's

Table 5
Descriptive statistics for continuously compounded one-week rates of return on large and small closed-end fund net assets and shares during the first week of the year and over the preceding year excluding the first week using all available data (for 68 funds) from January 1967 through December 1983

		Grand mean,[1] %					Correlation[2] of turn of year return with	
		Turn of year return		Preceding year return				
Fund group	Number of turn of year return observations	One week	Four-week equivalent	One week	Four-week equivalent	Standard deviation of preceding year returns	Mean preceding year return	Standard deviation of preceding year returns
		Panel A: Net assets						
Large	403	0.48	1.93	.15	.59	2.29	.23†	.16†
Small	156	0.49	1.96	.02	.09	3.41	.07	−.05
		Panel B: Shares						
Large	482	1.68	6.83	.09	.37	3.09	−.31†	.33†
Small	208	2.04	8.33	.01	.04	4.28	−.35†	.47†

Funds are listed in the Appendix.

[1] Using pooled cross-sectional and time-series data (i.e., for all funds of the given size, for all time periods).

[2] Using cross-sectionally matched data (e.g., matching a fund's turn of the year one-week return with that fund's mean one-week return over the preceding year).

† Statistically different from zero at the 1 percent level or beyond.

on individual share attributes as opposed to portfolio characteristics because tax-loss selling, if it exists, is a phenomenon associated with individual securities, not portfolios. The summary statistics also are reported on the basis of net asset returns to expose any differences in the aggregate tax-loss-selling compositions of the holdings of large and small funds.[14] The rates of return are reported on a one-week basis because the tax-loss-selling effect should be concentrated in the first week after the turn of the year. The turn of the year week is defined as the week ending with the first Friday of the new year. Four-week equivalent mean rates of return are provided for ease of comparison with the four-week rates of return reported earlier. Several

methodology is used in this article, his measure seemed a sensible choice. Second, of all the alternatives, mean preceding year return was the only one that could be constructed from the raw data avaialble here (i.e., rates of return). Note further, a vigorous literature exists exploring trading volumes and patterns for evidence of tax-loss selling. Instructive recent exchanges are provided by Ferris, Haugen, and Makhija (1988), Harris (1988), Ritter (1988), and Ziemba (1988).

[14] Brickley, Manaster, and Schallheim (1988) make the point that "[t]he influence of tax timing on multi-asset portfolios is difficult to determine." Therefore, the results based on net asset portfolio rates of return are at best suggestive of the possible differences in tax-loss-selling attributes of the funds. Brickley, Manaster, and Schallheim go on to argue the failure of fund managers to engage in optimal tax-loss trading contributes to the discounts at which these funds sell. After detailed inspection of tax-loss-selling–related measures for the individual stocks held by funds and comparison of those measures to discounts, they concluded trading portfolios of tax timing options for tax timing options on portfolios by buying the funds instead of their constituent stocks explains about 15 percent of closed-end fund discount variation.

aspects of the table are interesting. First, note even though the portfolios of net assets held by large and small funds had virtually the same turn of the year rates of return, the mean preceding year rate of return was much higher for large funds, accounting for their overall outperformance of small funds. Second, the nearly identical turn of the year rates of return on net assets by fund size suggests that the funds' holdings are similar in terms of their aggregate tax-loss-selling attributes.[15] Third, consistent with tax-loss selling of the shares, small-fund shares exhibited much larger rates of return at the turn of the year than large-fund shares. Fourth, also consistent with tax-loss selling of the shares, their turn of the year rates of return were negatively correlated with their mean preceding year rate of return and positively correlated with the standard deviations of their preceding year rates of return. More rigorous evaluation of the tax-loss-selling evidence can be provided using an extension of the approach followed by Roll (1983).

As Roll (1983) points out, regressing the turn of the year rates of return for securities against their tax-loss-selling attributes effectively tests a trading strategy of buying the securities at the end of the year based on those attributes. The single attribute he used was mean preceding year rate of return. To that attribute can be added the standard deviation of the preceding year rates of return. Paraphrasing Roll, if the tax-selling hypothesis is correct, a negative coefficient for average preceding year rate of return and a positive coefficient for standard deviation of preceding year rates of return should result.

Table 6 shows estimates of the following regressions:

$$\mathrm{RT}_{jt} = \hat{d}_{g1} + \hat{d}_{g2}\mathrm{RP}_{jt} + \hat{d}_{g3}\mathrm{SD}_{jt} + \eta_{jt} \tag{3}$$

where RT_{jt} is the rate of return at the turn of the year on fund j in year t, RP_{jt} is the mean preceding year rate of return on the same fund j for year t, SD_{jt} is the standard deviation of the preceding year rates of return on the same fund j for year t, $\hat{d}_{g1}$ is the intercept coefficient estimate for fund group g, $\hat{d}_{g2}$ is the coefficient estimate for the mean preceding year rate of return for fund group g, $\hat{d}_{g3}$ is the coeffcient estimate for the standard deviation of the preceding year rates of return for fund group g, and η_{jt} is a well-behaved error term. The regression was estimated for large-fund net assets, small-fund net assets, large-fund shares, and small-fund shares. The coefficients were estimated twice using ordinary least squares and pooled cross-sectional and time-series data. In the first set of regressions the coef-

[15] No difference in net asset portfolio rates of return at the turn of the year by fund size suggests, but does not prove, no differences in the aggregate tax-loss-selling attributes of funds of different sizes. (See note 14.)

Table 6
Estimates of the expected turn of the year one-week rates of return on large and small closed-end fund net assets and shares not explained by the matching average one-week rate of return over the preceding year or the matching average one-week rate of return over the preceding year and the matching standard deviation of the one-week rates of return over the preceding year from January 1967 through December 1983 (*t*-values in parentheses)

$$\mathrm{RT}_{jt} = \hat{d}_{g1} + \hat{d}_{g2}\mathrm{RP}_{jt} + \hat{d}_{g3}\mathrm{SD}_{jt} + \eta_{jt} \qquad g = 1, \ldots, 4; j = 1, \ldots, N_g; N_g < 68$$

Fund group	Regression coefficient estimates: Intercept	Average preceding year return	Standard deviation of preceding year returns	R^2	*F*-statistic*	Total degrees of freedom
			Panel A: Net assets			
Large	0.004 (5.90)	0.661 (4.79)		.05	22.92†	401
Small	0.005 (1.79)	0.148 (0.90)		.01	0.80	155
Large	0.002 (2.85)	0.615 (4.35)	0.064 (2.45)	.07	15.17†	397
Small	0.007 (2.11)	0.286 (1.19)	−0.070 (−1.14)	.01	0.90	154
			Panel B: Shares			
Large	0.018 (15.72)	−1.577 (−7.05)		.09	49.73†	480
Small	0.021 (6.41)	−1.316 (−5.41)		.12	29.25†	207
Large	0.000 (0.03)	−1.289 (−5.90)	0.578 (6.68)	.17	49.42†	480
Small	−0.006 (−1.09)	−0.621 (−1.99)	0.621 (5.54)	.23	31.20†	206

For each fund grouping by size and rate of return basis g, the coefficient $\hat{d}_{g1}$ is an estimate of those funds' expected one-week turn of the year rate of return (see Table 5) that cannot be explained by the matching average or matching average and standard deviation of the preceding year one-week rates of return. The t-statistic for $\hat{d}_{g1}$ is for the test of whether this expected unexplained return is significantly different from zero. The coefficient $\hat{d}_{g2}$ is an estimate of the expected sensitivity of those funds' one-week turn of the year rates of return to a unit change in the matching average preceding year one-week rate of return. The t-statistic for $\hat{d}_{g2}$ is for the test of whether this expected sensitivity is significantly different from zero. The coefficient $\hat{d}_{g3}$ is an estimate of the expected sensitivity of those funds' one-week turn of the year rate of return to a unit change in the matching standard deviation of the preceding year one-week rates of return. The estimates are made twice—once with $\hat{d}_{g2}$ constrained to equal zero and once with no such constraint. The t-statistic for $\hat{d}_{g3}$ is for the test of whether this average sensitivity is significantly different from zero.

* The F-statistic tests the hypothesis that d_{g2} and d_{g3} are jointly equal to zero for each $g = 1, \ldots, 4$.

† Statistically significant at the 1 percent level or beyond.

ficients for the standard deviations were constrained to zero. As a result, these regressions are comparable to those reported by Roll (1983). In the second set of regressions the standard deviation coefficient estimates were not so constrained. The second set of regressions, therefore, correspond to selecting investments on the basis of both tax-loss-selling variables simultaneously.

Consider for the moment only the results for the closed-end fund share rates of return. The intercept coefficients estimate the expected one-week turn of the year rates of return that cannot be explained by the matching standard deviations of the preceding year rates of return and/or the mean of the preceding year rates of return. With the mean preceding year return as the only explanatory variable, the intercept coefficients are significantly greater than zero at very small significance levels. However, when the standard deviation of the preceding year returns is also used as an independent variable, the intercept coefficients become insignificantly different from zero. That is, using both independent variables, the estimated value of the expected turn of the year return unexplained by those variables is zero. The mean preceding year rate of return coefficients estimate the sensitivities of the turn of the year rates of return to unit increases in the mean preceding year rates of return. These coefficients are negative, as predicted by the tax-loss-selling explanation, in all four cases. The significance levels for rejecting a null hypothesis of a zero value in favor of an alternative hypothesis of a negative value for the coefficients are always less than 2.5 percent. The coefficient for the standard deviation of the preceding year rates of return are estimates of the sensitivities of the turn of the year rates of return to unit increases in the standard deviations of the preceding year rates of return. These coefficients are positive, as predicted by the tax-loss-selling argument. Their one-tail significance levels are well beyond the 1 percent level. Overall, the F-statistics for the share rate of return regressions are quite large. Turning to the net asset rate of return regressions, very little is consistent with aggregate tax-loss selling in the portfolios held by the funds—the coefficient for the standard deviation of the preceding year rates of return for large funds being the only estimate with the predicted sign.

While the evidence shown in Table 6 supports an association between the January effect in closed-end fund shares and variables related to tax-loss selling, that evidence certainly does not exclude additional secondary market explanations as well. The marginal investor would be willing to make a share price concession equal to the difference between the tax savings from deducting a loss in the current year by selling in December and the present value of the tax savings from deducting the loss in the following year by selling in January. Reasonable values of the marginal investor's tax rate, the appropriate discount rate, and deductible losses suggest as much as one-third of the small-fund January effect and two-thirds of the large-fund January effect documented in Table 2 may be due to tax-loss-selling pressure alone.[16]

[16] Let all of the return to shares in January be due to the elimination of the present-value difference of the tax savings in the two years (i.e., shareholders who sell in December concede the full difference between the tax savings from deducting the loss then and the present value of the tax

The results for closed-end fund shares are in good agreement with those for all NYSE stocks over the period 1962 to 1980 as reported by Roll (1983, tables 2 and 4). For a total of 45,135 turn of the year rate of return observations over the period, he found an average one-week turn of the year rate of return of 3.55 percent and an average 50-week preceding year return of 10.70 percent. Here, for the total 690 turn of the year share rate of return observations, the average one-week turn of the year rate of return is 1.75 percent and the average 50-week equivalent preceding year return is 10.47 percent. The preceding year returns are virtually identical. The difference in the average turn of the year returns has to do with the way in which Roll defined the turn of the year period. Using daily data, he was able to measure consistently the turn of the year week over the last trading day of December and the first four trading days of January. Using only calendar week data for closed-end funds required that the turn of the year week be defined as the week ending with the first Friday of January. Thus, the turn of the year week for the funds could have as few as one and as many as five days in January. This data-imposed restriction provides a downwardly biased measure of the magnitude of the turn of the year return since that return is concentrated in the first five days of the new year [see Keim (1983)]. Roll formed a portfolio of stocks for each year of his data and regressed the portfolios' turn of the year rates of return against their average preceding year rates of return. He reports a slope coefficient of -0.118 (t-score -3.00). Duplicating that process for closed-end fund shares yields a coefficient of -0.052 (t-score -4.22). The closed-end fund share portfolios' coefficient is smaller in absolute value because their measured average turn of the year return is smaller while their average preceding year return is the same.

Taken as a whole, the results presented in this section support the presence of tax-loss selling in the shares of closed-end investment funds, even though tax-loss selling alone cannot account for all of

savings from decucting the loss one year hence). Under these conditions, the January rate of return on a share, r_j, would be given by

$$r_j = [it/(1 + i)][(P_H/P_D) - 1]$$

where i is defined as the interest rate appropriate for discounting the tax savings, t represents the marginal investor's tax rate for deducting the loss, P_H is the highest price that would generate a deductible loss, and P_D denotes the end-of-December price. The value of i should be the market capitalization rate for the stock. The average return on the S&P Composite Index of common stocks from 1967 through 1983 was about 10.0 percent [see Ibbotson Associates (1989, app. C)]. The value of t depends upon whether the loss is deductible from earned income, as a short-term capital loss, or as a long-term capital loss (these distinctions are meaningful over the period covered by this study) for the marginal investor. Malkiel (1977) assumes an investor tax rate of 25 percent for an example in an investigation of a related issue. Values of i equal to 0.10 and t equal to 0.25 imply that a 50 percent price drop would generate a January return of 2.27 percent. This number is about one-third of the observed small-fund January effect and two-thirds of the large-fund January effect.

the January seasonal in share rates of return. When this determination is combined with the earlier conclusion that information patterns for the underlying assets do not appear to account for the January seasonal in closed-end fund share rates of return, a consistent picture emerges of at least one purely secondary security market phenomenon at work.[17]

4. Conclusion

Closed-end funds hold assets that provide cross-sectionally similar and temporally consistent rate of return distributions, yet the stocks of closed-end funds offer rate of return distributions that vary by time of the year and fund size. Portfolios of large-fund shares earn a rate of return over the first four weeks of the year that exceeds the average four-week rate of return over the rest of the year by 3.41 percent. Portfolios of small-fund shares earn almost twice this differential—6.67 percent. These comparative return behavior observations, which can only be made using closed-end fund data, are themselves quite remarkable. But why do these patterns arise?

The uniform process by which information about the funds' assets comes to the market, coupled with the lack of a pattern in the net asset rates of return, suggests information-based arguments cannot explain the phenomenon. This conclusion does not imply systematic information variation can never cause equity rate of return seasonals; although in an informationally efficient market, one would expect reliable cyclic information to be impounded in prices so that rates of return would not exhibit similar cyclical behavior. This conclusion does imply information variation about underlying assets is not a necessary condition for the January effect.

The relationships between the funds' turn of the year rates of return and variables associated with tax-loss selling suggest at least that this pure secondary market effect is at work. This result does not rule out additional secondary market causes for the January equity rate of return seasonal. For example, Chang and Pinegar (1989) argue seasonal real growth is not impounded efficiently in secondary security market prices and so also contributes a partial explanation for the January seasonal. Even though tax-loss selling may not be the only source of the January seasonal, it does seem to be one source.

Why the obvious arbitrage opportunity created by the January rate of return seasonal does not lead to elimination of the seasonal is a matter for further research. Perhaps, as Roll (1983) argued, the markets for small capitalization equities are too illiquid and transaction

[17] These conclusions are also consistent with a finding in Brickley, Manaster, and Schallheim (1988) that differential tax-loss trading is related to closed-end fund discounts.

costs are too large to allow for more complete arbitrage. Perhaps some other institutional explanation is the key. Whatever the reason, the results of this study suggest the sources of the January seasonal in equity returns be sought in the behavior of secondary markets and not in the relationship between rates of return on derivative assets and information about their underlying assets.

Appendix

The following is a list of the most recent names of the closed-end funds used in this study (earlier names are in parentheses).

ASA Ltd. (American South African)
AVC Corp. (American Viscose Corp.)
Abacus Fund, Inc.
Adams Express Co.
Advance Investors Corp.
Alleghany Corp.
American Capital Bond Fund, Inc. (American General Bond Fund, Inc.)
American Capital Securities, Inc. (American General Securities, Inc.)
American International Corp.
American Research and Development Corp.
American Utilities Shares, Inc. (Bayrock Utilities Securities)
Astrotech International (Cyprus Corp., S-G Securities)
Bancroft Convertible Fund, Inc.
Bunker Hill Income Securities, Inc.
CL Assets, Inc. (CNA Larwin Investment Co.)
CNA Income Shares, Inc.
Carriers and General Corp.
Castle Convertible Fund, Inc. (CI Convertible Fund)
Central Securities Corp.
Chase Convertible Fund of Boston, Inc.
Claremont Capital Corp. (Diebold Venture Capital Corp.)
Current Income Shares, Inc.
Dominick Fund, Inc.
Drexel Bond Debenture Trading Fund

Ebasco Industries, Inc. (Electric Bond and Share Co.)
Energy and Utility Shares, Inc. (Drexel Utility Shares)
Eurofund International, Inc. (Eurofund, Inc.)
Excelsior Income Shares, Inc.
Fort Dearborn Income Securities, Inc.
General American Investors, Inc.
Griesedieck Co.
John Hancock Income Securities Corp.
John Hancock Investors, Inc.
MA Hanna Co.
Hatteras Income Securities, Inc.
Highland Capital Corp. (Price Capital Corp.)
Holyoke Shares Inc. (American Writing Paper Corp.)
INA Investment Securities, Inc.
Intercapital Income Securities, Inc. (Standard & Poor's Intercapital)
International Holdings Corp.
Japan Fund, Inc.
Lehman Corp.
Lincoln National Direct Placement Fund
Madison Fund, Inc.
Massmutual Corporate Investors, Inc.
Massmutual Income Investors, Inc.
Montgomery Street Income Securities, Inc.
Mutual of Omaha Investment Shares, Inc.
National Aviation and Technology Corp. (National Aviation Corp.)
Niagara Share Corp.
Overseas Securities, Inc.
Pacific American Income Shares, Inc.
Petroleum and Resources Corp. (Petroleum Corp. of America)
Precious Metals Holdings, Inc.
RET Income Fund, Inc. (REIT Income Fund)
St. Paul Securities, Inc.
Standard Shares, Inc.
State Mutual Securities, Inc.
Sterling Capital Corp. (Value-Line Development Capital)

Surveyor Fund, Inc. (General Public Service Corp.)

Tonopah Mining Co.

Transamerica Income Shares, Inc.

Tricontinental Corp.

United Corp.

United States and Foreign Securities Corp.

USLIFE Income Fund, Inc.

Vestaur Securities, Inc.

Wheelabrator Corp. (The Equity Corp.)

These are all the funds for which any rate of return information was simultaneously available for both net assets (from *Wall Street Journal* and *Barron's*) and shares (from the Center for Research in Security Prices daily returns file). Data cover the period from January 1967 through December 1983.

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