RFE Review of Financial Economics
1994, Vol. 4, No. 1, 79–91

Professional Portfolio Managers and the January Effect: Theory and Evidence

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While many researchers have documented a pronounced seasonality of stock returns in the month of January, a universally accepted theory of why this so-called "January effect" occurs has yet to be put forward. This paper develops a theory of portfolio rebalancing which is based on the effects induced by the calendar year planning horizon of professional portfolio managers. A simple model of portfolio choice and leisure consumption is developed via which it is shown that portfolio allocations early in the calendar year should be more heavily weighted towards the stock market and less heavily weighted towards cash and cash equivalents than later in the calendar year. The paper provides evidence on the impact systematic shifts in the portfolio holdings of institutional investors have had on the aggregate stock market in Canada over the period 1973:Q1 to 1992:Q4. It is shown that institutional trading actively influences stock price changes and that portfolio rebalancing on the part of professional fund managers, prompted by conflict-of-interest considerations, causes the bidding up of stock prices in January.

Over the past several years, researchers have empirically documented a pronounced seasonality of stock returns in the month of January (Rozeff and Kinney, 1976; Brown, Kleidon and Marsh, 1983a, 1983b; Keim, 1983; Gultekin and Gultekin, 1983; Berges, McConell and Schlarbaum, 1984; Kato and Schallheim, 1985). Many possible explanations for this so-called "January effect" have been proposed (Reinganum, 1983; Tinic and West, 1984; Seyhun, 1988) with only mixed success (Kato and Schallheim, 1985; Berges et al., 1984; Brown et al., 1983a; Seyhun, 1988; Ritter and Chopra, 1989).

Recently, Haugen (1986, p. 500) and Haugen and Lakonishok (1988, pp. 66–101) have offered an alternative explanation of the January effect which has the potential to address the shortcomings of the other explanations. It has been dubbed the portfolio-rebalancing hypothesis. This hypothesis asserts that the abnormally

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high returns to stocks in the month of January are caused by (systematic) shifts in the portfolio holdings of institutional investors at the turn-of-the-year, which are, in turn, related to the nature of the compensation system in the securities industry. Portfolio managers acting as agents attempt to maximize their own utility rather than that of their principals, the claimholders. Managers are typically rewarded at the end of the year with their "Christmas bonus", the size of which is determined by the rate of return earned by the manager during the year. Managers put the funds allocated to them at risk at the beginning of the year. If at any time during the year their portfolio produces a satisfactory return, they lock in the return and their bonus, by moving the portfolio out of the equity market and into lower-risk securities, such as T-bills or government bonds.[1] At the beginning of January, the game starts all over again and managers move their funds back into equities. For this reason a huge inflow of funds in the stock market is witnessed in January, which causes stock prices to rise. It is noteworthy that the introduction of this principal-agent arrangement in the professional management of investment portfolios predates the introduction of income taxes. As the January effect has been empirically verified for time periods before the advent of income taxes (Fedenia, Haugen, Cuny and Cho, 1990), the portfolio rebalancing hypothesis provides a more compelling explanation for the January effect than its major competing hypothesis, tax-loss selling.

Fedenia et al. (1990) test for portfolio rebalancing at the turn-of-the-year by professional portfolio managers to explain the abnormal behavior of U.S. stocks in the month of January. Their analysis of 77 mutual funds over the period 1969–1986 supports portfolio rebalancing. Athanassakos (1992) carried out a test of portfolio rebalancing by both institutional and individual investors in Canada. Athanassakos' (1992) tests show that institutional investors are responsible for the January seasonal, whereas individual investors play some role which, nevertheless, is less important in the 1st quarter than the rest of the year. Athanassakos' (1992) findings contrast with Ritter's (1988) findings that in the U.S. individual investors' portfolio rebalancing, prompted by tax-loss selling at year-end, is responsible for the January effect. Finally, Athanassakos (1992) also tests for the more general expression of portfolio rebalancing, known as the "market impact" hypothesis (Klemkosky, 1977), which states that institutional investors actively influence stock price changes. His tests of the market impact hypothesis show that mutual and pension fund investing causes changes in stock prices and that this is not true for individuals. A similar conclusion had been reached earlier by Klemkosky (1977).

The purpose of this paper is to develop a theoretical articulation of the Haugen and Lakonishok (1988) portfolio-rebalancing approach and to test the model's predictions by using pension fund and mutual fund data from the flow-of-funds/CANSIM database for the period 1973:Q1 to 1992:Q4. The next section articulates a model of professional manager portfolio selection and leisure consumption. It is shown that in optimizing the tradeoff between achieving portfolio performance and consuming leisure, the manager will choose portfolios which involve larger positions in the stock market early in the year compared to later in the year. The data and methodology employed to test the model are discussed subsequently, and are followed by the empirical evidence. Concluding comments are found in the last section.

The Model

Consider a portfolio manager with an additively separable utility function, $[U_1(V) + U_2(L)]$, defined on V, the end-of-year or terminal market value of the portfolio under his management and L, the amount of leisure the manager consumes during the year. The assumed additive separability of the utility function is consistent with the existing agency theory literature (Tirole, 1988, pp. 51–55), which likewise assumes that the agent's utility is additively separable in two arguments, financial payoff and effort. Although the utility function argument usually assumed in the finance literature is the decision-maker's wealth rather than the wealth under his management, the latter is specified here as an argument of his utility function due to the assumed positive relationship between the portfolio manager's compensation and the market value of the portfolio he manages. Thus, $U_1()$ is an induced utility function on V. It is assumed that the manager exhibits nonsatiation and decreasing marginal utility in both arguments. Thus, U_1' and U_2' are both greater than zero and U_1'' and U_2'' are both less than zero, where single primes denote first derivatives and double primes denoted second derivatives.

At this juncture, it is important to emphasize that the portfolio manager's incentive pay is assumed to be based on the year-end market value of the portfolio under his control. Thus, his remuneration is modeled as an unspecified positive function of his portfolio's year-end value. Clearly, this is not the only way to model incentive payment schemes in the institutional investment management industry. Other schemes, discussed in Modigliani and Pogue (1975) and Grinblatt and Titman (1986), base incentive pay on performance gauged with reference to a stock market index which may or may not be beta-adjusted. Still other bonus schemes discussed by the same authors require that penalties for substandard performance be symmetrical with rewards for superior performance, whereas other schemes involve an asymmetric structure entailing bonus payments when fund performance beats the standards but no, or very small, penalties when fund performance is substandard.[2] Unfortunately, there appears to be no definitive empirical study which unequivocally establishes the incentive payment scheme which predominates in the investment management industry. In the absence of such a definitive study, the theoretical development in this section should be viewed as a first attempt at modeling the January effect-inducing portfolio-rebalancing behavior described by Haugen and Lakonishok (1988). Clearly, future research should address whether the type of behavior depicted in this section persists in the presence of the numerous variations on bonus incentive schemes observed in the investment management industry.

The manager has T amount of total time available during the year to allocate between leisure, L, and work, T–L. It is assumed that the manager can increase the terminal value of the portfolio by working harder, i.e., by reducing his consumption of leisure. A unit of work is assumed to increase the terminal value of the portfolio by D. Interpret V as the sum of two components. One component, $\overline{V}$, does not depend on the amount of effort exerted but depends exclusively on the mix between, on the one hand, the riskless asset and, on the other hand, the risky assets in the manager's chosen portfolio. It is assumed that the manager possesses no special ability vis-à-vis this portfolio mix decision. The second component, D(T–L), derives exclusively from the amount of effort exerted by the manager and his ability in security analysis, i.e., in his choice of specific undervalued securities within both the riskless and the risky asset portions of his portfolio. Assume that there are only two assets, a riskless asset yielding a rate of return, R_F, with certainty and a risky asset yielding an uncertain rate of return of R. A simple binomial situation is assumed here. Thus, R can take on only two values, R_A with probability $P_A > 0$, associated with bear market conditions, and R_B with probability $P_B > 0$, associated with bull market conditions. It is appropriate to assume that $R_A < R_F < R_B$ for otherwise the risky asset would dominate the riskless asset or vice-versa. In the later case, there would be no portfolio allocation problem to solve. Define X as the fraction of the portfolio allocated by the manager to the risky asset. It is assumed that short-selling the risky asset is proscribed. Thus $X \geq 0$. To further simplify the presentation, assume that all variables are scaled so that the manager has $1 to invest at the start of the year. Thus, $\overline{V}(X;R) = 1 + (1-X)R_F + XR$. Here, the effort-free portion of the portfolio's terminal value, $\overline{V}(X;R)$, is expressed as a function of X with parameter R. The manager can augment the rate of return achieved in the absence of effort, $\overline{V}(X;R)$, by applying both his skill and effort to the choice of riskless and risky securities. This would increase the portfolio rate of return achieved by the quantity D(T–L), where D calibrates the manager's skill in security analysis and (T–L) represents the amount of effort in security analysis expended by the manager. Given these definitions, the portfolio manager's utility function is expressible as $[U_1(\overline{V}(X;R) + D(T-L)) + U_2(L)]$.

Next, consider two different decision scenarios. The first, referred to here as the early-in-the-year scenario, characterizes the portfolio manager's situation during the first quarter of the calendar year. In this scenario, the manager can adopt a wait and see strategy of first deciding on the portfolio allocation (i.e., setting X), then observing the state of the market (i.e., the value of R) and subsequently deciding on his consumption of leisure (i.e., setting L). Denote X_e^*, L_A^*, and L_B^* as the optimal values of X and L in this setting. Since L is set after observing R, different values of L are set depending upon whether a bear market (L_A^*) or a bull market (L_B^*) prevails. The second decision scenario, referred to here as the late-in-the-year scenario, characterizes the portfolio manager's situation during the last quarter of the calendar year. In this setting, the manager has to set X and L simultaneously. Only after these decisions are made is the state of the market, whether bear of bull, revealed. Denote the optimal values of X and L in this setting as X_l^* and L^*.

Clearly, as the first decision scenario dominates the second, no manager would rationally choose the latter in preference to the former. Thus, the first decision scenario would describe the portfolio manager's problem early in the year. However, later in the year as the manager approaches the end of his evaluation period, the first decision scenario ceases to be a viable alternative and the manger is forced to adopt the second decision scenario.

The following two results can be easily shown to hold.[3]

Result 1: $L_A^* < L^* < L_B^*$.
Result 2: $X_e^* > X_l^*$.

Result 1 states that early in the year, the manager exploits his ability to adjust ex-post, i.e., after observing the behavior of the market, his consumption of leisure. In a bear market, the manager reduces his consumption of leisure. He works harder to make up for the reduction in the value of the portfolio induced by the bear market. In a bull market, the manager increases his consumption of leisure. He reduces his work effort in response to the increase in the value of the portfolio he manages caused by the bull market. In the absence of the ability to make these adjustments to leisure consumption to compensate for changes in the value of the portfolio caused by the market, the manager's consumption of leisure is intermediate between the levels chosen ex-post in bear and bull markets.

What is the implication of the ability to adjust leisure consumption ex-post during the first quarter of the year and the absence of the ability to make these adjustments late in the year? The answer is provided by Result 2. That result states that early in the year the manager allocates a greater portion of the portfolio to the risky asset compared to his portfolio allocation late in the year. The intuitive rationale for this derives from the manager's ability to make ex-post adjustments to his consumption of leisure. Given this ability, the manager can tolerate more risk in the portfolio because, should either a bear or bull market eventuate, remedial action in the form of ex-post adjustment of leisure can be taken. In the absence of this ability, no ex-post remedial action can be taken and as a result the portfolio proportion allocated to the risky asset is less.

It should be pointed out that the model of portfolio selection developed in this paper is not peculiar to professional portfolio managers but generic, being equally applicable to individual investors who manage their portfolios on personal account. What distinguishes the former from the latter is the time horizon involved. While the professional manager works within a one year time horizon, given the frequency with which his performance is monitored and assessed (Shleifer and Summers, 1990), the individual investor works within a lifetime horizon. Thus, when applied to the individual investor, our model implies that early in his life, the investor would choose to invest a greater portion of his portfolio in risky assets, whereas later in his life, as his retirement date approaches, he would tend to reduce the portion of his portfolio allocated to risky assets. The latter is consistent with the well-known personal financial planning dictum[4] and the empirical evidence cited in Bodie, Kane and Marcus (1989, p. 838), regarding the riskiness of portfolios chosen by individuals at different stages of their life cycles. In essence, what our model predicts is that whatever is observed over an individual investor's lifetime is likewise observed over the professional portfolio manager's one-year performance evaluation interval.

The preceding discussion leads naturally to the following hypothesis:

H_0: *The net change in the amount of money invested in the stock market (cash and equivalents) by professional fund managers should, on average, be higher (lower) in the 1st quarter than in the rest of the year.*

Data and Methodology

The test period[5] of this study is 1973:Q1 to 1992:Q4. The stock returns data employed are obtained from the TSE/Western data base of the University of Western Ontario. To capture the seasonality of stock returns and its possible relation to firm size, we make use of four different stock indexes: the Toronto Stock Exchange 300 (TSE-300)[6] price and total return indexes,[7] as well as the equally and value weighted indexes of the common stock universe of the TSE/Western data base.

To examine the buying and selling behavior of institutional investors (i.e., Mutual and Pension Funds) throughout the year, we make use of the Flow of Funds (F/F) matrixes from the CANSIM data base.[8] We use net changes in the cash and equivalents and equity holding of F/F Sector VII.3 to capture pension fund investing behavior[9] and net changes in the cash and equivalents and equity holdings of F/F Sector VIII.2 to capture the investing behavior of mutual funds.[10] Institutional data obtained from the F/F matrixes have an advantage over other sources of pension and mutual fund investing behavior. For example, the data that SEI Funds Evaluation Services and the Investment Funds Institute provide are contaminated with valuation changes and, as a result, the researcher has to, in some way, attempt to adjust the data to remove changes in relative valuations across asset classes. Studies that do not perform such an adjustment are subject to the usual simultaneous equation bias problem encountered in the mutual fund timing literature. This adjustment, however, is difficult to perform if not done at the source. On the contrary, the F/F data are recorded on a transactions basis at the source and reflect no such valuation changes. This makes the F/F data better to use to test the hypothesis investigated in this paper.

Finally, we will deflate the F/F data by using the GDP deflator, obtained from the CANSIM data base (CANSIM Series # D20556), to convert the F/F series into real magnitudes and achieve comparability over time (1986=100). Moreover, comparability over time will be enhanced by employing a dummy variable to control for the change in monetary policy in the 1980's vis-à-vis the 1970's. At the end of 1979, the U.S. Fed announced that, instead of trying to control interest rates, it was going to attempt to control the rate of growth in the money supply. As a result of these changes, interest rates gyrated more violently in the 1980's than before and the inflation afflicted 1970's gave rise to the disinflationary 1980's. Stock markets in Canada were adversely impacted from these changes, given the resource based Canadian economy.

Consequently, one can monitor the investing behavior of pension and mutual funds by looking at the net changes of dollar amounts committed into equities and cash and equivalents throughout the year. A difficulty with the F/F data is that they are reported on a quarterly basis. This may not, however, present a problem as long as we can still infer important aspects of trading behavior by observing the relative quarter by quarter performance of the stock indexes vis-à-vis the trading behavior of institutional investors.[11] For this comparison, the return of the aforementioned indexes, which were made available to us on a monthly basis, are converted into quarterly returns by compounding the monthly returns over each quarter.

Empirical Evidence

Documentation of Seasonality in Stock Returns and Institutional Trading Patterns

Table 1 furnishes summary statistics of pension and mutual fund data (i.e., equity and cash and equivalents) for 1973:Q1 to 1992:Q4, not only for the total

Table 1. Summary Statistics and Characteristics of Mutual and Pension Fund Flow of Funds Data and Major Stock Indexes: 1973:Q1 to 1992:Q4

	Total Sample		*Quarters with (+ve) Returns*		*Quarters with (–ve) Returns*	
	1st Quarter	*Rest of Year*	*1st Quarter*	*Rest of Year*	*1st Quarter*	*Rest of Year*
Panel A: Pension Funds (1986 $ Billion)						
Cash and Equivalents[a]	0.228	0.249	0.174	0.259	0.532	0.229
	[0.55]	[0.60]	[0.58]	[0.54]	[0.10]	[0.70]
	(1.85)***	(3.21)*	(1.23)	(2.95)*	(8.92)*	(1.50)
Equity[b]	0.555	0.581	0.654	0.544	0.537	0.651
	[0.42]	[0.56]	[0.45]	[0.58]	[0.20]	[0.54]
	(5.89)*	(7.97)*	(4.90)*	(5.87)*	(5.62)**	(5.46)*
Panel B: Mutual Funds (1986 $ Billion)						
Cash and Equivalents[a]	0.393	0.083	0.233	0.084	0.421	0.083
	[0.54]	[0.88]	[0.54]	[0.29]	[0.24]	[1.46]
	(3.48)*	(0.73)	(3.22)*	(1.80)***	(1.67)***	(0.26)
Equity[b]	0.140	0.098	0.173	0.077	–0.045	0.137
	[0.32]	[0.25]	[0.33]	[0.23]	[0.19]	[0.29]
	(1.91)***	(3.00)*	(2.10)**	(2.12)**	(–0.39)	(2.10)**
Panel C: Stock Index Returns						
TSE-300 Return	0.036	0.010	0.064	0.049	–0.117	–0.071
	[0.09]	[0.08]	[0.06]	[0.05]	[0.07]	[0.08]
	(1.81)***	(0.91)	(4.27)*	(5.68)*	(–2.83)**	(–4.09)*
TSE-300 Total Return	0.046	0.020	0.073	0.060	–0.108	–0.062
	[0.09]	[0.08]	[0.06]	[0.05]	[0.07]	[0.08]
	(2.29)**	(1.83)***	(4.92)*	(6.84)*	(–2.67)**	(–3.56)*
VW[c]-Index Return	0.044	0.019	0.059	0.055	–0.043	–0.055
	[0.08]	[0.08]	[0.07]	[0.06]	[0.03]	[0.08]
	(2.56)**	(1.71)***	(3.36)*	(5.74)*	(–2.41)***	(–2.99)*
EW[d]-Index Return	0.094	0.023	0.120	0.076	–0.067	–0.085
	[0.11]	[0.10]	[0.08]	[0.06]	[0.09]	[0.08]
	(3.86)*	(1.74)***	(6.29)*	(7.78)*	(–1.52)	(–4.59)*

Notes: a. Net change in real dollars invested in cash and equivalents.
b. Net change in real dollars invested in equity.
c. VW stands for the value weighted index of the TSE/Western data base.
d. EW stands for the equally weighted index of the TSE/Western data base.
[ ] denotes standard deviation
( ) denotes t-statistic
* Statistically significant at the 1% level.
** Statistically significant at the 5% level.
*** Statistically significant at the 10% level.

sample, but also for quarters when the market (i.e., the Equally Weighted TSE-300 total return index) experienced "down days" and quarters when the market went up.

Evidence from Panels A and B provide support for the hypothesis that institutional investing affects 1st quarter returns. When market returns are negative there is a lower net change in the amount of real dollars invested in equities and a larger net change in the amount of real dollars invested in cash and equivalents in the 1st quarter than the rest of the year, whereas when market returns are positive the opposite is true. Moreover, both pension funds and mutual funds invest, statistically, a larger amount of real dollars in equities in the in the 1st quarter in an "up" market than in a "down" market. On the other hand, pension funds and mutual funds invest a larger net amount of real dollars in cash and equivalents in the 1st quarter in a "down" market than in an "up" market.

Regarding stock returns seasonality, there is strong evidence that the "1st quarter" effect is, to a large extent, a small firm effect.[12] The equally weighted TSE/Western index (EW) returns are much stronger in the 1st quarter than the rest of the year vis-à-vis corresponding returns of the other reported indexes. This, however, is primarily related to the performance of the EW index in a "down" market. In an "up" market, both the TSE-300 price and total return indexes experience as strong a 1st quarter return vis-à-vis the rest of the year as the EW index. Where index performance differs is in a "down" market. While the EW index experiences a decline that is not statistically significant from zero, the fall of the two aforementioned indexes in the 1st quarter in a "down" market exceeds that of the rest of the year, weakening the overall seasonal performance of these indexes.

In conclusion, the findings in this section provide support to the argument that in an "up" market, in particular, institutional investors are responsible for all indexes' strong performance, in a way consistent with the hypothesis advanced in this paper. Institutional investors appear to switch between equity and cash and equivalents throughout the year and, as a result, affect the market's performance.

Regression Model Tests of Concurrent Relationships

In this section, we provide further tests of our hypothesis, by investigating and quantifying the relationship that appears to be evident in the summary statistics reported in Table 1. In particular, we test the concurrent effect of mutual and pension fund investing on the various indexes returns by specifying the following model:

$$\text{RETURN}_t = f(\text{PENF}_t, \text{MUTF}_t, \text{DUM8092}) \quad (1)$$

where

RETURN_t = quarterly return of the indexes used,
PENF_t = net change in quarterly real investment in equities by pension funds
MUTF_t = net change in quarterly real investment in equities by mutual funds.
DUM8092 = dummy variable that takes on the value of unity if 1980/92 and zero otherwise.

If pension funds and mutual funds have an impact on stock returns, we would expect a positive relationship between PENF and MUTF and stock returns. As the liabilities of pension and mutual funds are, in general, different, their investment strategies differ. Hence, the correlation between PENF and MUTF is quite small. DUM8092 controls for the change in monetary policy in the 1980's and for the adverse effect this change had on the resource based stock markets in Canada. As a result, we expect DUM8092 to be negatively related with stock returns.

Equation 1 captures the average importance of the independent variables ($PENF_t$, $MUTF_t$) in explaining stock return variability throughout the year. If, however, we wish to isolate the importance of a given variable for a specific quarter of the year, then Equation 1 provides little information. For example, a variable could be, on average, insignificant and yet explain a great deal of a given quarter's stock variability. To differentiate the first quarter from the rest of the year we could run a set of two separate quarterly regressions, one of the first quarter returns against the first quarter values of our independent variables and another for the rest of the year stock returns against the rest of the year values of the independent variables.

However, a more efficient way to perform the same test, as suggested by Judge, Griffiths, Hill, Lutkephol and Lee (1985), is to combine the two quarterly regressions into one as follows:[13]

$$RETURN_t = a_0 + a_1D_1 + a_2D_1 \times PENF_t + a_3D_1 \times MUTF_t + a_4D_5 \times PENF_t + a_5D_5 \times MUTF_t + a_6 \times DUM8092 + Z_t \quad (2)$$

where

D_1 = seasonal dummy variable that takes on the value of unity if 1st quarter and 0 otherwise,

D_5 = qualitative variable taking on the value of unity if 2nd, 3rd or 4th quarter and 0 otherwise;

Z_t = normally distributed error term with zero mean and finite variance.

We expect $a_2 > a_4 \geq 0$ and $a_3 > a_5 \geq 0$. Put simply, we expect most of the positive impact of institutional investing on stock prices to occur in the 1st quarter. Finally, the coefficient of DUM8092 is expected to be negative.

The time series regression results for the extreme case $RETURN_t$ regressions over the 15 year period from 1973:Q1 to 1992:Q4 are reported in Table 2. The Durbin-Watson statistic of the original regressions were significantly lower than 2 indicating positive autocorrelation in the disturbance. Therefore, we re-estimated the model via the maximum likelihood (ML) estimation method (Judge et al., 1985, pp. 275–332). As the above mentioned problem was evident in all regressions estimated, the parameter estimates reported in Table 2 are those obtained from the maximum likelihood estimation method. In particular, Table 2 reports the findings of Relationship 2 where the dependent variables are first, the return of the equally weighted and, then, the return on the value weighted TSE/Western indexes. All coefficients have the expected signs. Moreover, as hypothesized, $a_2 > a_4$ and $a_3 > a_5$, although only a_3 is statistically significant from zero at traditional levels of signifi-

Table 2. Regression Results with the Quarterly Value Weighted (VW) and Equally Weighted (EW) Index Returns[a] as the Dependent Variables for 1978:Q1 to 1992:Q2: The First Quarter vs. The Rest of the Year

	Dependent Variables									
Independent Variables	*Intercept*	D_1	$D_1^b \times PENF^c$	$D_1 \times MUTF^d$	$D_5^e \times PENF$	$D_5 \times MUTF$	$DUM8092^f$	R^2	$D\text{-}W^g$	*No. of Observations*
VW-Index Returns	0.0279 (1.61)	0.0175 (0.51)	0.0014 (0.64)	0.0115 (1.71)***	0.0006 (0.11)	0.0077 (1.44)	−0.0512 (−1.92)***	.09	1.99	80
EW-Index Returns	0.0301 (1.23)	−0.0789 (−2.03)**	0.0025 (0.39)	0.0176 (2.14)**	0.0021 (0.74)	0.0084 (1.24)	−0.0593 (−1.56)	.18	1.98	80

Notes: a. Tabular entries refer to the regression coefficients, t-statistics are in parentheses. Original Durbin-Watson Statistics from OLS regressions were significantly lower than 2, indicating positive autocorrelation in the disturbance terms. Hence, regressions were re-estimated via the maximum likelihood estimation (ML) method. Reported regression coefficients are the ML estimated coefficients.

b. D_1 is a seasonal dummy variable which takes on the value of unity if 1st quarter, 0 otherwise.

c. PENF is the net change in real dollars (1986 $ Billion) invested in equities by pension funds.

d. MUTF is the net change in real dollars (1986 $ Billion) invested in equities by mutual funds.

e. D_5 is a qualitative variable which takes on the value of unity if 2nd, 3rd or 4th quarter, 0 otherwise.

f. DUM8092 is a dummy variable that takes on the value of unity if 1980/92, 0 otherwise.

g. Durbin-Watson.

** Statistically significant at the 5% level

*** Statistically significant at the 10% level cance.[14] Hence, Table 2 provides further support of the hypothesis advanced in this paper, substantiating the findings of Table 1.

Summary and Conclusions

This study develops a theory of calendar year portfolio rebalancing which is based on a simple model of portfolio choice *cum* leisure consumption on the part of professional portfolio managers. It provides a more complete articulation of the institutional investor portfolio-rebalancing conjecture made by Haugen and Lakonishok (1988). Empirical evidence supportive of the theory is presented. Using data from the flow-of-funds statistics for the period 1973:Q1 to 1992:Q4, we document that pension fund and mutual fund investing behavior exhibits a quarterly seasonal pattern. The intra-year pattern of this investing behavior is related to the magnitude of the seasonal behavior of quarterly stock returns in Canada. Hence, the investing behavior of institutional managers in the 1st quarter is consistent with the model developed in this paper.

The findings in this paper lead us to conclude that institutional investors are responsible for the anomalous 1st quarter (and by deduction, the January) increase in stock market returns. Moreover, the pattern of institutional investing throughout the year seems, on average, to be related to the nature of the compensation system in the securities industry, specifically the calendar year evaluation period and planning horizon of professional portfolio managers. Thus, this paper's corroborated thesis is that the January effect is an artifact of conflict-of-interest considerations. To wit, attempts by portfolio managers to maximize their own utility rather than that of their claimholders induce the January effect.

Acknowledgment: The financial assistance provided by a Society of Management Accountants of Canada research grant is gratefully acknowledged. An earlier version of the paper was presented at the 1993 Eastern Finance Association Meetings in Richmond, Virginia. The helpful comments of conference participants are gratefully acknowledged.

Notes

1. This behavior should be all the more important in Canada where, only as recently as July 1, 1992, pension and other fund managers were allowed by regulators to buy futures and options.
2. An anonymous referee has likewise pointed out that another popular incentive scheme involves a bonus which is a truncated function of the manager's annual performance, i.e., the bonus rises with performance until a ceiling is reached whereupon the bonus becomes invariant to performance.
3. The proofs of results 1 and 2 are available from the authors upon request.
4. For example, Haggett (1992, p. 16) argues that "another consideration is your age ... young investors are better candidates for an equity fund than those who may have to live off (their retirement funds) in the near term."
5. The flow-of-funds data are available since 1962:Q1. Nevertheless, we chose 1973:Q1 as the first year of our sample period for the following reason. Statistics Canada warn users that "the data prior to 1972 suffer from a number of ... shortcomings. These include weak survey coverage, survey questionnaires which were not sufficiently detailed to meet the requirements of the financial flow accounts, and a lack of adequately documented records" (Financial Flow Accounts, Volume II, Statistics Canada, 1976: xvii).
6. The TSE-300 index (a value weighted index) is widely used as a benchmark in evaluating the investment performance of mutual funds and pension plan portfolios and in obtaining estimates of the cost of capital for regulated and unregulated firms in Canada (see Tinic and Barone-Adesi, 1988).

7. The total return index includes actual dividends paid during the quarter, as well as changes in the values of the stocks.
8. CANSIM stands for Canadian Socioeconomic Information Management System and is the official data base of Statistics Canada.
9. The quarterly financial flows for trusteed pension plans (Sector VII.3) are based on data provided by the Pensions Section, Labour Division, Statistics Canada. The raw financial data are at book value, provided by respondents to the quarterly surveys conducted by the Pensions Section. The quarterly survey is a sample which includes the largest plans and covers about 98% of total assets. The sample results are adjusted to represent the universe. A full description of survey coverage and methods can be found in the annual publication *Trusteed Pension Plans Financial Statistics*, catalogue 74-201 and the *Quarterly Estimates of Trusteed Pension Funds*, catalogue 74-001.
10. Sector VII.2 includes corporations and trusts which sell shares or units to the public through brokers or their own sales force and invest the proceeds in a variety of financial instruments (common and preferred shares, bonds, mortgages, money market instruments). These "open-end" funds are distinguished from "closed-end" funds. Closed-end funds are included in Sector VIII.6. Additional detail is available in Financial Institutions, cat. 61- 006, where these funds are referred to as investment funds. The segregated funds of life insurance companies and trusteed pension plans (Sectors VII.2 and VII.3) are similar in function to mutual funds but they are not included here. The funds established by Trust Companies solely for investing the proceeds or RRSP contributions and similar tax shelter schemes are also excluded from this section. The source of data for this sector is a quarterly survey performed by the Financial Institutions Section, Industrial Organization and Finance Division, Statistics Canada. Survey coverage of the relevant universe is very high, nearly one hundred percent in terms of total assets.
11. For example, the Pearson correlation coefficient between the January and 1st quarter returns of the TSE-300 total returns index over our test period is 0.67 which is statistically significant at the 1% level of significance.
12. This corroborates the earlier statistical evidence on Canadian stock prices provided by Tinic, Barone-Adesi and West (1987), although our explanation for this behavior differs from that offered by Tinic et al. (1987).
13. This single equation specification provides a convenient framework for consistently and efficiently estimating and statistically evaluating the significance of the seasonal variation in the intercept and the variable treatment parameters (Judge, Griffiths, Hill, Lutkephol and Lee, 1985, pp. 800–801). The single equation specification is equivalent to using Zellner's seemingly unrelated regression (SUR) specification to the set of two separate quarterly equations.
14. The insignificance of the $PENF_t$ coefficient for the 1st quarter may be related to the reduced role of pension funds as marginal investors in the stock market in recent years. As D. Coxe of the *Globe and Mail* reports "this time around, the pension funds are not market stars, but merely supporting players. Pension assets stopped growing a few years ago as a result of corporate restructurings and the decline in usage of the actuaries' pride, the defined benefits plan" (Coxe, 1993, p. C2).

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