

Economic Cycles and the Monthly Effect in the OTC Market

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Abstract

This study examines the impact of economic cycles on the monthly effect in over-the-counter (OTC) stocks from 1973 to 1989. For the entire period, test results indicate that the pattern of the monthly effect varies with the index examined. The introduction of business cycles into this analysis provides evidence that the monthly effect is confined to periods of economic expansion. The absence of a monthly effect during economic contractions suggests that business cycles significantly can influence the monthly effect in the OTC market.

Introduction

Ariel (1987) and Linn and Lockwood (1988) find that stocks traded in the organized exchanges exhibit a monthly effect. The first halves of trading months produce returns that significantly exceed zero, according to these studies, while the second halves of trading months provide returns insignificantly different from zero. These studies further indicate that the returns in the first halves of months significantly exceed the returns in the second halves of months. Linn and Lockwood also examine the NASDAQ composite return index and provide evidence of a monthly effect in the OTC market as well.

Fama and French (1989), however, document that economic conditions produce a variation in expected returns on stocks and bonds, while Liano and Gup (1989) provide evidence that business cycles significantly influence the pattern of the day-of-the-week effect in exchange-listed stocks. Because stock returns can vary according to economic conditions, changes in economic conditions also may alter the pattern of the monthly effect in the OTC market. The objective of this study, therefore, is to investigate the effect of business cycles on the monthly effect in the OTC market. Business cycles are incorporated into an analysis of the monthly effect in OTC stocks to determine if the monthly effect exists during both economic expansions and economic contractions. The current

study is the first to examine the impact of business cycles on the monthly effect in the OTC market. Although the impact of business cycles on the monthly effect in the OTC market has not been previously examined, the implications for portfolio managers are extremely important because the continuous absence of a monthly effect during either economic cycle would indicate that portfolio adjustments for the monthly effect should be ignored in that cycle. Differences in returns between small and large firms also are examined during expansions and contractions for the existence of a size effect in either economic cycle.

Data and Methodology

Daily value-weighted (VWID) and daily equally weighted (EWID) return indices of OTC stocks, provided by the Center for Research in Security Prices (CRSP), are used in this study to examine the persistence of the monthly effect in the OTC market from 1973 through 1989.¹ Because the value-weighted index is invested more heavily in larger firms than is the equally weighted index, Roll (1983) indicates that a comparison of the value-weighted and equally weighted indices can provide a measure of the size effect. To examine the size effect in the OTC market, an additional measure, DIFF, is constructed by taking the difference between EWID and VWID.² A positive (negative) DIFF value would indicate that small (large) firms outperform large (small) firms. For purposes of comparison, the NASDAQ composite return index (NCRI) investigated by Linn and Lockwood (1988) also is included in this analysis.

To examine the monthly effect, both Ariel (1987) and Linn and Lockwood (1988) define a *trading month* as the period from the last trading day of a calendar month to the second-to-last trading day of the following calendar month. Adopting the same definition, this study equally divides the trading month into two halves, the first and second halves, with the odd middle trading day to be included in the second half. A t-test is performed to determine if index returns in the first and second halves of months differ significantly from zero. Although the magnitudes of the NCRI, VWID, and EWID provide information on average daily returns in the OTC market, evidence of a size effect during the entire sample period is produced if returns on the DIFF measure differ significantly from zero. The four return indices, NCRI, VWID, EWID, and DIFF, are analyzed subsequently for the existence of a monthly effect over the entire sample period by

¹The sample period of 1973-1989 is dictated by the availability of OTC data on CRSP tapes.

²OTC stocks generally are categorized as small capitalization stocks, but this is just a relative claim when compared with stocks on organized exchanges. Lamoureux and Sanger (1989, Table I) document a large variation in the market values of OTC stocks. Specifically, the average market value for the smallest 5 percent portfolio of OTC stocks is \$920,000, while the average market value for the largest 5 percent portfolio of OTC stocks is \$413,443,060.

comparing the returns on each index in the first halves of trading months to the returns in the second halves of months using parametric ANOVA and nonparametric Kruskal-Wallis procedures. The Kruskal-Wallis test is a nonparametric, rank-ordered test that can be applied to general populations. In contrast to the standard ANOVA procedure, the Kruskal-Wallis test is a distribution-free procedure that is insensitive to nonstationarity and heteroskedasticity.³ A monthly effect exists in OTC stocks when index returns in the first halves of trading months differ significantly from index returns in the second halves of months.

To analyze the impact of economic cycles on the monthly effect in the OTC market, the entire period from 1973 to 1989 is categorized into periods of economic expansion and periods of economic contraction. The dates of initiation, the concluding dates, and the durations of expansions and contractions are determined in accordance with the specifications used by the National Bureau of Economic Research (NBER) to identify business cycles. A summary of these dates and durations is provided in Table 1. According to the NBER, business cycles officially begin (conclude) on the first (last) day of the initial (final) month of the economic cycle. Therefore, the *trading month* used in this study leads and lags the initial and final days of a business cycle, as defined by the NBER, by one trading day.⁴ Data are provided for the entire sample period, as well as for periods of expansion and contraction.

After the categorization, each trading month is divided into two halves. A t-test is conducted to determine if the returns on NCRI, VWID, EWID, and DIFF in the first and second halves of trading months differ significantly from zero during expansionary periods. A significantly positive or negative DIFF measure would imply the existence of a size effect during expansions. The returns in the first halves of trading months then are compared to the returns in the second halves of trading months during economic expansions using ANOVA and Kruskal-Wallis tests. Significantly different returns between the first and second halves of trading months within expansionary periods would provide evidence of a monthly effect in OTC stocks during economic expansions.

Similarly, a t-test is performed to determine if the returns on the four indices in the first and second halves of trading months differ significantly from zero during economic contractions. A DIFF measure that significantly differs from zero would provide evidence of a size effect during periods of contraction. Both ANOVA and Kruskal-Wallis procedures are used subsequently to test whether returns generated in the first halves of trading months during contractions differ significantly from returns realized in the second halves of trading months in

³For a detailed discussion of the Kruskal-Wallis test, see Gibbons (1985).

⁴Supplemental tests provide evidence that results from the trading month definition of business cycles differ insignificantly from the results using the NBER definition.

these periods. Evidence of a monthly effect during periods of economic contraction is provided when returns in the first and second halves of months significantly differ.

Empirical Results

The results of tests for the existence of the monthly effect using NCRI, VWID, EWID, and DIFF are shown in Table 2. From Panel A of Table 2, NCRI, VWID, and EWID provide composite returns that significantly exceed zero for the entire month during the sample period from 1973 to 1989. After the separation of trading months into the first and second halves, the test results are consistent with the analysis of NCRI by Linn and Lockwood as all three indices generate significantly positive returns in the first halves of trading months.

No uniform pattern of returns is exhibited by the four indices in the second halves of trading months during the entire sample period, however. In the second halves of months over the entire period, the negative but insignificant returns on NCRI are consistent with the findings of Linn and Lockwood. The insignificantly positive returns on both VWID and EWID in the second halves of trading months during the entire sample period, however, deviate from the pattern exhibited by the NCRI measure.

For the entire sample period, the ANOVA and Kruskal-Wallis test results provided in Panel A suggest the existence of a monthly effect in the NCRI, VWID, and EWID measures as returns during the first halves of trading months significantly exceed the returns in the second halves of months for each of these indices. An examination of the size-effect proxy variable, DIFF, indicates that the returns on this measure significantly exceed zero for the entire month, as well as in both the first and second halves of trading months separately. In other words, independent of the half of month considered, small capitalization OTC stocks (as proxied by EWID) outperform large capitalization OTC stocks (as proxied by VWID). Therefore, a size effect is documented in OTC stocks irrespective of the half of month considered. No significant difference exists between the value of DIFF in the first and second halves of trading months, however, a result which indicates that no monthly effect is detected in the patterns of the DIFF measure over the entire sample period.

Panel B of Table 2 presents the test results from an analysis of economic expansions. With the exception of the significantly positive returns on EWID in the second halves of months during expansions, the pattern of returns on each index in each half of trading months is consistent with the pattern of the entire period (Panel A of Table 2). In particular, NCRI, VWID, EWID, and DIFF all generate significantly positive returns for the entire month, as well as in the first halves of months. Further, NCRI, VWID, and EWID all exhibit a monthly

effect during economic expansions, while the DIFF measure exhibits no monthly effect during expansions. Similar to the patterns documented in the entire sample period, the DIFF measure produces significantly positive returns during expansions, thereby providing evidence of a size effect in these periods.

The test results from an analysis of economic contractions are provided in Panel C of Table 2. When the analysis is conducted for the entire month during contractions, NCRI, VWID, EWID, and DIFF all are characterized by insignificant returns. Furthermore, all four indices produce returns that are positive, but insignificantly different from zero, in the first halves of months during contractions. These findings differ from the returns generated by all four indices in the first halves of trading months during expansionary periods. The second halves of months during contractions also provide returns that differ insignificantly from zero, but these returns are all negative. These results also deviate from the pattern documented in the second halves of trading months during economic expansions.

Further, no significant differences are documented between the returns on NCRI, VWID, EWID, and DIFF in the first and second halves of trading months during economic contractions. These results imply that, unlike the results from an analysis of expansionary periods, no monthly effect exists in the OTC market during economic contractions in any of the four indices. In addition, an examination of DIFF provides no evidence of a size effect in either half of trading months or in the entire month during economic contractions. Because returns on the VWID and EWID indices differ insignificantly from zero during contractions, the DIFF measure is expectedly insignificant as well. As a consequence, contrary to the results for expansionary periods, no size effect is detected during periods of economic contraction.⁵ The empirical findings from the OTC data are consistent with results from the organized exchanges. Analyzing the monthly effect in the NYSE and AMEX from 1963 to 1989, Liano, Kelly, and Carroll (1990) find that the monthly effect is more pronounced during economic expansions and is less apparent during contractions.

The findings of this study are consistent with the flow-of-funds explanation of the monthly effect presented by Pettengill and Jordan (1988) and the liquid-profits explanation provided by Ogden (1990). Pettengill and Jordan document higher trading volume on turn-of-the-month trading days and find a causal relationship extending from trading volume to stock returns. On the other hand, Ogden examines the relationship between liquid profits and stock returns, hypothesizing that investors possess greater liquidity in the first halves of trad-

⁵The study is repeated for months excluding January to determine if the observed monthly effect is driven by abnormal returns during the first half of January. The results from an analysis that excludes January are similar to those of the full data set and are available from the authors upon request.

ing months because of the payment patterns of common stock dividends and bond interest payments. This increased liquidity thereby generates higher demand for common stocks and a surge in stock returns during these periods, a result that is consistent with the seasonality in trading volume documented by Pettengill and Jordan. In addition, Ogden argues that the surge in stock returns during the first halves of trading months should be more evident during months in which aggregate liquid profits are large and no turn-of-the-month surge in stock returns should be observed when aggregate liquid profits are small. While Ogden utilizes the stringency of the monetary regime (represented by the Fed funds spread) to proxy the level of liquidity, the use of NBER business cycles in the current study provides a more intuitive measure of economic activity and the level of aggregate liquid profits.

Conclusions

This study examines the impact of economic cycles on the monthly effect in the OTC market from 1973 to 1989 by analyzing the daily NASDAQ composite return index (NCRI), the daily value-weighted (VWID), the daily equally weighted (EWID) return indices computed from OTC stocks, and the daily DIFF, an index to proxy the size effect in OTC stocks. An analysis of NCRI, VWID, and EWID provides evidence of a monthly effect in the entire sample period. The significantly positive returns on DIFF in both halves of trading months also suggest the presence of a size effect during the entire sample period, although insignificantly different returns between the first and second halves of trading months indicate that no monthly effect is detected in the DIFF measure. For those indices that exhibit a monthly effect, the pattern of returns in the second halves of trading months varies depending upon the index examined.

With the introduction of business cycles into the analysis, the results for periods of economic expansion are consistent with the results obtained from the entire sample period. In particular, NCRI, VWID, and EWID all produce significantly positive returns for the entire month as well as in the first halves of months during expansion, although only EWID provides significantly positive returns in the second halves of months. A comparison of first and second half returns indicates that NCRI, VWID, and EWID all exhibit a monthly effect during expansionary periods. An examination of the size-effect proxy variable, DIFF, provides evidence of a size effect in both the first and second halves of trading months during economic expansions, but no monthly effect is detected in the DIFF measure during expansions.

Periods of economic contraction exhibit a return pattern that deviates either from the pattern documented in the entire sample period or from the pattern found in expansionary periods. Unlike the returns during economic expansions,

NCRI, VWID, and EWID generate insignificantly positive returns in the first halves of trading months and insignificantly negative returns in the second halves of trading months during economic contractions. When the entire trading month is examined, the results reveal that insignificant returns are realized on NCRI, VWID, and EWID during economic contractions. Also contradicting the patterns exhibited during economic expansions are the insignificantly different returns between the first and second halves of trading months, a result that indicates that NCRI, VWID, EWID, and DIFF all fail to exhibit a monthly effect during economic contractions. In addition, the insignificant returns on DIFF imply that no size effect is detected during periods of contraction.

As a consequence, the monthly effect and the size effect that characterize the pattern of returns over the entire sample period are driven by the patterns observed during economic expansions. Because the monthly effect exists during economic expansions and disappears during economic contractions, investors should consider the impact of the monthly effect in the timing of their transactions only during periods of economic expansion. Furthermore, future research on the monthly effect should recognize this pattern by separately examining periods of economic expansion and contraction.

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Table 1
Business Cycles:
Initiation, Conclusion, and Duration

Business Cycle		Contraction ^a	Expansion ^b
Initiation	Conclusion		
November 1970	November 1973		36 ^c
December 1973	March 1975	16	
April 1975	January 1980		58
February 1980	July 1980	6	
August 1980	July 1981		12
August 1981	November 1982	16	
December 1982	December 1989		85 ^d
Total Duration (months)		38	166

^aEach contraction represents the number of months from the peak of the previous expansion to the trough of the following economic downturn

^bEach expansion represents the number of months from the trough of the previous contraction to the peak of the following expansionary period

^cThe earliest available data for this expansionary period were from January 1973, meaning that only the final 11 months of the 36 month expansion were used in this study

^dThe latest available data for this expansionary period were from December 1989, resulting in a truncated data series of 85 months

Source: *Survey of Current Business* (October 1990), p. C-45

Table 2
The Monthly Effect in the OTC Market
(1973-1989)

		Entire Month	Period First Half	Second Half	F-Value	K-W Value
Panel A: Full Sample						
NCRI	Mean (%)	0.0317	0.0768	-0.0111	12.49 #	16.92 #
	Variance	0.6667	0.6165	0.7108		
	t-statistic	2.54*	4.47**	-0.62		
VWID	Observations	4300	2092	2208	11.39 #	14.89 #
	Mean (%)	0.0415	0.0843	0.0010		
	Variance	0.6558	0.6087	0.6973		
EWID	t-statistic	3.37**	4.94**	0.06	18.30 #	21.67 #
	Observations	4304	2093	2211		
	Mean (%)	0.0616	0.1032	0.0222		
DIFF	Variance	0.3870	0.3472	0.4217	0.05	0.96
	t-statistic	6.50**	8.01**	1.61		
	Observations	4304	2093	2211		
	Mean (%)	0.0201	0.0189	0.0212		
	Variance	0.1208	0.1222	0.1196		
	t-statistic	3.79**	2.47*	2.88**		
	Observations	4304	2093	2211		
Panel B: Expansions						
NCRI	Mean (%)	0.0396	0.0896	-0.0076	14.04 #	17.28 #
	Variance	0.5909	0.5232	0.6507		
	t-statistic	3.05**	5.11**	-0.40		
VWID	Observations	3503	1703	1800	13.19 #	16.02 #
	Mean (%)	0.0491	0.0972	0.0037		
	Variance	0.5826	0.5137	0.6438		
EWID	t-statistic	3.81**	5.60**	0.19	18.56 #	19.85 #
	Observations	3507	1704	1803		
	Mean (%)	0.0714	0.1155	0.0297		
DIFF	Variance	0.3489	0.2994	0.3923	0.52	1.52
	t-statistic	7.16**	8.71**	2.01*		
	Observations	3507	1704	1803		
	Mean (%)	0.0223	0.0183	0.0260		
	Variance	0.1005	0.0968	0.1040		
	t-statistic	4.16**	2.43**	3.43**		
	Observations	3507	1704	1803		
Panel C: Contractions						
NCRI	Mean (%)	-0.0034	0.0209	-0.0266	0.45	0.85
	Variance	0.9995	1.0234	0.9780		
	t-statistic	-0.10	0.41	-0.54		
VWID	Observations	797	389	408	0.30	0.49
	Mean (%)	0.0083	0.0281	-0.0105		
	Variance	0.9774	1.0235	0.9352		
EWID	t-statistic	0.24	0.55	-0.22	1.32	2.15
	Observations	797	389	408		
	Mean (%)	0.0187	0.0496	-0.0108		
DIFF	Variance	0.5531	0.5544	0.5514	0.45	0.06
	t-statistic	0.71	1.31	-0.29		
	Observations	797	389	408		
	Mean (%)	0.0104	0.0216	-0.0003		
	Variance	0.2104	0.2340	0.1882		
	t-statistic	0.64	0.88	-0.01		
	Observations	797	389	408		

* Significantly different from zero, 5 percent confidence level

** Significantly different from zero, 1 percent confidence level

Mean in the first half differs from mean in the second half, 1 percent confidence level

