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The Weekly Pattern in Stock Index Futures: A Further Note

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IN A RECENT NOTE in this Journal, Cornell [2] examines weekly patterns in returns in the cash and futures markets for common stock. He finds a close-to-open "weekend effect" in the cash market similar to the result previously reported by Rogalski [4]. However, based on his results for the futures market, he concludes, "During the close to open period, the mean returns are virtually indistinguishable across days of the week. In short, the behavior of the future prices is consistent with the predictions of the efficient market hypothesis," (p. 586). Cornell's results contrast markedly with those reported by Dyl and Maberly [3] from a very similar study (albeit over a slightly different time period). Both studies examined Standard & Poor's 500 Stock Index Futures.

In an attempt to resolve this puzzling inconsistency, we replicated Cornell's study for the period from May 3, 1982, through July 24, 1984. We were unable to duplicate his results. In addition, we also report results for the period from May 3, 1982, through December 31, 1985, that further confirm the existence of a close-to-open "weekend effect" in the market for Standard & Poor's 500 Stock Index Futures.

I. Differences in Methodology

There were several minor differences in the methodologies employed in the Cornell [2] and Dyl and Maberly [3] studies. In addition to examining a different sample (i.e., time period), as contracts approached maturity we switched to the contract that was next closest to maturity at a different time from when Cornell did. The results reported below use Cornell's switching convention. Both studies used the same procedure for dealing with holidays, deleting both holidays and days following holidays.

A more important methodological difference between the two studies is that Cornell [2] examines "returns" (calculated as $R_t = \ln(P_t/P_{t-1}) \times 100$), whereas Dyl and Maberly [3] examine price changes ($\Delta P_t = P_t - P_{t-1}$). It is generally agreed that examining price changes in futures markets is the appropriate procedure. For example, Black [1] notes, "Since his investment is zero, it is not possible to talk about the percentage or fractional return on the investor's position in the futures market. Both his risk and his expected return must be defined in dollar terms," (p. 171).¹ Cornell indicated (in correspondence) that he used the logarithmic measure so that his futures results would be comparable to previously

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¹ See also Scholes [5].

Table I
Day-of-the-Week Close-to-Open Statistics for Stock Index Futures

	Monday	Tuesday	Wednesday	Thursday	Friday	F-Statistic ^a
A. Cornell's results, May 3, 1982-July 24, 1984						
Mean R_t	.0139	.0137	.0608	.0664	.0387	0.26
t -Statistic	(0.27)	(0.28)	(1.27)	(1.38)	(0.81)	
Observations	99	107	104	103	111	
B. Replication, May 3, 1982-July 24, 1984						
Mean R_t	-.0618	.0278	.0423	.0717	.0317	1.38
t -Statistic	(-1.56)	(0.11)	(0.52)	(0.70)	(0.19)	
Mean ΔP_t	-.0817	.0434	.0604	.1039	.0353	
t -Statistic	(-1.47)	(0.17)	(0.52)	(1.38)	(0.01)	1.36
Observations	101	106	115	113	111	
C. New results, May 3, 1982-December 31, 1985						
Mean R_t	-.0413	.0613	.0406	.0627	.0388	2.25**
t -Statistic	(-2.10)*	(1.20)	(0.32)	(1.03)	(0.20)	
Mean ΔP_t	-.0547	.1060	.0628	.0951	.0563	
t -Statistic	(-2.05)*	(1.46)	(0.26)	(1.02)	(0.05)	2.33**
Observations	171	175	187	184	182	

^aThe F -statistic is for the hypothesis that all the coefficients are equal in the regressions R_t (or ΔP_t) = $a_1D1 + a_2D2 + a_3D3 + a_4D4 + a_5D5$, where $D1$ through $D5$ are day-of-the-week dummies.

*, ** Significance at the 5% and 10% level, respectively.

reported cash results. We employ Cornell's measure in this study in addition to ours to see if the different return measures explain the difference between our findings and Cornell's.

Data on opening and closing prices for Standard & Poor's 500 Stock Index Futures were obtained from the Eastern Edition of *The Wall Street Journal*. These data were checked using various issues of the *Index and Option Market Year Book* published by the Chicago Mercantile Exchange. Discrepancies were resolved by calling the Chicago Mercantile Exchange. Prices reported in *The Wall Street Journal* on May 17, 1982, May 18, 1982, and June 22, 1982, were found to be incorrect.

II. Results of the Replication

Panel A of Table I shows the mean daily close-to-open returns originally reported by Cornell [2, Table I]. Panel B shows the results of our careful replication of Cornell's study. We find negative mean close-to-open returns on Monday using both measures of return (R_t and ΔP_t), although the t - and F -statistics indicate that the Monday returns are not statistically different from the other days of the week at a meaningful level. Nonetheless, we certainly find a very different result from Cornell's. The explanation for the difference was not immediately clear. It is unlikely that errors in several *Wall Street Journal* quotes, noted earlier, would seriously change the overall results. Similarly, although Cornell reports a different number of daily observations from what we report for each day except Friday, the effect of a few missing observations should not be significant when the overall sample consists of approximately 100 observations.²

At the Editor's suggestion, we corresponded with Cornell and exchanged data sets. Cornell's data contained several errors. Most notably, the close-to-open return for Monday, March 7, 1983, in Cornell's data was 5.4916 percent, whereas the correct value was -0.7772 percent. When this entry is corrected, Cornell's data also show a negative return over the weekend. (The other errors in Cornell's data were not on weekends and are thus not relevant to this discussion.)

III. New Results

Panel C in Table I shows mean daily "returns" and price changes for stock index futures over the period from May 3, 1982, through December 31, 1985.

² The number of daily observations was as follows:

	Total Days (5/3/82-7/24/84)	Holidays	Days Following Holidays	Net Days
Monday	116	11	4	101
Tuesday	117	0	11	106
Wednesday	116	1	0	115
Thursday	116	2	1	113
Friday	116	3†	2	111

† The Chicago Mercantile Exchange was closed on two consecutive days on Thursday and Friday, November 24-25, 1983.

With the larger sample size, we now find a statistically significant close-to-open weekend effect in the futures market that is similar to the nontrading weekend effect in the stock market reported by Rogalski [4] and Cornell [2].

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