The January Effect, Arbitrage Opportunities, and Derivative Securities: Has Anything Changed?

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INTRODUCTION

Rozeff and Kinney (1976) are of the first to document that common stocks earn above normal rates of return in January compared with other months. Later studies by Banz (1981) and Reinganum (1981) report a significant negative relationship between rates of return and firm size. This phenomenon, which is most pronounced over the month of January, has become known as the January or turn-of-the-year effect. Recently, Keim (1989) argues that the calculation of portfolio returns using closing transactions contains a return bias in favor of small firms and that this bias partially explains the size-related January effect. He documents a dramatic shift of closing transactions occurring at bid prices to ask prices around the turns of the year between 1983–88 for OTC National Market System Stocks.

Based on historical data, it appears that the January effect produces arbitrage opportunities that can be profitably exploited. For example, over the seven turns of the year between 1975–82, the difference between rates of return on the Value Line (VL) and S&P (SP) 500 indexes average 2.9 percent as measured from the penultimate trading day of December to the end of January.[1] Brauer and Chang (1990) ponder "Why the obvious arbitrage opportunity created by the January rate of return seasonal does not lead to elimination of the seasonal." Ross (1983) suggests that the market for small firms is not liquid and transaction costs are too large to allow for more complete arbitrage.

This article argues that the introduction of derivative securities (index futures in 1982 and index options in 1983) allows for more complete arbitrage of the size-related January effect by increasing liquidity, reducing transaction costs, and facili-

[1]The Value Line Composite (VL) and S&P (SP) 500 indexes represent returns to small and large firms in this study, respectively.

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tating large dollar transactions (especially short sales).[2] Additionally, Haugen and Lakonishok (1988) propose various strategies using index futures and no-load mutual funds to exploit the January effect that if followed by enough investors, could reduce arbitrage opportunities created by this phenomenon.

Theory suggests that financial markets anticipate the January effect before the fact. Empirically, the adjustment may be obscured by market imperfections. Maloney and Rogalski (1989) provide support for this argument based on their observation that call option prices reflect, *ex ante,* the phenomenon (see Rogalski and Tinic (1986)) that the variance of security returns is higher than normal during January. They conclude "the January phenomena are widely anticipated by financial markets before the fact."

This article hypothesizes that there exists a reduction in arbitrage opportunities created by the size related January effect associated with the introduction of index futures and index options in early 1982 and 1983, respectively. The analysis documents a significant reduction in arbitrage opportunities created by the size related January effect since the introduction of index futures and index options. Although no attempt is made to show a direct cause and effect relationship, it is argued that one is implied by the results presented in this article.

DATA AND METHOD OF ANALYSIS

The data consists of daily returns for the forty trading days surrounding the fifteen turns of the year between 1975–90 on the VL and SP 500 indexes. Daily returns for the VL index are not available before 1975. The value-weighted SP 500 index represents returns on large firms in this study. The equally-weighted VL index, based on the roughly 1700 stocks reviewed in the *Value Line Investment Survey,* represents returns on small firms in this study. One motivation for comparing returns on the VL and SP 500 indexes is that futures trading in both indexes opened in the same year, 1982. Although returns on the VL and SP 500 indexes are not calculated in the same way, selecting a different index to represent returns to small firms (for example, Wilshire 5000 equity index) does not change the findings.[3]

The average daily difference in returns around the turn of the year between small and large firms is calculated over two subperiods: pre-index futures period, 1975–82, and post-index futures period, 1982–90. For illustrative purposes, the cumulative mean return differential, plotted in Figure 1, is set equal to zero on day 1. Day 0 represents the last trading day of December.

SIZE RELATED JANUARY EFFECT

Pre-Index Futures Period: 1975–82

Table I and Figure 1 illustrates the traditional size-related January effect around the turns of the year 1975–82 (pre-index futures period). As recorded in the top

[2]Gay and Kim (1987) report that other return regularities such as weekend and January effects have disappeared in futures price series since 1981. "Regardless of the cause, futures markets appear to have become more efficient since 1981." Similar observations are noted by Chang (1988) and Chang and Kim (1988).

[3]VL index returns are based on an equally-weighted geometric average of component security returns. In contrast, SP 500 index returns are based on a value-weighted arithmetric average of component security returns.

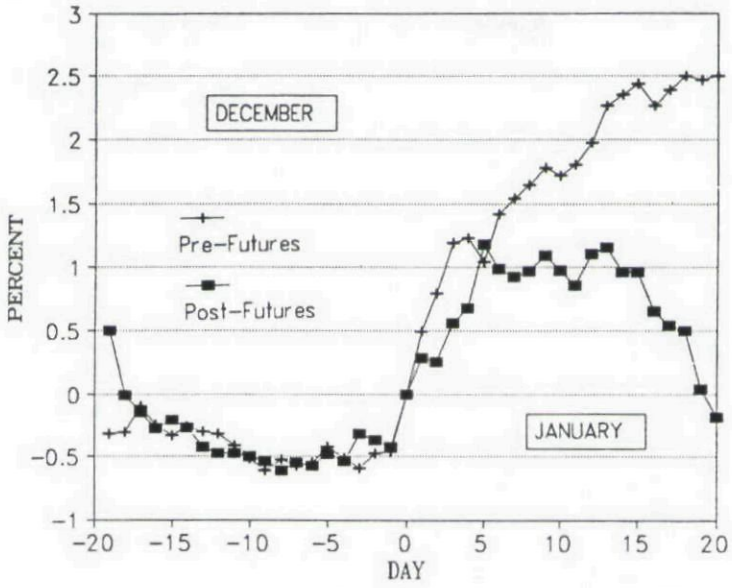

Figure 1
Cumulative Mean Return Differential Around the Turn of the Year: 1975 to 1990, Value Line Composite Minus S&P 500 Indexes
Pre-Stock Index Futures Period: Turns of the Year 1975–1982. Post-Stock Index Futures Period: Turns of the Year 1982–1990. The cumulative mean return for day 0 was set equal to zero for illustrative purposes. Day 0 corresponds to the last trading day of December.

half of Table I, the return differential between small and large firms on the last trading day of December averages .46 percent while the differential on the first trading day of January averages .50 percent. For the month of January, the cumulative mean return differential equals 2.4 percent. These observations are all statistically significant at the .01 level.

Post-Index Futures Period: 1982–90

In contrast, the data presented in Table I and Figure 1 do not support the existence of the traditional size related January effect around the turns of the year between 1982–90 (post-index futures period). The bottom half of Table I shows that only the last trading day of the year yields differences in returns between small and large firms that are statistically significant. On an end of December to end of January basis, large firms outperform small firms, although the difference is small.

The cumulative mean return differential, plotted in Figure 1, reaches a maximum of 1.2 percent on day 5 declining to −.18 percent by the end of January.[4] In contrast, this differential reaches a maximum of 2.5 percent on day 18 for the pre-index futures period declining slightly to 2.4 percent by the end of January. A 1.2 percent return differential over the first five trading days of January is not unusual given

[4]If the Wilshire 5000 equity index represents returns to small firms, then the mean return differential measured from the end of December to the end of January for the turns of the year 1982–90 equals .06 percent.

Table I

MEAN DAILY RETURNS DECEMBER AND JANUARY, VALUE LINE COMPOSITE AND S&P 500 INDEXES: 1975 TO 1990

	December			January		
	Last 20 Days	Last 10 Days	Last Day	First Day	First 10 Days	First 20 Days
	A. Pre-Stock Index Futures (1975 to 1982)					
Value Line						
Mean	0.068%	0.178%	0.693%	0.245%	0.157%	0.150%
S&P 500						
Mean	0.053	0.127	0.231	−0.254	−0.014	0.032
VL Minus S&P						
Mean	0.015	0.051	0.462	0.500	0.172	0.120
t-statistic	0.53	1.28	4.01a	7.35a	4.15a	3.97a
	B. Post-Stock Index Futures (1982 to 1990)					
Value Line						
Mean	0.062	0.133	0.490	0.559	0.293	0.129
S&P 500						
Mean	0.076	0.083	0.063	0.272	0.196	0.138
VL Minus S&P						
Mean	−0.014	0.050	0.427	0.287	0.097	−0.009
t-statistic	−0.39	1.02	3.66a	1.71	1.69	−0.22

[a]Significant at an alpha level of .01 percent for a two-tailed test.

Keim's estimate that the difference in extreme portfolio biases on the first trading day of January is 2.0 percent for OTC National Market System Stocks.

Figure 1 shows that the cumulative mean return differential is similar for both subperiods from day −17 to day 5. However, beyond day 5, the two graphs deviate significantly. It is evident that the introduction of index futures and index options corresponds to a significant reduction in arbitrage opportunities created by the size-related January effect.

CONCLUSIONS

This article documents a significant reduction in arbitrage opportunities created by the size related January effect since the introduction of index futures and index options in 1982 and 1983, respectively. It is argued that the introduction of derivative securities allows for a more complete arbitrage of the January anomaly.

The cumulative mean return differential between small and large firms reaches a maximum of 1.2 percent on day 5 in the post-index futures period (1982–1990). On average, small firms outperform large firms beginning on the last trading day of December continuing only through the first five trading days of January. On an end of December to end of January basis, the mean return differential is close to zero (−.18 percent). A 1.2 percent return differential around the turn of the year between small and large firms is not unusual considering Keim's hypothesis. Although it appears that arbitrage opportunities have been reduced, the results should not be interpreted as implying that the January effect has been completely priced away in the post-index futures period.

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